RJOC

Stormwater Management Report

Definitive Subdivision
316 New Boston Street
Woburn, Massachusetts

Prepared for:
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Date:
April 6, 2020

COMMONWEALTH OF MASSACHUSETTS
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4-6-2020

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Table of Contents

I. Stormwater Report Narrative

1.0 Introduction 2
2.0 Site Location and Description 2
3.0 Proposed Project 3
4.0 Compliance with MassDEP Stormwater Handbook 5
5.0 Soil Data 7
6.0 Hydrologic Methodology 7
7.0 Existing Drainage Conditions 7
7.1 On-Site Resources 7
7.2 Existing Hydrology 8
7.3 Pre-Development Hydrological Conditions 8
8.0 Proposed Drainage Conditions 9
8.1 Proposed Hydrology 9
8.2 Post-development Hydrological Conditions 9
8.3 Stormwater Quality 10
9.0 Summary 13

II. Figures

Figure 1 – USGS Map
Figure 2 – FEMA Flood Insurance Rate Map
Figure 3 – NRCS Web Soil Survey Map
Figure 4 – Existing Watershed Plan
Figure 5 – Proposed Watershed Plan
Figure 6 – MassGIS Resource Area Map
Figure 7 – MassGIS Orthoimage Site Map
Figure 8 – USGS Drainage Area Quadrant

III. Appendices

Appendix A – MassDEP Checklist for Stormwater Report
Appendix B – Computations
Pre-Development Hydrological Computations
Post-Development Hydrological Computations
TSS Removal Calculations and Pipe Sizing Calculations
Appendix C – Stormwater Pollution Prevention Plan (SWPPP)
Appendix D – Operation and Maintenance Plan (O&M)

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I. STORMWATER REPORT NARRATIVE

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1.0 Introduction

R.J. O'Connell & Associates, Inc. (RJOC) has prepared this stormwater report on behalf of DM Five, Inc. for the proposed subdivision at 316 New Boston Street located in Woburn, Massachusetts (refer to Figure 1, "USGS Map"). This study uses the computer program HydroCAD, version 10.00, to model existing and proposed hydrologic site conditions based on the Natural Resources Conservation Service (NRCS) TR-20 Computer Program for Project Formulation Hydrology. The study presents a comparative analysis of pre-development hydrologic conditions to post-development hydrologic conditions and demonstrates that the proposed condition will be an improvement over the existing stormwater management condition.

2.0 Site Location and Description

The proposed project site is located on a parcel of land located at 316 New Boston Street in Woburn, Massachusetts. The site is comprised of approximately 19.364 acres, of which 16.063 acres are located in Woburn and 3.301 acres are located in Wilmington. The site is bounded by a vacant lot within Wilmington to the North, Landscape Express to the South, the MBTA Railroad to the East, and a solar facility to the West. The site is accessed from New Boston Street and currently consists of an industrial warehouse, associated parking, loading and appurtenances and an access driveway.

The lot was expanded in 1961 with a building addition and three (3) loading bays added to the existing industrial warehouse in the northern portion of the lot per record data obtained from the City of Woburn. In 2012, solar panels were installed along the roof with the addition of a transformer and additional electrical appurtenances. An existing railroad spur exists in poor condition along the eastern property line and is unused. Currently, the existing building is being utilized by New England Resins and Pigments Corporation for shipping and receiving via a primary access drive connecting to New Boston Street.

Existing conditions have been hydrologically analyzed for stormwater runoff generation. Under existing conditions there are four (4) sub-catchments, EX-1, EX-2, EX-3 and EX-4. Refer to Figure 4 for existing watershed areas and points of analysis. Sub-catchment EX-1 is comprised of the existing building, parking and loading areas, limited grass and woodlands and a wetland area located along the eastern property line that discharge to the Point of Analysis: POA-1. Sub-catchment EX-2 is comprised of the existing woodlands and isolated wetlands that lie upland of POA-1. Sub-catchment EX-3 is comprised of portions of an existing parking area to the west and lowland areas located offsite and discharge to point of analysis: POA-2. Sub-catchment EX-3 is proposed to be modified post development to discharge to POA-1, ultimately removing discharge offsite to POA-2. Sub-catchment EX-4 consists of offsite paved areas and a portion of New Boston Street which discharges via overland flow to POA-1.

Currently, stormwater runoff from sub-catchment EX-1 sheet flows over paved areas and is collected in catch basins before discharging to POA-1. Runoff generated from the roof of the existing building discharges to POA-1 via the existing catch basins located within the parking and loading areas as well. Runoff generated from the upland woodlands flows to the existing catch basins or the existing wetland along the eastern property line before ultimately discharging to POA-1 via an existing culvert that runs under the existing access drive.

Stormwater runoff from sub-catchment EX-2 flows overland through the woodlands prior to discharging at POA-1. Stormwater runoff flows through heavily vegetated areas prior to entering the existing wetlands south of POA-1.

Currently, stormwater runoff from a portion of the existing paved parking area, along with a portion of woodlands adjacent to the western property line in sub-catchment EX-3 flows directly off site at POA-2.

Sub-catchment EX-4 consists of part of a parking area on adjacent property and a portion of New Boston Street that is to be extended to the proposed subdivision cul-de-sac. Stormwater runoff flows from the east to west prior to discharging at POA-1. New Boston Street has no curbing and stormwater discharges directly to the wetland on the west side of the street.

3.0 Proposed Project

The proposed project consists of demolishing the existing building and removing all paved areas on site and constructing a 600-foot cul-de-sac with a 44-foot wide paved and curbed roadway and 6-foot wide, concrete sidewalks on each side of the road to provide access to the proposed, three lot subdivision. The proposed cul-de-sac has been designed to meet the City of Woburn subdivision standards for a Type III street. Deep sump catch basins will collect stormwater runoff generated over the proposed paved areas and will be conveyed to an oil/particle separator and a wet water quality swale with a sediment forebay to provide treatment of runoff from the cul-de-sac prior to discharging at POA-1.

The stormwater management scope in this report is for the roadway construction and the three lots after demolition of all existing buildings and paved areas. All existing buildings and pavement will be removed from the site as part of the subdivision road construction and those areas will be loamed and seeded with grass until development programs for those lots have been designed and permitted. Stormwater management systems will be designed for each lot at that time and will provide mitigation and treatment for impervious cover areas so that each lot, the overall subdivision will comply with MassDEP Stormwater Policy and Woburn Stormwater Regulations.

A hydrologic analysis was performed for the proposed conditions for the 2, 10, and 100-year, 24-hour storm events. The site has been analyzed and divided into 4 sub-catchments, PR-1, PR-2, PR-3 and PR-4. Refer to Figure 5 for proposed watershed areas. Sub-catchment PR-1 is comprised of the proposed cul-de-sac, sidewalk and landscaped areas that generate stormwater runoff to the Point of Analysis, POA-1. Sub-catchment PR-2 is comprised of the existing woods and grassed areas where the existing building and paved areas are proposed to be demolished. Sub-catchment PR-3 consists of the demolished parking area and remaining undisturbed woodlands near the western property line that discharge to POA-2. Sub-catchment PR-4 consists of the proposed New Boston Street Extension and landscaped areas that will generate stormwater flows to the point of analysis, POA-1.

Stormwater runoff generated from the proposed cul-de-sac will be directed to a wet water quality swale for treatment prior to discharge to the Point of Analysis, POA-1. Runoff generated over sub-catchments PR-2 will be reduced with demolished building and pavement areas stabilized with grass. Stormwater runoff generated over PR-2 will flow to POA-1 as under existing conditions. Stormwater runoff generated over the proposed New Boston Street extension will

flow along the proposed curb line via overland flow prior to discharge at POA-1 as under existing conditions.

Utilities including electricity, gas, communications, sanitary, water services to each proposed lot will be provided within the cul-de-sac. Street lighting and hydrants will also be provided along the cul-de-sac. Stormwater will be collected within deep sump catch basins along the curb line and conveyed to an oil/grit separator and sediment forebay before it discharges to the proposed wet water quality swale.

Throughout construction, the contractor shall maintain erosion control measures on site in good working order. Slope steeper than 3:1 shall be protected with erosion control matting. Stockpiles shall be covered and filter compost socks and silt fences shall be installed around stockpiles to prevent sediment migrating toward resource areas. Dust control shall be maintained throughout construction.

The project will result in a net decrease of approximately 147,082 square feet (3.37 acres) of impervious area compared to existing site conditions as a result of replacing demolished buildings and existing paved areas on-site with grass. A stormwater management system has been designed to capture and treat stormwater runoff from the site, which will improve runoff conditions. The proposed stormwater management system for the cul-de-sac will comply with all of the MassDEP Stormwater Management Standards as described herein. Runoff control and water quality improvement will be accomplished by implementing the following drainage improvements:

- Implement a Stormwater Pollution Prevention Plan (SWPPP) to control erosion sedimentation and other construction related impacts;
- Collect storm runoff in catch basins with deep sumps and hooded outlets;
- Install an oil/particle separator to provide additional pre-treatment and removal Total Suspended Solids (TSS).
- Construct a sediment forebay to provide additional treatment prior to discharge to the wet water quality swale;
- Construct a wet water quality swale to provide removal of Total Suspended Solids (TSS) and other pollutants from the water quality volume (first inch of runoff);
- Implement an Operation and Maintenance Plan (O&M) for the proposed stormwater management system that describes the various components of the system, identifies inspection and maintenance tasks, and provides a schedule to follow, which will ensure the proper long-term performance of the system;

The proposed stormwater management measures described above will result in no adverse impacts to adjacent properties. Runoff quantity will be reduced, and water quality enhanced, thereby improving existing conditions and providing an overall benefit to the surroundinarea.

4.0 Compliance with MassDEP Stormwater Handbook

This development program includes a stormwater management system that will collect, treat, and control stormwater runoff in conformance with MassDEP's Stormwater Management Policy. Stormwater Best Management Practices (BMPs) have been incorporated into the design to comply with all the Stormwater Management Standards as described below.

Standard 1 – No Untreated Discharges or Erosion to Wetlands: No new stormwater conveyances may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

No new stormwater conveyances discharging untreated stormwater to wetlands or waters of the Commonwealth are proposed. The proposed cul-de-sac will be curbed, and runoff will be directed to deep sump catch basins with hooded outlets prior to conveyance to an oil/particle separator, a sediment forebay and a wet water quality swale prior to discharge to the existing wetlands, POA-1.

Standard 2 – Peak Rate Attenuation: Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

As a result of a reduction of approximately 3.37 acres of impervious area, peak rates of runoff discharged from the site under post-development conditions compared to pre-development rates for all storms analyzed will be decreased. Refer to calculations and appendices below for details.

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

The project proposes to decrease impervious area by approximately 3.37 acres, resulting in an increase in groundwater recharge.

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

Runoff from proposed paved areas will be collected in deep sump hooded catch basins with hooded outlets, conveyed to an oil/particle separator then to a sediment forebay and to a wet water quality swale achieving 89% TSS removal prior to discharging to POA-1.

Standard 5 – Land Uses with Higher Potential Pollutant Loads: For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

The project does not propose a land use with higher potential pollutant loads. However, a Long-Term Pollution Prevention Plan (LTPPP) has been provided as part of the attached Operation and Maintenance Plan.

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

The site is not located within a Zone II or wellhead protection area and does not discharge to any other critical areas.

Standard 7 - Redevelopment: A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pre-treatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

This proposed project is a mixture if redevelopment and new development and meets all of the Stormwater Management Standards.

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

A Stormwater Pollution Prevention Plan (SWPPP) to control erosion, sedimentation and other pollutant sources, and prevent erosion and sediment from moving off-site during construction and land disturbance activities will be submitted prior to land disturbance.

Standard 9: A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

An Operation and Maintenance Plan (O&M) to ensure the long term, post-construction operation of the stormwater management system is included in Appendix D.

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

An illicit discharge compliance statement is included within the Operation and Maintenance Plan.

5.0 Soil Data

Soil data has been compiled using the Natural Resources Conservation Service (NRCS) Web Soil Survey tool. The soil survey identified the soil on the site as Udorthents, urban land complex which does not have a Hydrologic Soil Group (HSG) designation. Refer to Figure 3, NRCS Web Soil Survey Map.

6.0 Hydrologic Methodology

Pre- and post-development drainage analyses were performed for the 2, 10, 25 and 100-year storm events. Rainfall events have been compiled for extreme precipitation as noted below:

County	2-year	10-year	25-year	100-year
Middlesex	3.10 in.	4.50 in.	5.30 in.	6.50 in.

The NRCS method uses several parameters based on watershed characteristics and configuration to generate a curvilinear unit hydrograph and produce a runoff hydrograph for the watershed. Basic input data required to generate a hydrograph are the watershed area, storm frequency, time of concentration, 24-hour rainfall, and the watershed's runoff curve number.

NRCS Technical Release 55 (TR-55) methodology was utilized to determine weighted runoff curve number (CN) for the pre- and post-development watershed areas. Inputs for obtaining the weighted CN were determined based on ground cover type and the Hydrological Soil Group (HSG), as described in the Soil Data section above. Time of concentration (Tc) was determined based on the most hydrologically distant point (timewise) within the watershed.

Watershed boundaries were established based on topography, storm drainage layouts, and the location of major drainage discharge points, or Points of Analysis (POA). The pre-development watershed boundaries are indicated on Figure 4, "Existing Watershed Plan" and the post-development boundaries are depicted on Figure 5, "Proposed Watershed Plan".

7.0 Existing Drainage Conditions

7.1 On-Site Resources

Isolated vegetated wetlands exist to the South and West onsite and on the adjacent property. A bordering vegetated wetland exists adjacent to the eastern property line.

The site lies within a Zone X per FEMA FIRM Map Number 25017C0294E, effective date June 4, 2010.

The site is not located within a Zone II or wellhead protection area and does not discharge to any other critical areas.

There are no endangered species habitats located within or adjacent to the site.

No vernal pools, certified or potential, have been observed or recorded on site.

7.2 Existing Hydrology

The existing site has been analyzed under current extreme precipitation values for the 2-year, 10-year, 25-year and 100-year 24-hour storm events. A Point of Analysis, POA-1, has been identified as the existing wetland to the south. Refer to Figure 2 FEMA Floodplain Map.

Existing Sub-Catchment Area 1 (EX-1)
This 10.865-acre sub-catchment area consists of the existing building and paved areas associated with the existing use. Stormwater flows over woods and grass to POA-1 via overland flow. Stormwater runoff generated from the building and paved areas are captured within catch basins prior to discharge to POA-1.

Existing Sub-Catchment Area 2 (EX-2)
This 6.664-acre sub-catchment area consists of dense woods and brush at the southern portion of the site, South of EX-1. Stormwater flows over brush and grass prior to discharge to POA-1.

Existing Sub-Catchment Area 3 (EX-3)
This 0.134-acre sub-catchment area consists of a paved parking area and landscaping that discharge to POA-2. Stormwater flows over brush and woods prior to discharge to the existing wetlands to the west, or POA-2. Under proposed conditions, no runoff is proposed to discharge to POA-2.

Existing Sub-Catchment Area 4 (EX-4)
This 0.249-acre sub-catchment area consists of a paved parking area, portions of New Boston Street and landscaping that discharge to POA-1. Stormwater flows over paved areas, brush and woods prior to discharge to or POA-1.

7.3 Pre-Development Hydrological Conditions

Below is a summary of the pre-development hydrological conditions at the Point of Analysis.

Pre-Development Peak Rates of Runoff in Cubic Feet per Second (cfs)

Location	Storm Event			
	2-year	10-year	25-year	100-year
POA-1	29.87	53.80	67.94	89.39
POA-2	0.33	0.52	0.62	0.78

Comprehensive hydrological computations for pre-development conditions are included in Appendix A.

8.0 Proposed Drainage Conditions

8.1 Proposed Hydrology

The proposed development project is divided into four (4) sub-catchment areas for analysis (see Figure 5 – "Proposed Watershed Plan"). Stormwater runoff generated over paved areas will be captured by deep sump catch basins with hooded outlets and an oil/particle separator prior to conveyance to a sediment forebay prior to discharging to the wet water quality swale. Areas of demolition are proposed to be seeded a grassed for stabilization. Future development has not been analyzed as part of this project and will require future stormwater management systems.

Proposed Sub-Catchment Area 1 (PR-1)
This 2.009-acre sub-catchment area consists of the proposed cul-de-sac, sidewalks and landscaped areas. Stormwater flows over paved areas into deep sump catch basins prior to discharging to POA-1 via the proposed wet water quality swale.

Proposed Sub-Catchment Area 2 (PR-2)
This 15.521-acre sub-catchment area consists of woods, brush and grass. Stormwater flows over brush and grass prior to discharging to POA-1.

Proposed Sub-Catchment Area 3 (PR-3)
This 0.134-acre sub-catchment area consists of a demolished and grassed parking area and landscaping that discharge to POA-2. Stormwater flows over brush and woods prior to discharge to the existing wetlands to the west, or POA-2. Under proposed conditions, runoff is reduced to POA-2.

Proposed Sub-Catchment Area 4 (PR-4)
This 0.249-acre sub-catchment area consists of the proposed New Boston Street Extension. Stormwater flows over the paved street along the curb line prior to discharge to POA-1 via overland flow as under existing conditions.

8.2 Post-development Hydrological Conditions

Under the proposed condition, stormwater runoff from the cul-de-sac will be directed to deep-sump catch basins with hooded outlets, an oil/particle separator a sediment forebay, and a wet water quality swale before it is discharged off-site at POA-1. As impervious area on site will be reduced by approximately 3.37 acres, rates of stormwater discharged from the site to the Point of Analysis for the storm events analyzed will be reduced under proposed conditions as compared to existing conditions.

POA-1 Pre- and Post-Development Peak Rates of Runoff in Cubic Feet per Second (cfs)

Storm Frequency	Existing Flow Rate (cfs)	Proposed Flow Rate (cfs)	Change (cfs)	% Reduction
2-Year	29.87	22.00	7.87	26%

10-Year	53.80	44.35	9.45	18%
25-Year	67.94	61.00	6.94	10%
100-Year	89.39	83.57	5.82	7%

POA-2 Pre- and Post-Development Peak Rates of Runoff in Cubic Feet per Second (cfs)

Storm Frequency	Existing Flow Rate (cfs)	Proposed Flow Rate (cfs)	Change (cfs)	% Reduction
2-Year	0.33	0.19	0.14	42%
10-Year	0.52	0.37	0.15	29%
25-Year	0.62	0.48	0.14	23%
100-Year	0.78	0.64	0.14	18%

Comprehensive hydrological computations for post-development conditions are included in Appendix A.

8.3 Stormwater Quality

The development program includes suitable Best Management Practices (BMPs) to pre-treat and treat runoff from the cul-de-sac. Stormwater quality will be improved through the use of the following BMPs to remove at least 80% of TSS overall prior to discharge off-site. See below for TSS removal calculations.

- Catch Basins with Deep Sumps and Hooded Outlets
  Stormwater runoff from the proposed cul-de-sac will be directed via curbing and site grading to catch basins with deep sumps and hooded outlets. Catch basins trap and remove sediments and larger particles from stormwater runoff and improve the performance of subsequent BMP's. The catch basin sumps will be a minimum of 4 feet in depth, and a regular inspection and cleaning schedule will be followed to ensure optimal effectiveness. When properly constructed and maintained, catch basins with deep sumps and hooded outlets are effective in reducing the sediment and pollutant load in runoff.

- Oil/Particle Separator
  Oil/particle separators are proprietary, precast concrete structures designed to remove settleable solids and floating contaminants from stormwater runoff. Although it varies by manufacturer, they are typically designed to remove at least 25% TSS for the 1-inch water quality flow. Low storm flows are directed into a treatment chamber where floatables and buoyant debris are trapped and settleable solids sink to the sump of the structure. Larger flows are controlled by an internal diversion weir, which directs high intensity storm events around the chamber so the system does not backwater.

- Sediment Forebay
  Sediment forebays are runoff impoundments, basins or other storage structure designed to slow and dissipate the energy of incoming stormwater runoff and allow for initial settling of coarse sediments. The volume of the basin is sized to provide storage for the 10% of water quality volume, which is the first 1-inch of runoff from paved impervious surfaces.

- Wet Water Quality Swale
  The proposed wet water quality swale has been designed to store and treat the required water quality volume within the swale and convey runoff from the 10-year storm. Wet water quality swales with proper pre-treatment will provide the required TSS and pollutant removal.

Water Quality Volume:

$$V_{WQ} = D_{WQ} * A_{impervious}$$

Where:
D_{WQ} = Water Quality Depth = 1-inch
$A_{impervious}$= Impervious area = 37,250 sf

$$V_{WQ} = 1.0\ in * \left(\frac{1\ ft}{12\ in}\right) * 37{,}250\ sf = 3{,}104\ \boldsymbol{CF}$$

Water Quality Volume Provided:

System	Elevation	Water Quality Volume Required	Water Quality Volume Provided
Sediment Forebay (10% WQv)	42 – 44	310 CF	400 CF (10%)
Wet WQ Swale (100% WQv)	71 – 72.05	3,104 CF	3,118 CF (100%)
Total	-	**3,404 CF**	**3,518 CF**
Net	-	**-**	**+114 CF**

Pre-Treatment TSS Removal Calculation – Treatment Train 'A'

	BMP (A)	TSS Removal Rate (B)	Starting TSS Load (C)	Amount Removed (BxC) (D)	Remaining Load (C-D) (E)
Pre-Treatment	10% Street Sweeping	0.10	1.00	0.10	0.90
Pre-Treatment	Deep Sump and Hooded Catch Basin	0.25	0.90	0.23	0.68
Pre-Treatment	Oil/Particle Separator	0.25	0.68	0.17	0.51
Pre-Treatment	Sediment Forebay	0.25	0.51	0.13	0.38
Treatment	Wet Water Quality Swale	0.70	0.38	0.27	0.11
	Total TSS Removal = Summation of (D) = 89%				

9.0 Summary

This hydrologic analysis estimates peak storm runoff discharged from the site for both existing and proposed conditions. The stormwater management system for the proposed development includes measures for collecting, controlling and treating stormwater runoff from the site. The proposed measures comply with all the Stormwater Management Standards of the MassDEP Stormwater Policy and represent an improvement over the existing conditions.

An Operation and Maintenance Manual has been included as part of this report to ensure the long-term operation of the proposed stormwater management system. As part of the proposed Operation and Maintenance Manual, a Long-Term Pollution Prevention Plan (LTPPP) has been incorporated to ensure proper spill prevention and management materials area available on site and staff are properly trained to prevent additional pollutant loading. The drainage improvements proposed herein will reduce stormwater runoff peak flow rates leaving the site and improve the overall water quality of stormwater runoff.

II. FIGURES

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SITE

South Wilmington

WOBURN

North Woburn

Mishawum

Mishawum Lake

Maple Meadow Brook

Halls Brook

Aberjona River

Peach Orchard Hill

PARKER ST
ALLEN PARK DR
KENWOOD AVE
WEST ST
KILMARNOCK ST
GROVE ST
WESTDALE AVE
TOWPATH DR
BUTTERS ROW
WOBURN ST
OX BOW DR
EAMES ST
INDUSTRIAL WAY
PRESIDENTIAL DR
PRESIDENTIAL WAY
JOHNSON WOODS DR
INWOOD DR
ARCADIA AV
BRIARWOOD RD
MOUNTAIN ST
MILAN AVE
MERRIMAC ST
TORRICE DR
WINTER ST
POOLE ST
COMMERCE WAY
NEW BOSTON ST
INDUSTRIAL PKWY
SCHOOL ST
FLETCHER RD
FOREST PARK RD
ARBORWOOD DR
PEARL ST
ELM ST
ALFRED ST
129
38
93
95
128

2,000 0 1,000 2,000 4,000

GRAPHIC SCALE IN FEET

RJO'CONNELL
& ASSOCIATES, INC.
CIVIL ENGINEERS, SURVEYORS & LAND PLANNERS

DATE: 02/20/2020 SCALE: 1"=2000'

FIGURE 1
USGS MAP
316 NEW BOSTON STREET
WOBURN, MA 01801

Copyright © 2019 by R.J. O'Connell & Associates, Inc.

Drawing name: G:\MA\Woburn\Fairfield Residential\316 New Boston Street\Reports\Figures\19078_FIG-1 USGS.dwg
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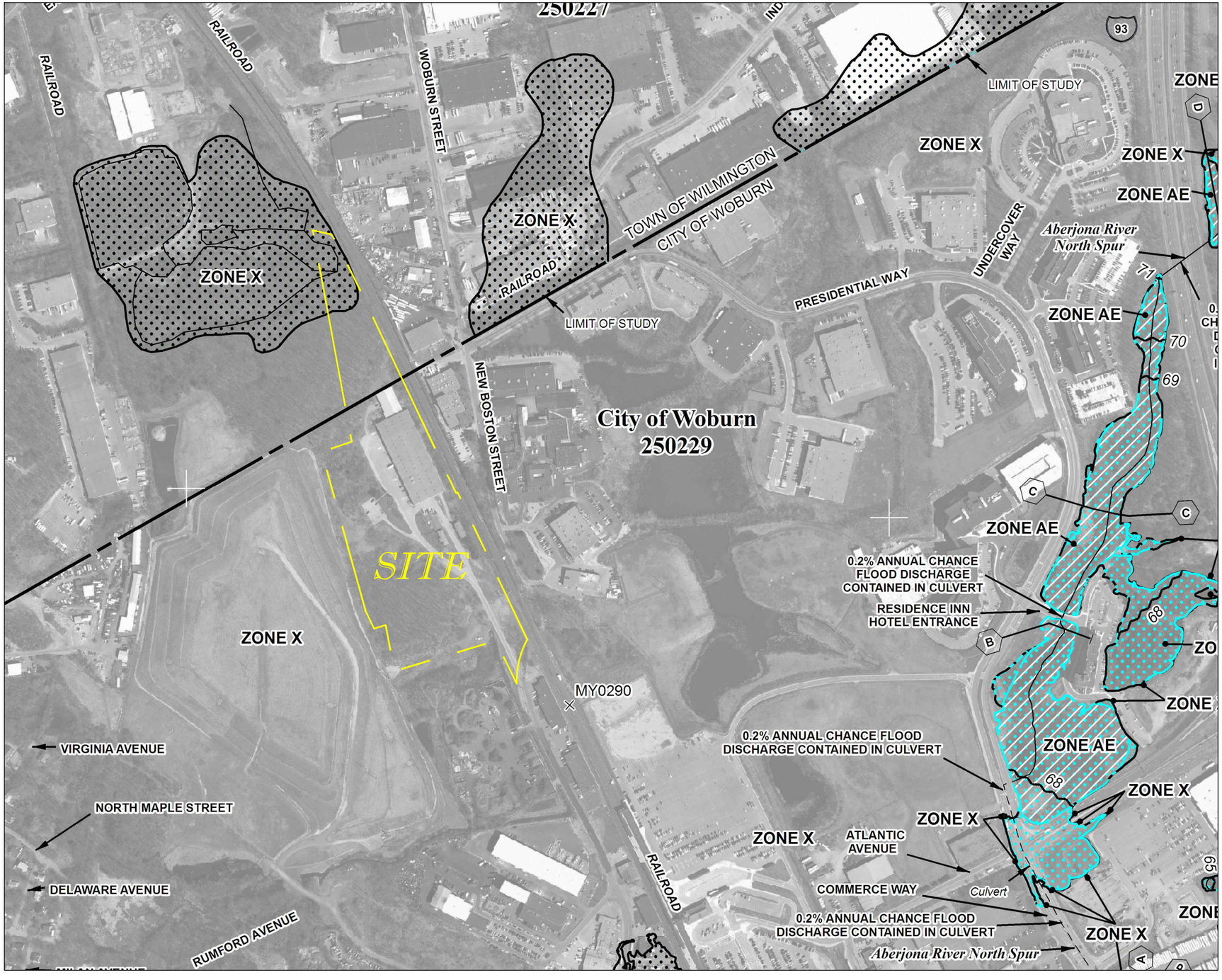

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LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual 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 decertified. Zone AR indicates that the former flood control system is being restored 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 Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

500 0 250 500 1,000

GRAPHIC SCALE IN FEET

REFERENCE: FEMA FLOOD INSURANCE RATE MAP, MIDDLESEX COUNTY, MASSACHUSETTS PANEL 294 OF 656, MAP NUMBER 25017C0294E EFFECTIVE DATE JUNE 4, 2010

RJO'CONNELL & ASSOCIATES, INC.

CIVIL ENGINEERS, SURVEYORS & LAND PLANNERS

DATE: 02/20/2020 SCALE: 1"=500'

FIGURE 2

FEMA FLOOD INSURANCE RATE MAP

316 NEW BOSTON STREET

WOBURN, MA 01801

Copyright © 2019 by R.J. O'Connell & Associates, Inc.

Drawing name: G:\MA\Woburn\Fairfield Residential\316 New Boston Street\Reports\Figures\19078_FIG-2 FEMA Firm Map.dwg
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NRCS SOIL MAP LEGEND		
MAP UNIT SYMBOL	MAP UNIT NAME	HSG
51A	SWANSEA MUCK, 0 TO 1% SLOPES	B/D
52A	FREETOWN MUCK, 0 TO 1% SLOPES	B/D
103B	CHARLTON HOLLIS ROCK OUTCROP COMPLEX, 3 TO 8% SLOPES	A
422B	CANTON FINE SANDY LOAM, 0 TO 8% SLOPES, EXTREMELY STONY	B
652	UDORTHENTS, REFUSE SUBSTRATUM	N/A
656	UDORTHENTS, URBAN LAND COMPLEX	N/A

300 0 150 300 600

GRAPHIC SCALE IN FEET

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DATE: 02/20/2020 SCALE: 1"=300'

FIGURE 3
NRCS WEB SOIL SURVEY MAP
316 NEW BOSTON STREET
WOBURN, MA 01801

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Drawing name: G:\MA\Woburn\Fairfield Residential\316 New Boston Street\Reports\Figures\19078_FIG-3 NRCS Soil Map.dwg
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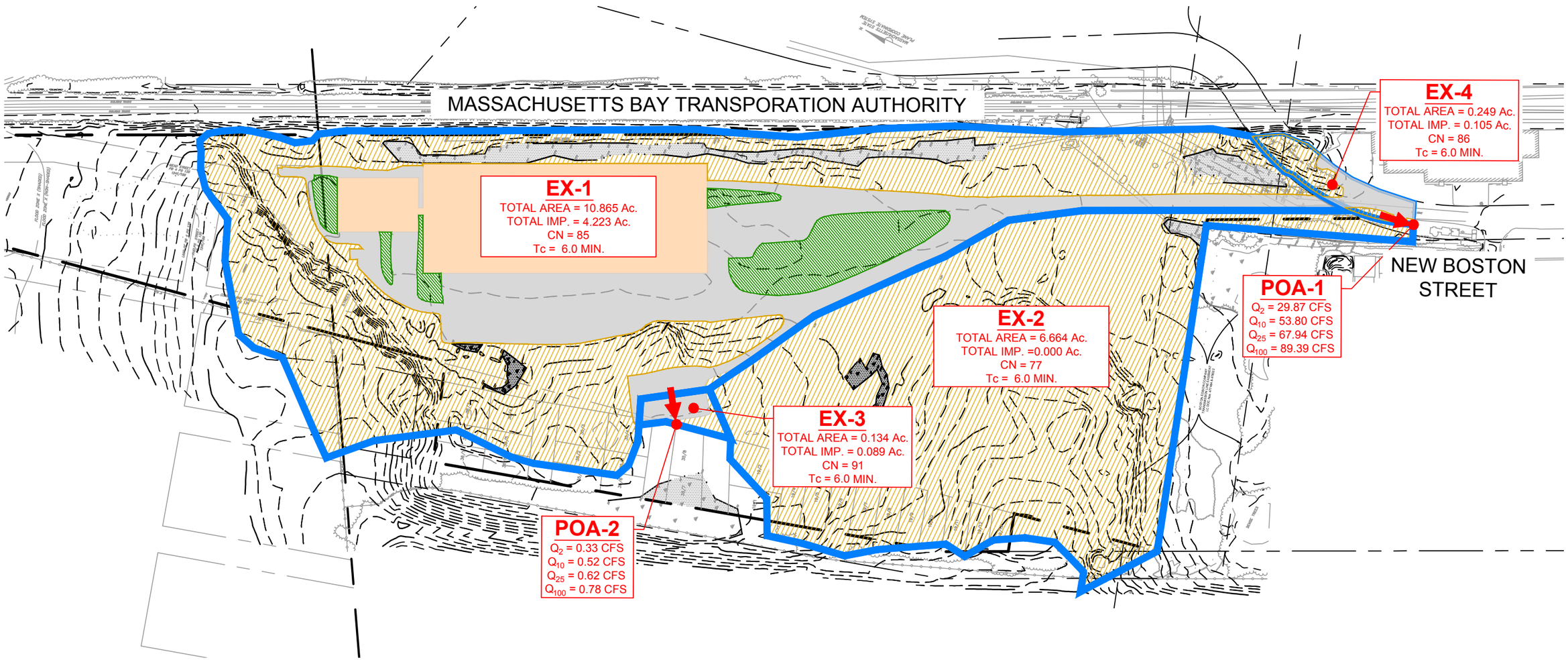

LEGEND

	WATERSHED BOUNDARY		BUILDING
	OPEN SPACE-GRASS/WOODS		PAVEMENT/IMPERVIOUS
	OPEN SPACE-WOODS/BRUSH	POA-1	POINT OF ANALYSIS
	WETLANDS		PROPERTY LINE
			Tc PATH

150 0 75 150 300

GRAPHIC SCALE IN FEET

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CIVIL ENGINEERS, SURVEYORS & LAND PLANNERS

DATE: 02/07/2020 SCALE: 1"=150'

FIGURE 4
EXISTING WATERSHED PLAN
316 NEW BOSTON STREET
WOBURN, MA 01801

Copyright © 2019 by R.J. O'Connell & Associates, Inc.

Drawing name: G:\MA\Woburn\Fairfield Residential\316 New Boston Street\Reports\Figures\19078_FIG-4 Existing Watershed Plan - Def Subdivision.dwg
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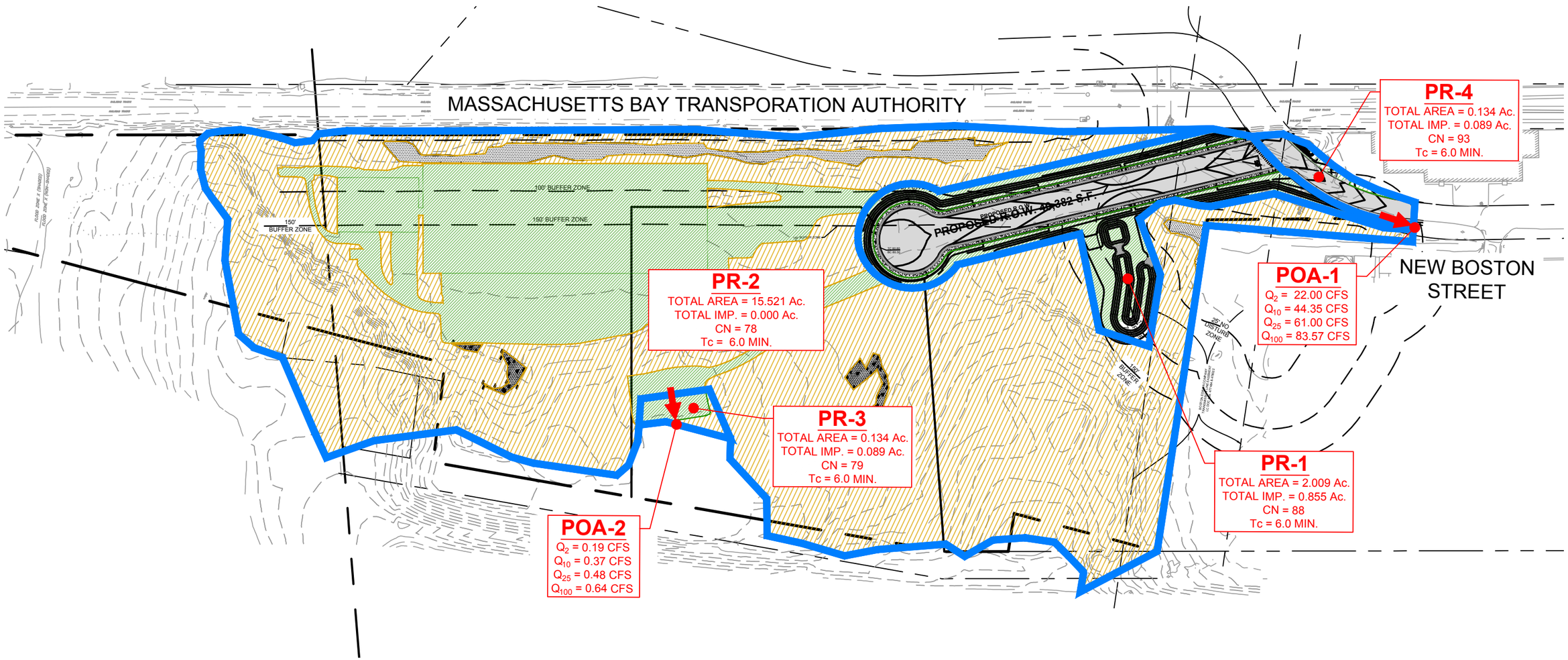

LEGEND

	WATERSHED BOUNDARY		BUILDING
	OPEN SPACE-GRASS		PAVEMENT/IMPERVIOUS
	OPEN SPACE-GRASS/WOODS	POA-1	POINT OF ANALYSIS
	WETLANDS		PROPERTY LINE
			Tc PATH

150 0 75 150 300

GRAPHIC SCALE IN FEET

RJO'CONNELL
& ASSOCIATES, INC.
CIVIL ENGINEERS, SURVEYORS & LAND PLANNERS

DATE: 02/07/2020 SCALE: 1"=150'

FIGURE 5
PROPOSED WATERSHED PLAN
316 NEW BOSTON STREET
WOBURN, MA 01801

Copyright © 2019 by R.J. O'Connell & Associates, Inc.

Drawing name: G:\MA\Woburn\Fairfield Residential\316 New Boston Street\Reports\Figures\19078_FIG-5 Proposed Watershed Plan - Def Subdivision.dwg
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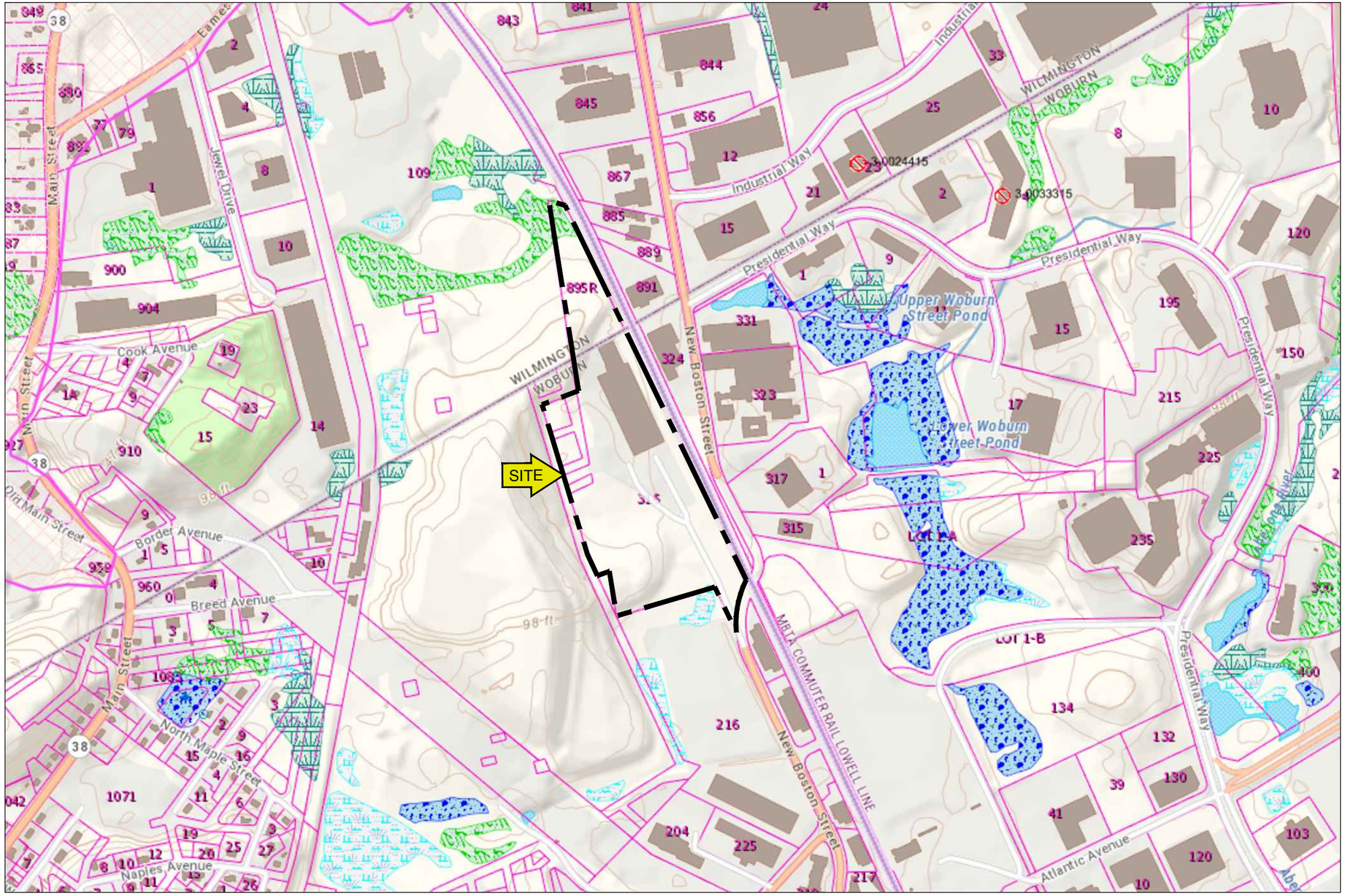

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AUL Sites

Zone IIs

Zone Is

IWPAs

DEP Wetlands Detailed With Outlines
- Barrier Beach System
- Barrier Beach-Deep Marsh
- Barrier Beach-Wooded Swamp Mixed
- Barrier Beach-Coastal Beach
- Barrier Beach-Coastal Dune
- Barrier Beach-Marsh
- Barrier Beach-Salt Marsh
- Barrier Beach-Shrub Swamp
- Barrier Beach-Wooded Swamp Conife
- Barrier Beach-Wooded Swamp Decidu
- Bog
- Coastal Bank Bluff or Sea Cliff
- Coastal Beach
- Coastal Dune
- Cranberry Bog
- Deep Marsh
- Barrier Beach-Open Water
- Open Water
- Rocky Intertidal Shore
- Salt Marsh
- Shallow Marsh Meadow or Fen
- Shrub Swamp
- Tidal Flat
- Wooded Swamp Coniferous
- Wooded Swamp Deciduous
- Wooded Swamp Mixed Trees

NHESP Priority Habitats of Rare Species

NHESP Estimated Habitats of Rare Wildlife

Potential Vernal Pools

NHESP Certified Vernal Pools

500 0 250 500 1,000

GRAPHIC SCALE IN FEET

RJO'CONNELL
& ASSOCIATES, INC.
CIVIL ENGINEERS, SURVEYORS & LAND PLANNERS

DATE: 02/20/2020 SCALE: 1"=500'

FIGURE 6
MassGIS RESOURCE AREA MAP
316 NEW BOSTON STREET
WOBURN, MA 01801

Copyright © 2019 by R.J. O'Connell & Associates, Inc.

Drawing name: G:\MA\Woburn\Fairfield Residential\316 New Boston Street\Reports\Figures\19078_FIG-6 Resource Area Map.dwg
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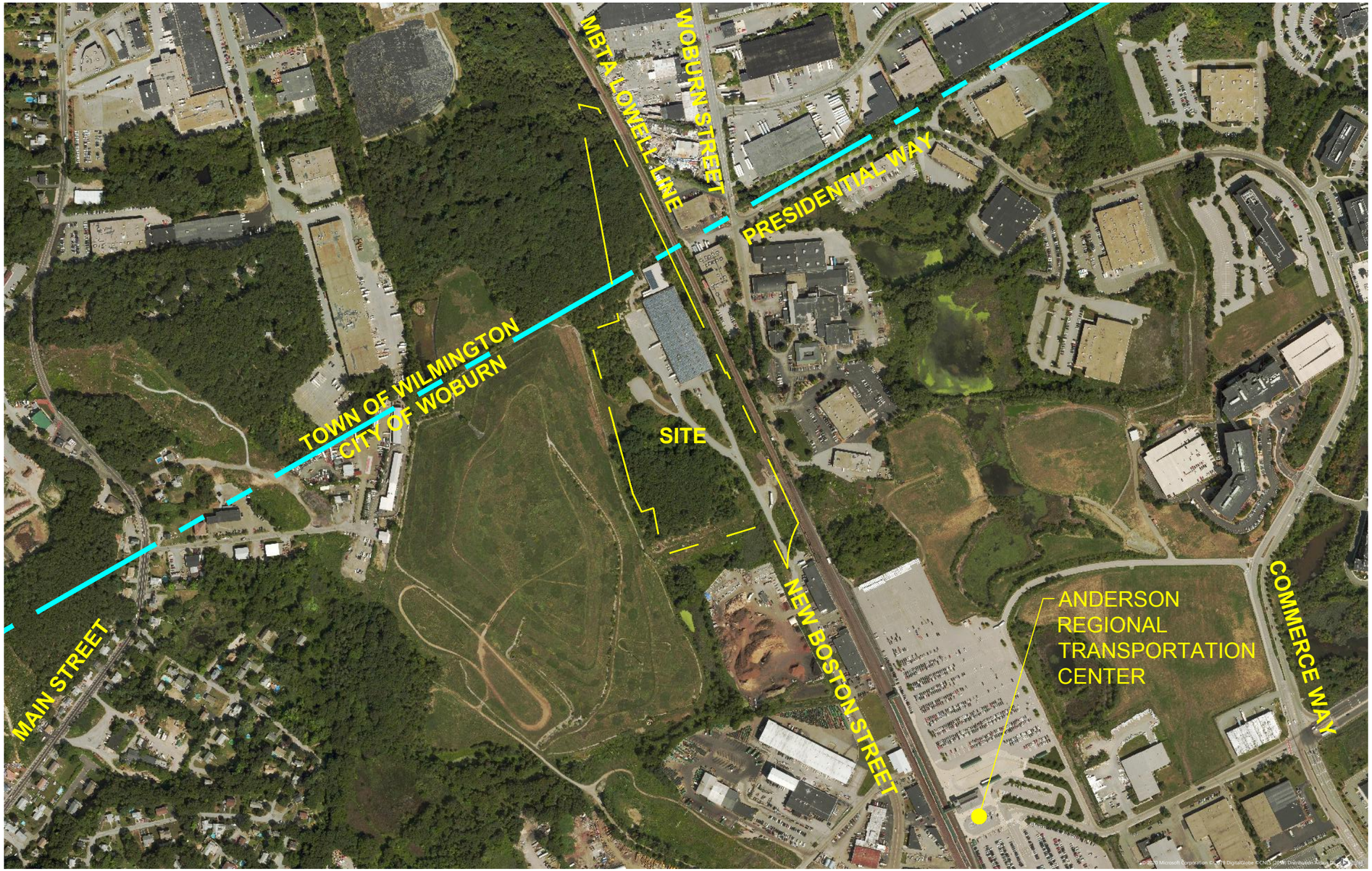

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RJO'CONNELL
& ASSOCIATES, INC.
CIVIL ENGINEERS, SURVEYORS & LAND PLANNERS

DATE: 02/20/2020 SCALE: 1"=500'

FIGURE 7
MassGIS ORTHOIMAGE SITE MAP
316 NEW BOSTON STREET
WOBURN, MA 01801

Copyright © 2019 by R.J. O'Connell & Associates, Inc.

Drawing name: G:\MA\Woburn\Fairfield Residential\316 New Boston Street\Reports\Figures\19078_FIG-7 MassGIS Ortho Map.dwg
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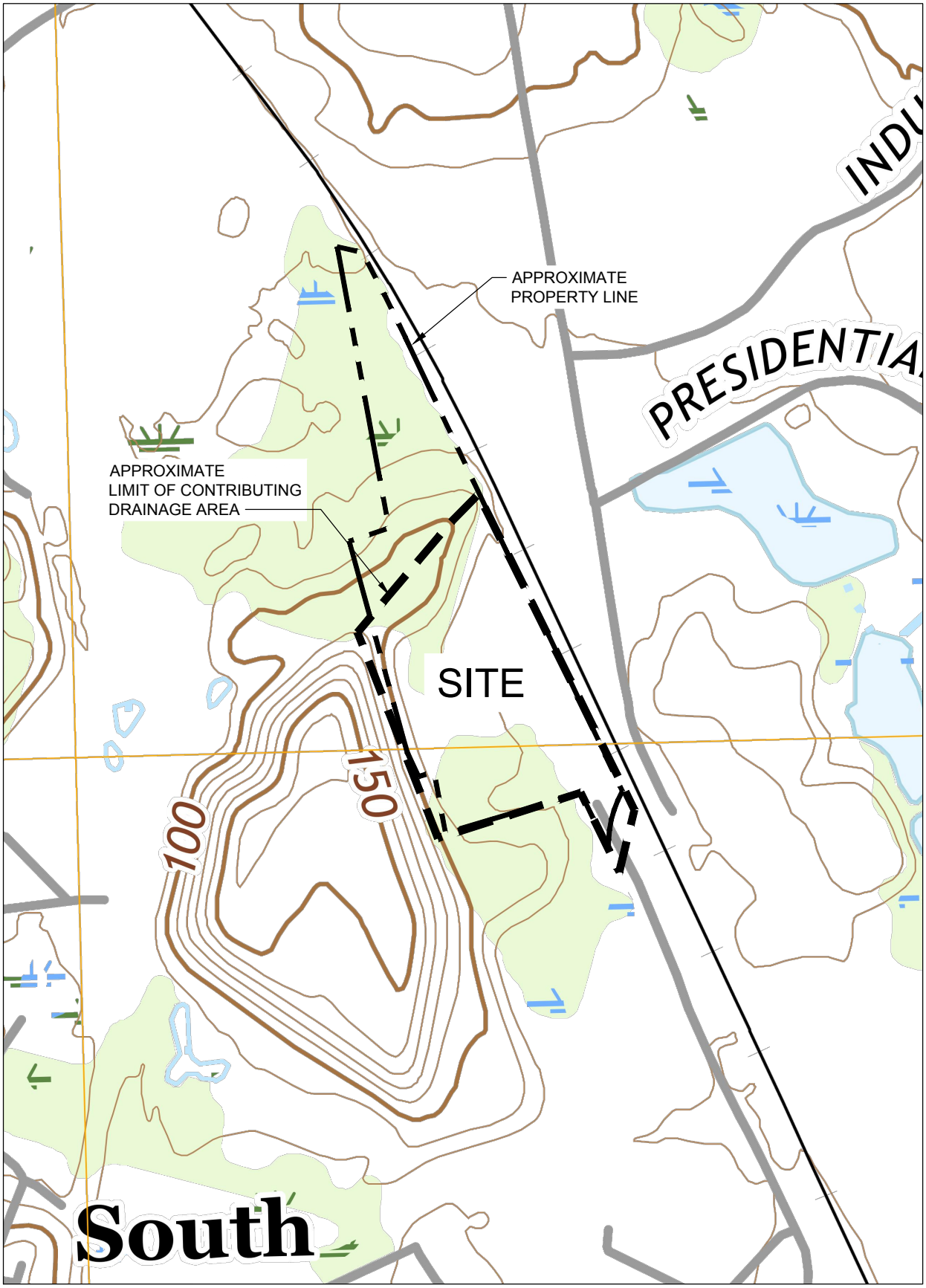

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500 0 250 500 1,000

GRAPHIC SCALE IN FEET

RJO'CONNELL
& ASSOCIATES, INC.
CIVIL ENGINEERS, SURVEYORS & LAND PLANNERS

DATE: 02/20/2020 SCALE: 1"=500'

FIGURE 8
USGS DRAINAGE AREA QUADRANT
316 NEW BOSTON STREET
WOBURN, MA 01801

Copyright © 2019 by R.J. O'Connell & Associates, Inc.

Drawing name: G:\MA\Woburn\Fairfield Residential\316 New Boston Street\Reports\Figures\19078_FIG-1 USGS.dwg
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III. APPENDICIES

APPENDIX A
MassDEP Checklist for Stormwater Reports

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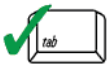
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

---

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

4-6-2020
Signature and Date

Checklist

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

☐ New development

☐ Redevelopment

☑ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of “country drainage” versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☑ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☑ No new untreated discharges
- ☑ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☑ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- ☑ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- ☐ Soil Analysis provided.
- ☐ Required Recharge Volume calculation provided.
- ☐ Required Recharge volume reduced through use of the LID site Design Credits.
- ☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.
  - ☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]
- ☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.
- ☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
  - ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
  - ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
  - ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
  - ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- ☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- ☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

- ☐ The project is ***not*** covered by a NPDES Construction General Permit.
- ☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- ☑ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- ☑ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
  - ☑ Name of the stormwater management system owners;
  - ☑ Party responsible for operation and maintenance;
  - ☑ Schedule for implementation of routine and non-routine maintenance tasks;
  - ☑ Plan showing the location of all stormwater BMPs maintenance access areas;
  - ☑ Description and delineation of public safety features;
  - ☐ Estimated operation and maintenance budget; and
  - ☑ Operation and Maintenance Log Form.
- ☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
  - ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
  - ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

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

APPENDIX B
Computations

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Pre-Development Hydrological Computations

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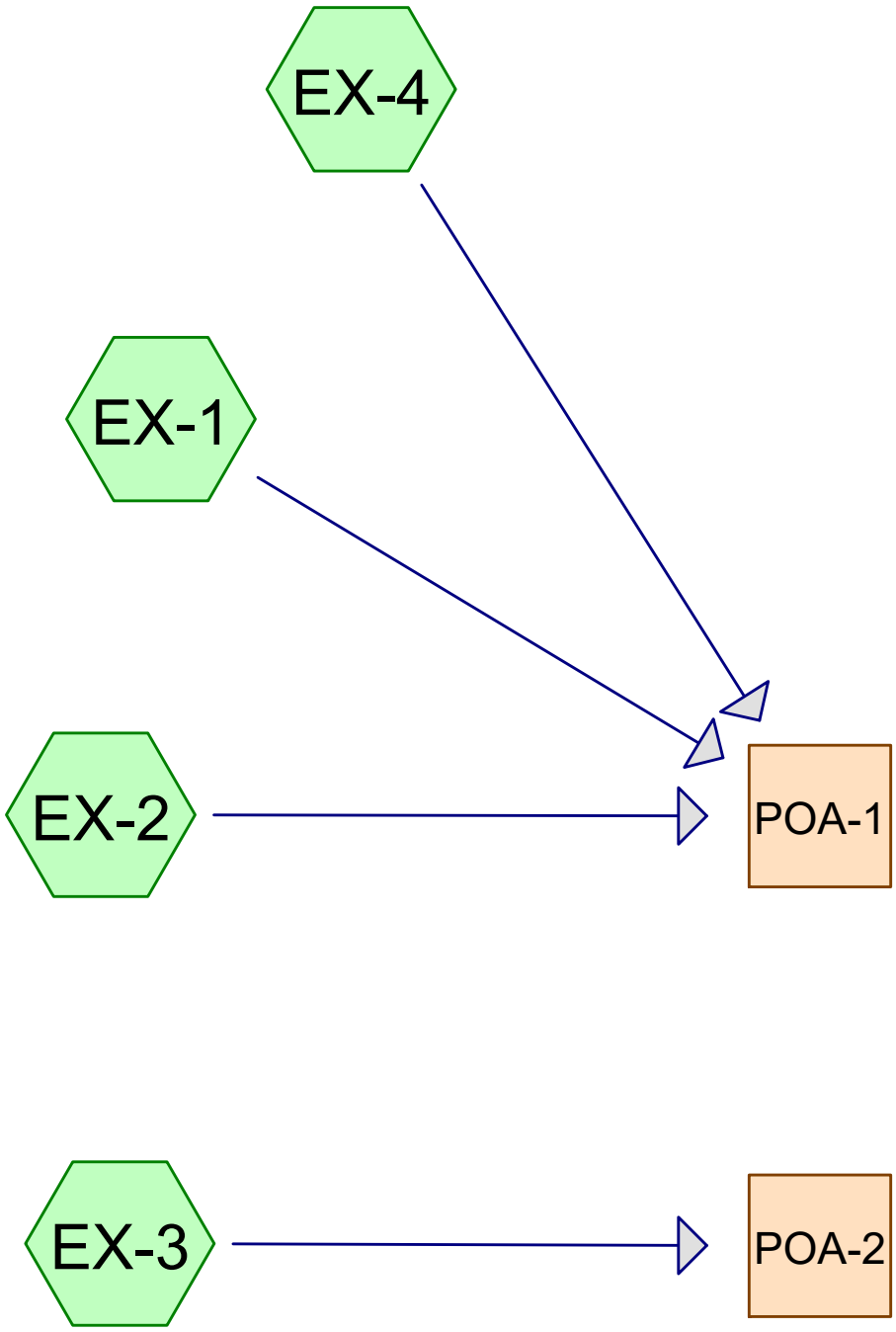
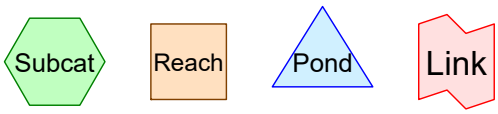




Routing Diagram for 19078_Existing Conditions_tp-40 - Def Subdivision
Prepared by RJ O'Connell & Associates, Inc., Printed 4/3/2020
HydroCAD® 10.00-25 s/n 04881 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
114,621	98	Paved parking, HSG D (EX-1, EX-3, EX-4)
77,783	98	Roofs, HSG D (EX-1)
27,036	78	Wetlands (EX-1, EX-2)
530,014	77	Woods, Good, HSG D (EX-1, EX-2, EX-3, EX-4)
30,756	79	Woods/grass comb., Good, HSG D (EX-1)
780,210	**82**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
0	HSG C	
753,174	HSG D	EX-1, EX-2, EX-3, EX-4
27,036	Other	EX-1, EX-2
780,210		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatc Number
0	0	0	114,621	0	114,621	Paved parking	
0	0	0	77,783	0	77,783	Roofs	
0	0	0	0	27,036	27,036	Wetlands	
0	0	0	530,014	0	530,014	Woods, Good	
0	0	0	30,756	0	30,756	Woods/grass comb., Good	
0	**0**	**0**	**753,174**	**27,036**	**780,210**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Runoff Area=473,312 sf 38.86% Impervious Runoff Depth>1.67"
Tc=6.0 min CN=85 Runoff=20.89 cfs 65,911 cf

Subcatchment EX-2: Runoff Area=290,234 sf 0.00% Impervious Runoff Depth>1.14"
Tc=6.0 min CN=77 Runoff=8.49 cfs 27,563 cf

Subcatchment EX-3: Runoff Area=5,824 sf 66.67% Impervious Runoff Depth>2.16"
Tc=6.0 min CN=91 Runoff=0.33 cfs 1,050 cf

Subcatchment EX-4: Runoff Area=10,840 sf 42.27% Impervious Runoff Depth>1.75"
Tc=6.0 min CN=86 Runoff=0.50 cfs 1,578 cf

Reach POA-1: Inflow=29.87 cfs 95,052 cf
Outflow=29.87 cfs 95,052 cf

Reach POA-2: Inflow=0.33 cfs 1,050 cf
Outflow=0.33 cfs 1,050 cf

Total Runoff Area = 780,210 sf Runoff Volume = 96,102 cf Average Runoff Depth = 1.48"
75.34% Pervious = 587,806 sf 24.66% Impervious = 192,404 sf

Summary for Subcatchment EX-1:

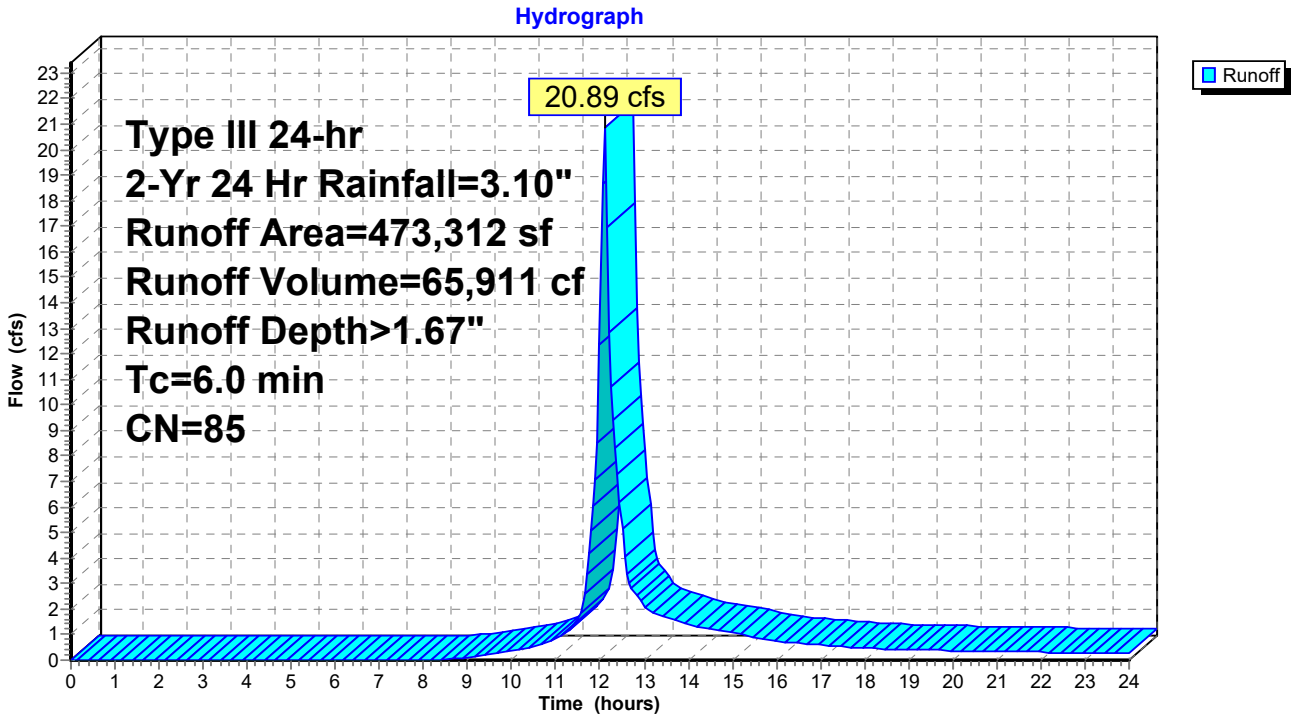
Runoff = 20.89 cfs @ 12.09 hrs, Volume= 65,911 cf, Depth> 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr 24 Hr Rainfall=3.10"

	Area (sf)	CN	Description
	30,756	79	Woods/grass comb., Good, HSG D
	236,144	77	Woods, Good, HSG D
	106,156	98	Paved parking, HSG D
	77,783	98	Roofs, HSG D
*	22,473	78	Wetlands
	473,312	85	Weighted Average
	289,373		61.14% Pervious Area
	183,939		38.86% Impervious Area

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

Subcatchment EX-1:



Hydrograph for Subcatchment EX-1:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	2.32	1.04	2.14
0.25	0.01	0.00	0.00	13.25	2.38	1.08	1.84
0.50	0.02	0.00	0.00	13.50	2.43	1.12	1.69
0.75	0.02	0.00	0.00	13.75	2.47	1.16	1.54
1.00	0.03	0.00	0.00	14.00	2.51	1.19	1.39
1.25	0.04	0.00	0.00	14.25	2.55	1.22	1.28
1.50	0.05	0.00	0.00	14.50	2.59	1.25	1.21
1.75	0.05	0.00	0.00	14.75	2.62	1.27	1.14
2.00	0.06	0.00	0.00	15.00	2.65	1.30	1.06
2.25	0.07	0.00	0.00	15.25	2.68	1.32	0.99
2.50	0.08	0.00	0.00	15.50	2.70	1.34	0.91
2.75	0.09	0.00	0.00	15.75	2.73	1.36	0.83
3.00	0.10	0.00	0.00	16.00	2.75	1.38	0.75
3.25	0.10	0.00	0.00	16.25	2.77	1.39	0.70
3.50	0.11	0.00	0.00	16.50	2.78	1.41	0.67
3.75	0.12	0.00	0.00	16.75	2.80	1.42	0.64
4.00	0.13	0.00	0.00	17.00	2.82	1.44	0.60
4.25	0.14	0.00	0.00	17.25	2.84	1.45	0.57
4.50	0.15	0.00	0.00	17.50	2.85	1.46	0.53
4.75	0.16	0.00	0.00	17.75	2.86	1.47	0.50
5.00	0.18	0.00	0.00	18.00	2.88	1.49	0.46
5.25	0.19	0.00	0.00	18.25	2.89	1.50	0.45
5.50	0.20	0.00	0.00	18.50	2.90	1.51	0.43
5.75	0.21	0.00	0.00	18.75	2.91	1.52	0.42
6.00	0.22	0.00	0.00	19.00	2.92	1.52	0.41
6.25	0.24	0.00	0.00	19.25	2.94	1.53	0.40
6.50	0.25	0.00	0.00	19.50	2.95	1.54	0.39
6.75	0.26	0.00	0.00	19.75	2.96	1.55	0.38
7.00	0.28	0.00	0.00	20.00	2.97	1.56	0.37
7.25	0.30	0.00	0.00	20.25	2.98	1.57	0.36
7.50	0.32	0.00	0.00	20.50	2.99	1.58	0.36
7.75	0.33	0.00	0.00	20.75	3.00	1.58	0.35
8.00	0.35	0.00	0.00	21.00	3.01	1.59	0.34
8.25	0.37	0.00	0.01	21.25	3.01	1.60	0.33
8.50	0.40	0.00	0.04	21.50	3.02	1.61	0.33
8.75	0.42	0.00	0.08	21.75	3.03	1.62	0.32
9.00	0.45	0.01	0.12	22.00	3.04	1.62	0.31
9.25	0.48	0.01	0.16	22.25	3.05	1.63	0.30
9.50	0.51	0.01	0.21	22.50	3.06	1.64	0.29
9.75	0.55	0.02	0.27	22.75	3.06	1.64	0.29
10.00	0.59	0.03	0.34	23.00	3.07	1.65	0.28
10.25	0.63	0.04	0.43	23.25	3.08	1.66	0.27
10.50	0.67	0.05	0.54	23.50	3.09	1.66	0.26
10.75	0.72	0.06	0.67	23.75	3.09	1.67	0.26
11.00	0.77	0.08	0.81	24.00	**3.10**	**1.67**	0.25
11.25	0.84	0.11	1.11				
11.50	0.92	0.14	1.55				
11.75	1.10	0.22	4.15				
12.00	1.55	0.48	**12.38**				
12.25	2.00	0.79	**10.71**				
12.50	2.18	0.93	5.11				
12.75	2.26	0.99	2.72				

Summary for Subcatchment EX-2:

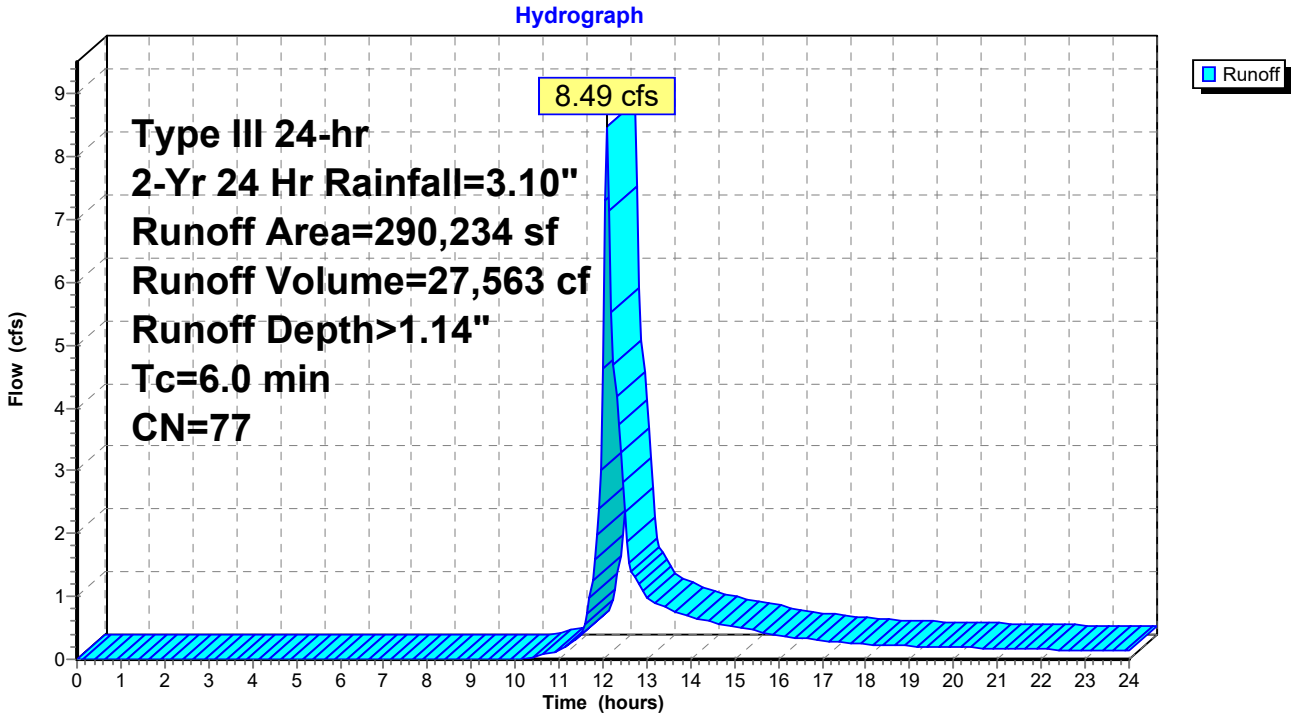
Runoff = 8.49 cfs @ 12.10 hrs, Volume= 27,563 cf, Depth> 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr 24 Hr Rainfall=3.10"

	Area (sf)	CN	Description
	285,671	77	Woods, Good, HSG D
*	4,563	78	Wetlands
	290,234	77	Weighted Average
	290,234		100.00% Pervious Area

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

Subcatchment EX-2:



Hydrograph for Subcatchment EX-2:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	2.32	0.63	1.01
0.25	0.01	0.00	0.00	13.25	2.38	0.67	0.87
0.50	0.02	0.00	0.00	13.50	2.43	0.70	0.81
0.75	0.02	0.00	0.00	13.75	2.47	0.72	0.74
1.00	0.03	0.00	0.00	14.00	2.51	0.75	0.67
1.25	0.04	0.00	0.00	14.25	2.55	0.77	0.62
1.50	0.05	0.00	0.00	14.50	2.59	0.79	0.59
1.75	0.05	0.00	0.00	14.75	2.62	0.82	0.55
2.00	0.06	0.00	0.00	15.00	2.65	0.83	0.52
2.25	0.07	0.00	0.00	15.25	2.68	0.85	0.48
2.50	0.08	0.00	0.00	15.50	2.70	0.87	0.45
2.75	0.09	0.00	0.00	15.75	2.73	0.89	0.41
3.00	0.10	0.00	0.00	16.00	2.75	0.90	0.37
3.25	0.10	0.00	0.00	16.25	2.77	0.91	0.35
3.50	0.11	0.00	0.00	16.50	2.78	0.92	0.33
3.75	0.12	0.00	0.00	16.75	2.80	0.94	0.32
4.00	0.13	0.00	0.00	17.00	2.82	0.95	0.30
4.25	0.14	0.00	0.00	17.25	2.84	0.96	0.28
4.50	0.15	0.00	0.00	17.50	2.85	0.97	0.27
4.75	0.16	0.00	0.00	17.75	2.86	0.98	0.25
5.00	0.18	0.00	0.00	18.00	2.88	0.99	0.23
5.25	0.19	0.00	0.00	18.25	2.89	0.99	0.22
5.50	0.20	0.00	0.00	18.50	2.90	1.00	0.22
5.75	0.21	0.00	0.00	18.75	2.91	1.01	0.21
6.00	0.22	0.00	0.00	19.00	2.92	1.02	0.21
6.25	0.24	0.00	0.00	19.25	2.94	1.03	0.20
6.50	0.25	0.00	0.00	19.50	2.95	1.03	0.20
6.75	0.26	0.00	0.00	19.75	2.96	1.04	0.19
7.00	0.28	0.00	0.00	20.00	2.97	1.05	0.19
7.25	0.30	0.00	0.00	20.25	2.98	1.05	0.18
7.50	0.32	0.00	0.00	20.50	2.99	1.06	0.18
7.75	0.33	0.00	0.00	20.75	3.00	1.07	0.18
8.00	0.35	0.00	0.00	21.00	3.01	1.07	0.17
8.25	0.37	0.00	0.00	21.25	3.01	1.08	0.17
8.50	0.40	0.00	0.00	21.50	3.02	1.09	0.17
8.75	0.42	0.00	0.00	21.75	3.03	1.09	0.16
9.00	0.45	0.00	0.00	22.00	3.04	1.10	0.16
9.25	0.48	0.00	0.00	22.25	3.05	1.10	0.15
9.50	0.51	0.00	0.00	22.50	3.06	1.11	0.15
9.75	0.55	0.00	0.00	22.75	3.06	1.12	0.15
10.00	0.59	0.00	0.00	23.00	3.07	1.12	0.14
10.25	0.63	0.00	0.01	23.25	3.08	1.13	0.14
10.50	0.67	0.00	0.05	23.50	3.09	1.13	0.13
10.75	0.72	0.00	0.09	23.75	3.09	1.14	0.13
11.00	0.77	0.01	0.14	24.00	**3.10**	**1.14**	0.13
11.25	0.84	0.02	0.24				
11.50	0.92	0.03	0.39				
11.75	1.10	0.07	1.26				
12.00	1.55	0.23	**4.62**				
12.25	2.00	0.45	**4.69**				
12.50	2.18	0.55	2.35				
12.75	2.26	0.59	1.27				

Summary for Subcatchment EX-3:

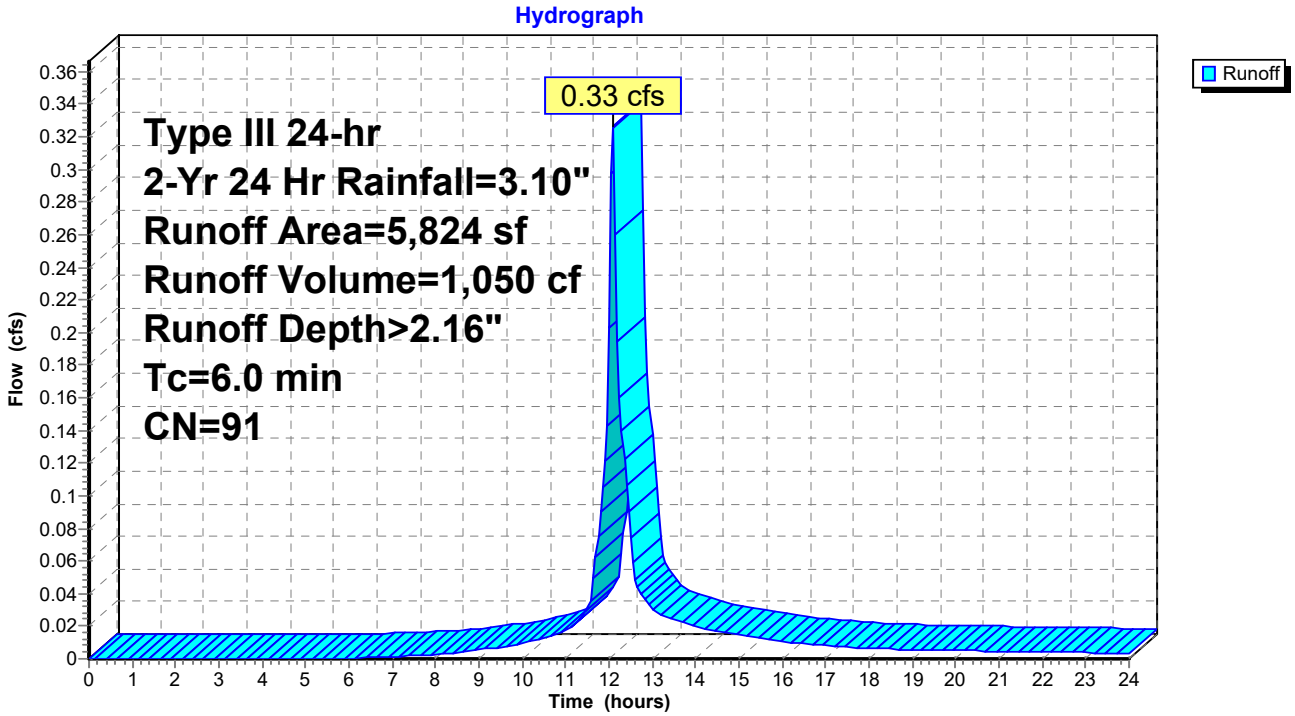
Runoff = 0.33 cfs @ 12.09 hrs, Volume= 1,050 cf, Depth> 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr 24 Hr Rainfall=3.10"

Area (sf)	CN	Description
3,883	98	Paved parking, HSG D
1,941	77	Woods, Good, HSG D
5,824	91	Weighted Average
1,941		33.33% Pervious Area
3,883		66.67% Impervious Area

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

Subcatchment EX-3:



Hydrograph for Subcatchment EX-3:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	2.32	1.45	0.03
0.25	0.01	0.00	0.00	13.25	2.38	1.50	0.03
0.50	0.02	0.00	0.00	13.50	2.43	1.55	0.02
0.75	0.02	0.00	0.00	13.75	2.47	1.59	0.02
1.00	0.03	0.00	0.00	14.00	2.51	1.62	0.02
1.25	0.04	0.00	0.00	14.25	2.55	1.66	0.02
1.50	0.05	0.00	0.00	14.50	2.59	1.69	0.02
1.75	0.05	0.00	0.00	14.75	2.62	1.72	0.02
2.00	0.06	0.00	0.00	15.00	2.65	1.75	0.01
2.25	0.07	0.00	0.00	15.25	2.68	1.77	0.01
2.50	0.08	0.00	0.00	15.50	2.70	1.80	0.01
2.75	0.09	0.00	0.00	15.75	2.73	1.82	0.01
3.00	0.10	0.00	0.00	16.00	2.75	1.84	0.01
3.25	0.10	0.00	0.00	16.25	2.77	1.85	0.01
3.50	0.11	0.00	0.00	16.50	2.78	1.87	0.01
3.75	0.12	0.00	0.00	16.75	2.80	1.89	0.01
4.00	0.13	0.00	0.00	17.00	2.82	1.90	0.01
4.25	0.14	0.00	0.00	17.25	2.84	1.92	0.01
4.50	0.15	0.00	0.00	17.50	2.85	1.93	0.01
4.75	0.16	0.00	0.00	17.75	2.86	1.94	0.01
5.00	0.18	0.00	0.00	18.00	2.88	1.96	0.01
5.25	0.19	0.00	0.00	18.25	2.89	1.97	0.01
5.50	0.20	0.00	0.00	18.50	2.90	1.98	0.01
5.75	0.21	0.00	0.00	18.75	2.91	1.99	0.01
6.00	0.22	0.00	0.00	19.00	2.92	2.00	0.01
6.25	0.24	0.00	0.00	19.25	2.94	2.01	0.01
6.50	0.25	0.00	0.00	19.50	2.95	2.02	0.01
6.75	0.26	0.00	0.00	19.75	2.96	2.03	0.01
7.00	0.28	0.01	0.00	20.00	2.97	2.04	0.01
7.25	0.30	0.01	0.00	20.25	2.98	2.05	0.00
7.50	0.32	0.01	0.00	20.50	2.99	2.06	0.00
7.75	0.33	0.02	0.00	20.75	3.00	2.07	0.00
8.00	0.35	0.02	0.00	21.00	3.01	2.08	0.00
8.25	0.37	0.03	0.00	21.25	3.01	2.08	0.00
8.50	0.40	0.03	0.00	21.50	3.02	2.09	0.00
8.75	0.42	0.04	0.00	21.75	3.03	2.10	0.00
9.00	0.45	0.05	0.01	22.00	3.04	2.11	0.00
9.25	0.48	0.06	0.01	22.25	3.05	2.12	0.00
9.50	0.51	0.08	0.01	22.50	3.06	2.12	0.00
9.75	0.55	0.09	0.01	22.75	3.06	2.13	0.00
10.00	0.59	0.11	0.01	23.00	3.07	2.14	0.00
10.25	0.63	0.13	0.01	23.25	3.08	2.15	0.00
10.50	0.67	0.15	0.01	23.50	3.09	2.15	0.00
10.75	0.72	0.18	0.02	23.75	3.09	2.16	0.00
11.00	0.77	0.21	0.02	24.00	**3.10**	**2.16**	0.00
11.25	0.84	0.25	0.02				
11.50	0.92	0.31	0.03				
11.75	1.10	0.43	0.08				
12.00	1.55	0.78	**0.20**				
12.25	2.00	1.16	**0.16**				
12.50	2.18	1.32	0.07				
12.75	2.26	1.39	0.04				

Summary for Subcatchment EX-4:

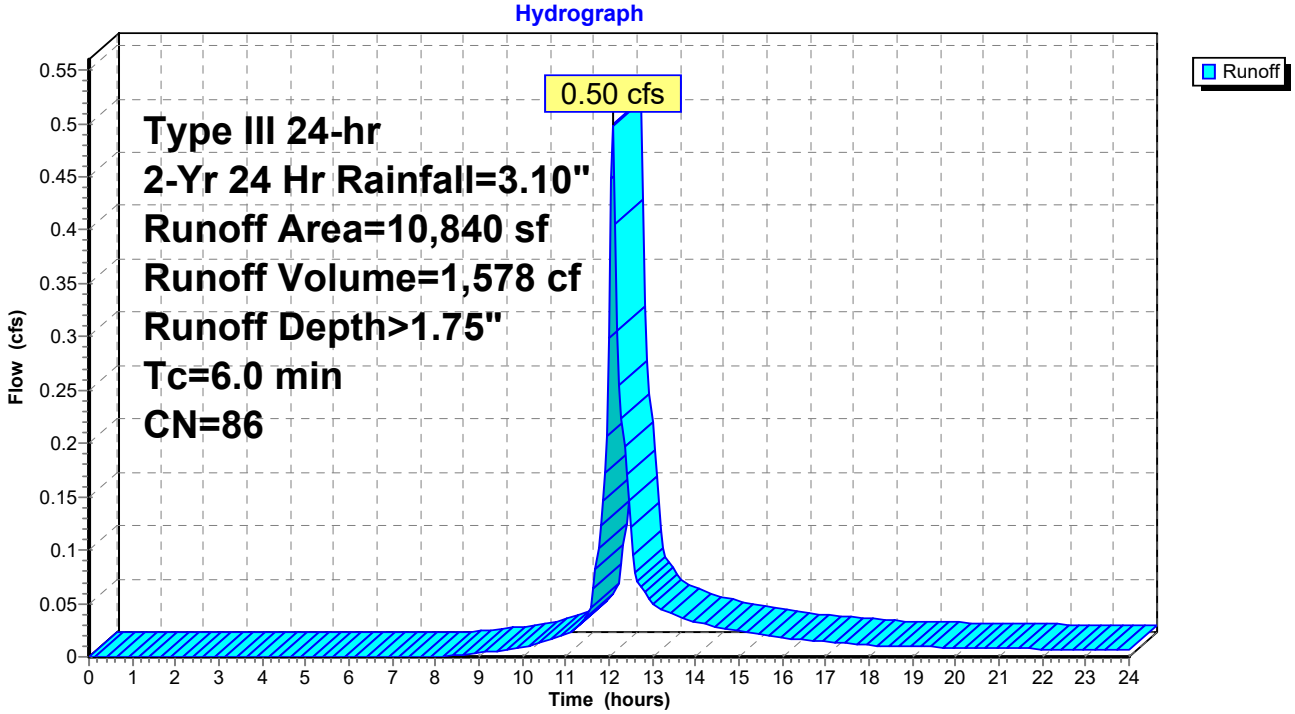
Runoff = 0.50 cfs @ 12.09 hrs, Volume= 1,578 cf, Depth> 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr 24 Hr Rainfall=3.10"

Area (sf)	CN	Description
6,258	77	Woods, Good, HSG D
4,582	98	Paved parking, HSG D
10,840	86	Weighted Average
6,258		57.73% Pervious Area
4,582		42.27% Impervious Area

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

Subcatchment EX-4:



Hydrograph for Subcatchment EX-4:

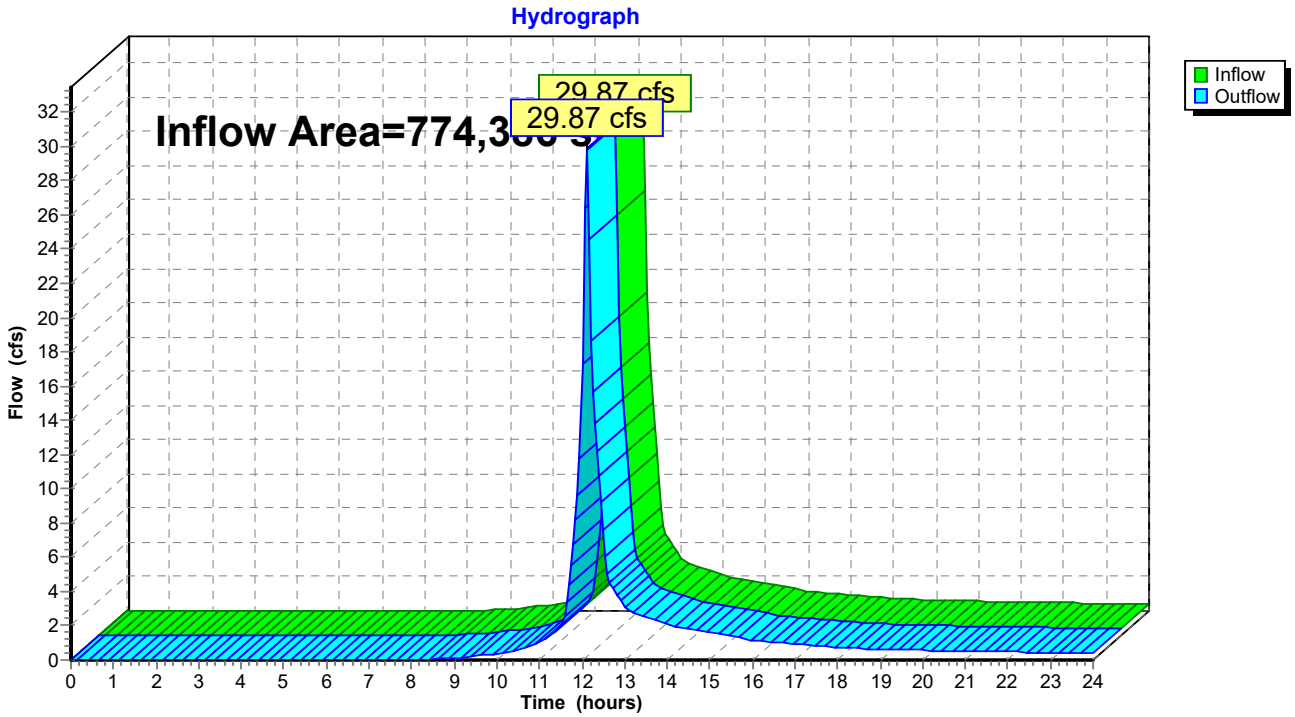
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	2.32	1.10	0.05
0.25	0.01	0.00	0.00	13.25	2.38	1.15	0.04
0.50	0.02	0.00	0.00	13.50	2.43	1.19	0.04
0.75	0.02	0.00	0.00	13.75	2.47	1.22	0.04
1.00	0.03	0.00	0.00	14.00	2.51	1.25	0.03
1.25	0.04	0.00	0.00	14.25	2.55	1.29	0.03
1.50	0.05	0.00	0.00	14.50	2.59	1.31	0.03
1.75	0.05	0.00	0.00	14.75	2.62	1.34	0.03
2.00	0.06	0.00	0.00	15.00	2.65	1.37	0.02
2.25	0.07	0.00	0.00	15.25	2.68	1.39	0.02
2.50	0.08	0.00	0.00	15.50	2.70	1.41	0.02
2.75	0.09	0.00	0.00	15.75	2.73	1.43	0.02
3.00	0.10	0.00	0.00	16.00	2.75	1.45	0.02
3.25	0.10	0.00	0.00	16.25	2.77	1.46	0.02
3.50	0.11	0.00	0.00	16.50	2.78	1.48	0.02
3.75	0.12	0.00	0.00	16.75	2.80	1.49	0.01
4.00	0.13	0.00	0.00	17.00	2.82	1.51	0.01
4.25	0.14	0.00	0.00	17.25	2.84	1.52	0.01
4.50	0.15	0.00	0.00	17.50	2.85	1.53	0.01
4.75	0.16	0.00	0.00	17.75	2.86	1.55	0.01
5.00	0.18	0.00	0.00	18.00	2.88	1.56	0.01
5.25	0.19	0.00	0.00	18.25	2.89	1.57	0.01
5.50	0.20	0.00	0.00	18.50	2.90	1.58	0.01
5.75	0.21	0.00	0.00	18.75	2.91	1.59	0.01
6.00	0.22	0.00	0.00	19.00	2.92	1.60	0.01
6.25	0.24	0.00	0.00	19.25	2.94	1.61	0.01
6.50	0.25	0.00	0.00	19.50	2.95	1.62	0.01
6.75	0.26	0.00	0.00	19.75	2.96	1.63	0.01
7.00	0.28	0.00	0.00	20.00	2.97	1.63	0.01
7.25	0.30	0.00	0.00	20.25	2.98	1.64	0.01
7.50	0.32	0.00	0.00	20.50	2.99	1.65	0.01
7.75	0.33	0.00	0.00	20.75	3.00	1.66	0.01
8.00	0.35	0.00	0.00	21.00	3.01	1.67	0.01
8.25	0.37	0.00	0.00	21.25	3.01	1.67	0.01
8.50	0.40	0.00	0.00	21.50	3.02	1.68	0.01
8.75	0.42	0.01	0.00	21.75	3.03	1.69	0.01
9.00	0.45	0.01	0.00	22.00	3.04	1.70	0.01
9.25	0.48	0.01	0.00	22.25	3.05	1.70	0.01
9.50	0.51	0.02	0.01	22.50	3.06	1.71	0.01
9.75	0.55	0.03	0.01	22.75	3.06	1.72	0.01
10.00	0.59	0.04	0.01	23.00	3.07	1.72	0.01
10.25	0.63	0.05	0.01	23.25	3.08	1.73	0.01
10.50	0.67	0.06	0.01	23.50	3.09	1.74	0.01
10.75	0.72	0.08	0.02	23.75	3.09	1.74	0.01
11.00	0.77	0.10	0.02	24.00	**3.10**	**1.75**	0.01
11.25	0.84	0.12	0.03				
11.50	0.92	0.16	0.04				
11.75	1.10	0.25	0.10				
12.00	1.55	0.53	**0.30**				
12.25	2.00	0.85	**0.25**				
12.50	2.18	0.98	0.12				
12.75	2.26	1.05	0.06				

Summary for Reach POA-1:

Inflow Area = 774,386 sf, 24.34% Impervious, Inflow Depth > 1.47" for 2-Yr 24 Hr event
Inflow = 29.87 cfs @ 12.09 hrs, Volume= 95,052 cf
Outflow = 29.87 cfs @ 12.09 hrs, Volume= 95,052 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach POA-1:



Hydrograph for Reach POA-1:

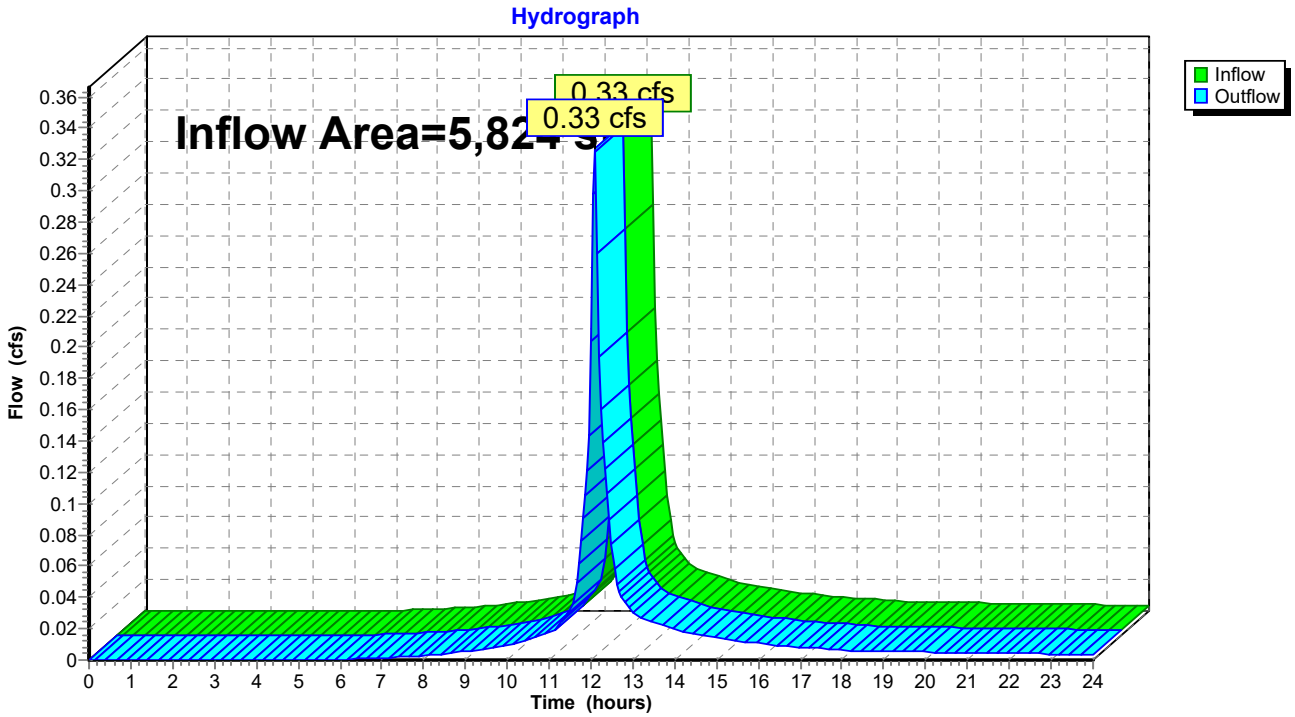
Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	13.00	3.20		3.20
0.25	0.00		0.00	13.25	2.75		2.75
0.50	0.00		0.00	13.50	2.54		2.54
0.75	0.00		0.00	13.75	2.31		2.31
1.00	0.00		0.00	14.00	2.09		2.09
1.25	0.00		0.00	14.25	1.93		1.93
1.50	0.00		0.00	14.50	1.83		1.83
1.75	0.00		0.00	14.75	1.72		1.72
2.00	0.00		0.00	15.00	1.61		1.61
2.25	0.00		0.00	15.25	1.49		1.49
2.50	0.00		0.00	15.50	1.38		1.38
2.75	0.00		0.00	15.75	1.26		1.26
3.00	0.00		0.00	16.00	1.14		1.14
3.25	0.00		0.00	16.25	1.07		1.07
3.50	0.00		0.00	16.50	1.02		1.02
3.75	0.00		0.00	16.75	0.97		0.97
4.00	0.00		0.00	17.00	0.92		0.92
4.25	0.00		0.00	17.25	0.86		0.86
4.50	0.00		0.00	17.50	0.81		0.81
4.75	0.00		0.00	17.75	0.76		0.76
5.00	0.00		0.00	18.00	0.71		0.71
5.25	0.00		0.00	18.25	0.68		0.68
5.50	0.00		0.00	18.50	0.66		0.66
5.75	0.00		0.00	18.75	0.65		0.65
6.00	0.00		0.00	19.00	0.63		0.63
6.25	0.00		0.00	19.25	0.62		0.62
6.50	0.00		0.00	19.50	0.60		0.60
6.75	0.00		0.00	19.75	0.59		0.59
7.00	0.00		0.00	20.00	0.57		0.57
7.25	0.00		0.00	20.25	0.56		0.56
7.50	0.00		0.00	20.50	0.55		0.55
7.75	0.00		0.00	20.75	0.53		0.53
8.00	0.00		0.00	21.00	0.52		0.52
8.25	0.02		0.02	21.25	0.51		0.51
8.50	0.04		0.04	21.50	0.50		0.50
8.75	0.08		0.08	21.75	0.49		0.49
9.00	0.12		0.12	22.00	0.48		0.48
9.25	0.17		0.17	22.25	0.46		0.46
9.50	0.22		0.22	22.50	0.45		0.45
9.75	0.28		0.28	22.75	0.44		0.44
10.00	0.35		0.35	23.00	0.43		0.43
10.25	0.45		0.45	23.25	0.42		0.42
10.50	0.60		0.60	23.50	0.40		0.40
10.75	0.77		0.77	23.75	0.39		0.39
11.00	0.97		0.97	24.00	0.38		0.38
11.25	1.37		1.37				
11.50	1.98		1.98				
11.75	5.51		5.51				
12.00	**17.30**		**17.30**				
12.25	**15.65**		**15.65**				
12.50	7.58		7.58				
12.75	4.05		4.05				

Summary for Reach POA-2:

Inflow Area = 5,824 sf, 66.67% Impervious, Inflow Depth > 2.16" for 2-Yr 24 Hr event
Inflow = 0.33 cfs @ 12.09 hrs, Volume= 1,050 cf
Outflow = 0.33 cfs @ 12.09 hrs, Volume= 1,050 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach POA-2:



Hydrograph for Reach POA-2:

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
0.25	0.00		0.00
0.50	0.00		0.00
0.75	0.00		0.00
1.00	0.00		0.00
1.25	0.00		0.00
1.50	0.00		0.00
1.75	0.00		0.00
2.00	0.00		0.00
2.25	0.00		0.00
2.50	0.00		0.00
2.75	0.00		0.00
3.00	0.00		0.00
3.25	0.00		0.00
3.50	0.00		0.00
3.75	0.00		0.00
4.00	0.00		0.00
4.25	0.00		0.00
4.50	0.00		0.00
4.75	0.00		0.00
5.00	0.00		0.00
5.25	0.00		0.00
5.50	0.00		0.00
5.75	0.00		0.00
6.00	0.00		0.00
6.25	0.00		0.00
6.50	0.00		0.00
6.75	0.00		0.00
7.00	0.00		0.00
7.25	0.00		0.00
7.50	0.00		0.00
7.75	0.00		0.00
8.00	0.00		0.00
8.25	0.00		0.00
8.50	0.00		0.00
8.75	0.00		0.00
9.00	0.01		0.01
9.25	0.01		0.01
9.50	0.01		0.01
9.75	0.01		0.01
10.00	0.01		0.01
10.25	0.01		0.01
10.50	0.01		0.01
10.75	0.02		0.02
11.00	0.02		0.02
11.25	0.02		0.02
11.50	0.03		0.03
11.75	0.08		0.08
12.00	**0.20**		**0.20**
12.25	**0.16**		**0.16**
12.50	0.07		0.07
12.75	0.04		0.04
13.00	0.03		0.03
13.25	0.03		0.03
13.50	0.02		0.02
13.75	0.02		0.02
14.00	0.02		0.02
14.25	0.02		0.02
14.50	0.02		0.02
14.75	0.02		0.02
15.00	0.01		0.01
15.25	0.01		0.01
15.50	0.01		0.01
15.75	0.01		0.01
16.00	0.01		0.01
16.25	0.01		0.01
16.50	0.01		0.01
16.75	0.01		0.01
17.00	0.01		0.01
17.25	0.01		0.01
17.50	0.01		0.01
17.75	0.01		0.01
18.00	0.01		0.01
18.25	0.01		0.01
18.50	0.01		0.01
18.75	0.01		0.01
19.00	0.01		0.01
19.25	0.01		0.01
19.50	0.01		0.01
19.75	0.01		0.01
20.00	0.01		0.01
20.25	0.00		0.00
20.50	0.00		0.00
20.75	0.00		0.00
21.00	0.00		0.00
21.25	0.00		0.00
21.50	0.00		0.00
21.75	0.00		0.00
22.00	0.00		0.00
22.25	0.00		0.00
22.50	0.00		0.00
22.75	0.00		0.00
23.00	0.00		0.00
23.25	0.00		0.00
23.50	0.00		0.00
23.75	0.00		0.00
24.00	0.00		0.00

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Runoff Area=473,312 sf 38.86% Impervious Runoff Depth>2.91"
Tc=6.0 min CN=85 Runoff=36.06 cfs 114,650 cf

Subcatchment EX-2: Runoff Area=290,234 sf 0.00% Impervious Runoff Depth>2.21"
Tc=6.0 min CN=77 Runoff=16.90 cfs 53,415 cf

Subcatchment EX-3: Runoff Area=5,824 sf 66.67% Impervious Runoff Depth>3.50"
Tc=6.0 min CN=91 Runoff=0.52 cfs 1,696 cf

Subcatchment EX-4: Runoff Area=10,840 sf 42.27% Impervious Runoff Depth>3.00"
Tc=6.0 min CN=86 Runoff=0.85 cfs 2,711 cf

Reach POA-1: Inflow=53.80 cfs 170,776 cf
Outflow=53.80 cfs 170,776 cf

Reach POA-2: Inflow=0.52 cfs 1,696 cf
Outflow=0.52 cfs 1,696 cf

Total Runoff Area = 780,210 sf Runoff Volume = 172,472 cf Average Runoff Depth = 2.65"
75.34% Pervious = 587,806 sf 24.66% Impervious = 192,404 sf

Summary for Subcatchment EX-1:

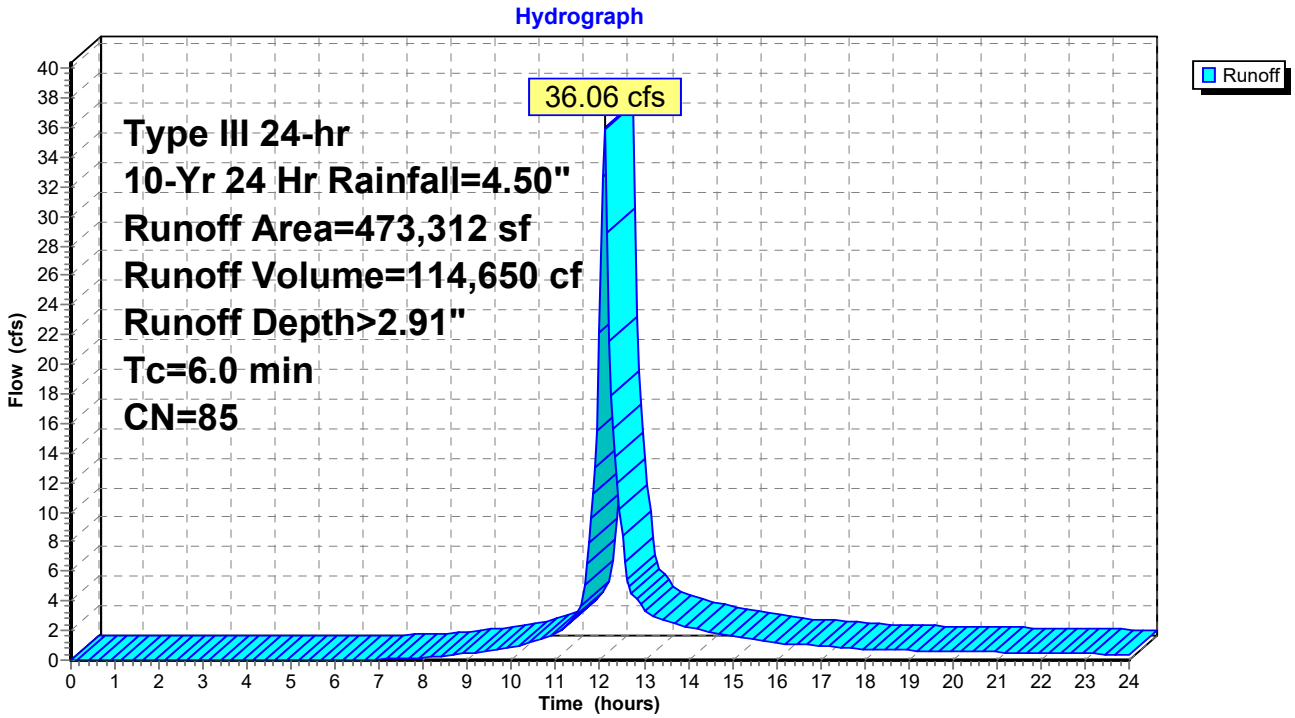
Runoff = 36.06 cfs @ 12.09 hrs, Volume= 114,650 cf, Depth> 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr 24 Hr Rainfall=4.50"

	Area (sf)	CN	Description
	30,756	79	Woods/grass comb., Good, HSG D
	236,144	77	Woods, Good, HSG D
	106,156	98	Paved parking, HSG D
	77,783	98	Roofs, HSG D
*	22,473	78	Wetlands
	473,312	85	Weighted Average
	289,373		61.14% Pervious Area
	183,939		38.86% Impervious Area

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

Subcatchment EX-1:



Hydrograph for Subcatchment EX-1:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	3.37	1.91	3.47
0.25	0.01	0.00	0.00	13.25	3.45	1.98	2.96
0.50	0.02	0.00	0.00	13.50	3.53	2.04	2.71
0.75	0.03	0.00	0.00	13.75	3.59	2.10	2.47
1.00	0.04	0.00	0.00	14.00	3.65	2.15	2.22
1.25	0.06	0.00	0.00	14.25	3.70	2.19	2.05
1.50	0.07	0.00	0.00	14.50	3.75	2.24	1.93
1.75	0.08	0.00	0.00	14.75	3.80	2.28	1.81
2.00	0.09	0.00	0.00	15.00	3.84	2.32	1.69
2.25	0.10	0.00	0.00	15.25	3.88	2.36	1.56
2.50	0.11	0.00	0.00	15.50	3.92	2.39	1.44
2.75	0.13	0.00	0.00	15.75	3.96	2.42	1.32
3.00	0.14	0.00	0.00	16.00	3.99	2.45	1.19
3.25	0.15	0.00	0.00	16.25	4.02	2.47	1.11
3.50	0.17	0.00	0.00	16.50	4.04	2.50	1.06
3.75	0.18	0.00	0.00	16.75	4.07	2.52	1.00
4.00	0.19	0.00	0.00	17.00	4.09	2.54	0.95
4.25	0.21	0.00	0.00	17.25	4.12	2.56	0.89
4.50	0.22	0.00	0.00	17.50	4.14	2.58	0.84
4.75	0.24	0.00	0.00	17.75	4.16	2.60	0.79
5.00	0.26	0.00	0.00	18.00	4.18	2.62	0.73
5.25	0.27	0.00	0.00	18.25	4.19	2.63	0.70
5.50	0.29	0.00	0.00	18.50	4.21	2.65	0.68
5.75	0.31	0.00	0.00	18.75	4.23	2.66	0.67
6.00	0.32	0.00	0.00	19.00	4.24	2.68	0.65
6.25	0.34	0.00	0.00	19.25	4.26	2.69	0.64
6.50	0.36	0.00	0.00	19.50	4.28	2.71	0.62
6.75	0.38	0.00	0.02	19.75	4.29	2.72	0.60
7.00	0.41	0.00	0.05	20.00	4.31	2.73	0.59
7.25	0.43	0.00	0.08	20.25	4.32	2.75	0.57
7.50	0.46	0.01	0.11	20.50	4.34	2.76	0.56
7.75	0.48	0.01	0.15	20.75	4.35	2.77	0.55
8.00	0.51	0.01	0.19	21.00	4.36	2.78	0.54
8.25	0.54	0.02	0.24	21.25	4.38	2.80	0.52
8.50	0.58	0.03	0.31	21.50	4.39	2.81	0.51
8.75	0.62	0.03	0.38	21.75	4.40	2.82	0.50
9.00	0.66	0.04	0.47	22.00	4.41	2.83	0.49
9.25	0.70	0.06	0.56	22.25	4.43	2.84	0.47
9.50	0.75	0.07	0.67	22.50	4.44	2.85	0.46
9.75	0.80	0.09	0.78	22.75	4.45	2.86	0.45
10.00	0.85	0.11	0.90	23.00	4.46	2.87	0.44
10.25	0.91	0.13	1.07	23.25	4.47	2.88	0.42
10.50	0.97	0.16	1.28	23.50	4.48	2.89	0.41
10.75	1.05	0.20	1.51	23.75	4.49	2.90	0.40
11.00	1.13	0.23	1.76	24.00	**4.50**	**2.91**	0.39
11.25	1.22	0.29	2.32				
11.50	1.34	0.35	3.13				
11.75	1.60	0.52	7.99				
12.00	2.25	0.98	**22.11**				
12.25	2.90	1.51	**17.88**				
12.50	3.16	1.72	8.36				
12.75	3.28	1.83	4.42				

Summary for Subcatchment EX-2:

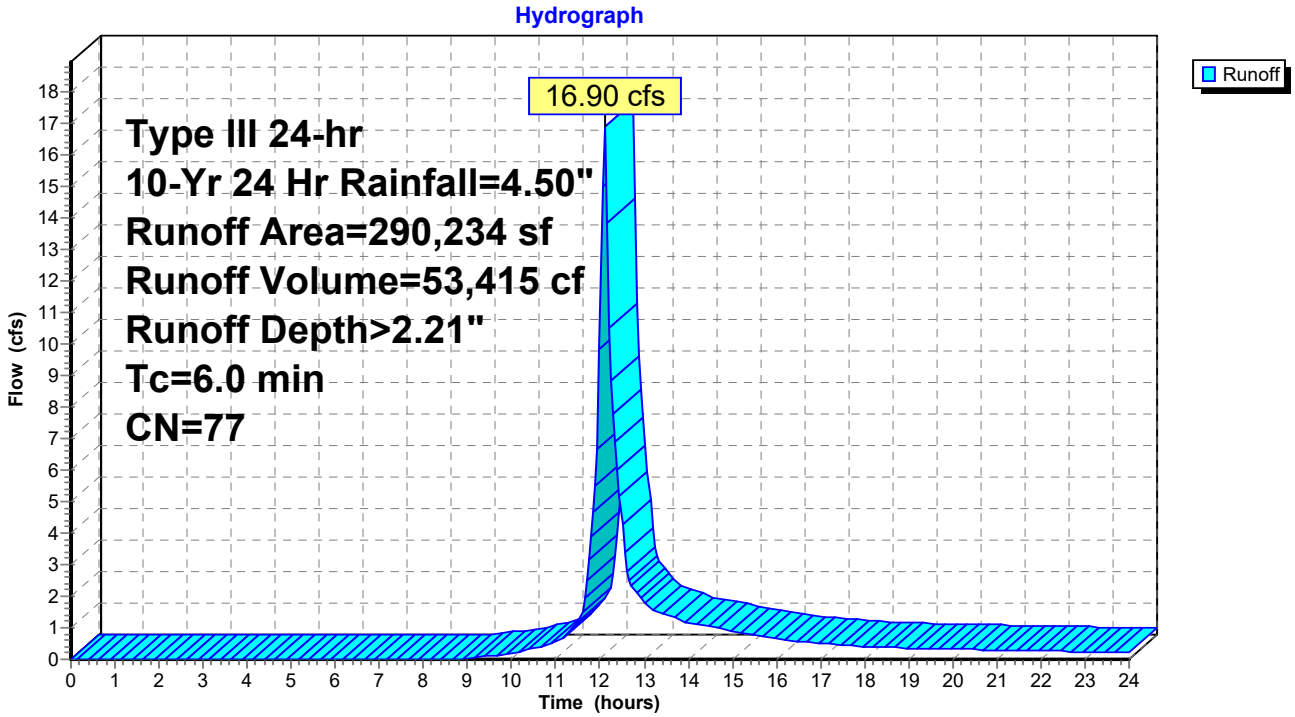
Runoff = 16.90 cfs @ 12.09 hrs, Volume= 53,415 cf, Depth> 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr 24 Hr Rainfall=4.50"

	Area (sf)	CN	Description
	285,671	77	Woods, Good, HSG D
*	4,563	78	Wetlands
	290,234	77	Weighted Average
	290,234		100.00% Pervious Area

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

Subcatchment EX-2:



Hydrograph for Subcatchment EX-2:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	3.37	1.34	1.80
0.25	0.01	0.00	0.00	13.25	3.45	1.40	1.54
0.50	0.02	0.00	0.00	13.50	3.53	1.45	1.42
0.75	0.03	0.00	0.00	13.75	3.59	1.50	1.30
1.00	0.04	0.00	0.00	14.00	3.65	1.54	1.17
1.25	0.06	0.00	0.00	14.25	3.70	1.58	1.08
1.50	0.07	0.00	0.00	14.50	3.75	1.62	1.02
1.75	0.08	0.00	0.00	14.75	3.80	1.66	0.96
2.00	0.09	0.00	0.00	15.00	3.84	1.69	0.90
2.25	0.10	0.00	0.00	15.25	3.88	1.72	0.83
2.50	0.11	0.00	0.00	15.50	3.92	1.75	0.77
2.75	0.13	0.00	0.00	15.75	3.96	1.78	0.70
3.00	0.14	0.00	0.00	16.00	3.99	1.80	0.64
3.25	0.15	0.00	0.00	16.25	4.02	1.82	0.60
3.50	0.17	0.00	0.00	16.50	4.04	1.85	0.57
3.75	0.18	0.00	0.00	16.75	4.07	1.87	0.54
4.00	0.19	0.00	0.00	17.00	4.09	1.88	0.51
4.25	0.21	0.00	0.00	17.25	4.12	1.90	0.48
4.50	0.22	0.00	0.00	17.50	4.14	1.92	0.45
4.75	0.24	0.00	0.00	17.75	4.16	1.94	0.42
5.00	0.26	0.00	0.00	18.00	4.18	1.95	0.39
5.25	0.27	0.00	0.00	18.25	4.19	1.96	0.38
5.50	0.29	0.00	0.00	18.50	4.21	1.98	0.37
5.75	0.31	0.00	0.00	18.75	4.23	1.99	0.36
6.00	0.32	0.00	0.00	19.00	4.24	2.01	0.35
6.25	0.34	0.00	0.00	19.25	4.26	2.02	0.34
6.50	0.36	0.00	0.00	19.50	4.28	2.03	0.34
6.75	0.38	0.00	0.00	19.75	4.29	2.04	0.33
7.00	0.41	0.00	0.00	20.00	4.31	2.05	0.32
7.25	0.43	0.00	0.00	20.25	4.32	2.07	0.31
7.50	0.46	0.00	0.00	20.50	4.34	2.08	0.30
7.75	0.48	0.00	0.00	20.75	4.35	2.09	0.30
8.00	0.51	0.00	0.00	21.00	4.36	2.10	0.29
8.25	0.54	0.00	0.00	21.25	4.38	2.11	0.28
8.50	0.58	0.00	0.00	21.50	4.39	2.12	0.28
8.75	0.62	0.00	0.00	21.75	4.40	2.13	0.27
9.00	0.66	0.00	0.03	22.00	4.41	2.14	0.26
9.25	0.70	0.00	0.07	22.25	4.43	2.15	0.26
9.50	0.75	0.01	0.11	22.50	4.44	2.16	0.25
9.75	0.80	0.01	0.15	22.75	4.45	2.17	0.24
10.00	0.85	0.02	0.20	23.00	4.46	2.18	0.24
10.25	0.91	0.03	0.27	23.25	4.47	2.19	0.23
10.50	0.97	0.04	0.36	23.50	4.48	2.19	0.22
10.75	1.05	0.06	0.45	23.75	4.49	2.20	0.22
11.00	1.13	0.08	0.57	24.00	**4.50**	**2.21**	0.21
11.25	1.22	0.11	0.80				
11.50	1.34	0.15	1.14				
11.75	1.60	0.25	3.16				
12.00	2.25	0.59	**9.83**				
12.25	2.90	1.00	**8.81**				
12.50	3.16	1.18	4.25				
12.75	3.28	1.27	2.27				

Summary for Subcatchment EX-3:

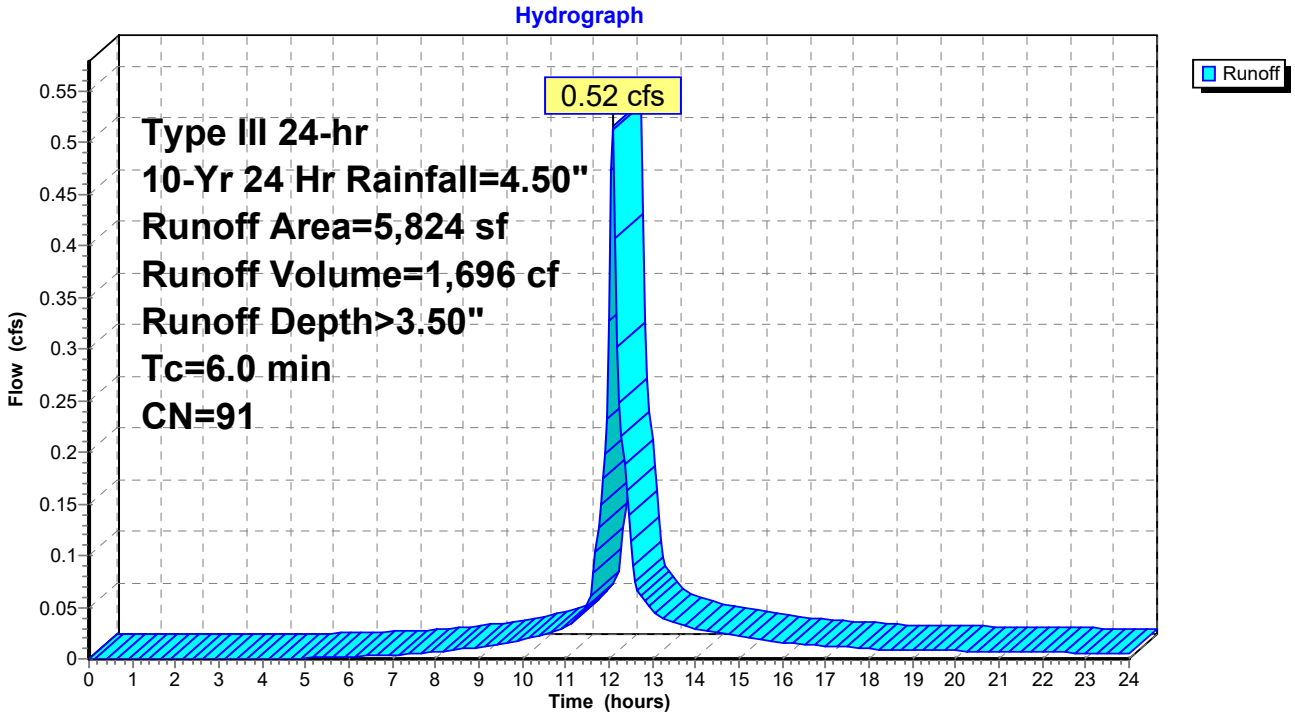
Runoff = 0.52 cfs @ 12.09 hrs, Volume= 1,696 cf, Depth> 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr 24 Hr Rainfall=4.50"

Area (sf)	CN	Description
3,883	98	Paved parking, HSG D
1,941	77	Woods, Good, HSG D
5,824	91	Weighted Average
1,941		33.33% Pervious Area
3,883		66.67% Impervious Area

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

Subcatchment EX-3:



Hydrograph for Subcatchment EX-3:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	3.37	2.42	0.05
0.25	0.01	0.00	0.00	13.25	3.45	2.50	0.04
0.50	0.02	0.00	0.00	13.50	3.53	2.57	0.04
0.75	0.03	0.00	0.00	13.75	3.59	2.63	0.03
1.00	0.04	0.00	0.00	14.00	3.65	2.68	0.03
1.25	0.06	0.00	0.00	14.25	3.70	2.73	0.03
1.50	0.07	0.00	0.00	14.50	3.75	2.78	0.03
1.75	0.08	0.00	0.00	14.75	3.80	2.83	0.02
2.00	0.09	0.00	0.00	15.00	3.84	2.87	0.02
2.25	0.10	0.00	0.00	15.25	3.88	2.91	0.02
2.50	0.11	0.00	0.00	15.50	3.92	2.94	0.02
2.75	0.13	0.00	0.00	15.75	3.96	2.98	0.02
3.00	0.14	0.00	0.00	16.00	3.99	3.00	0.02
3.25	0.15	0.00	0.00	16.25	4.02	3.03	0.01
3.50	0.17	0.00	0.00	16.50	4.04	3.06	0.01
3.75	0.18	0.00	0.00	16.75	4.07	3.08	0.01
4.00	0.19	0.00	0.00	17.00	4.09	3.11	0.01
4.25	0.21	0.00	0.00	17.25	4.12	3.13	0.01
4.50	0.22	0.00	0.00	17.50	4.14	3.15	0.01
4.75	0.24	0.00	0.00	17.75	4.16	3.17	0.01
5.00	0.26	0.00	0.00	18.00	4.18	3.19	0.01
5.25	0.27	0.01	0.00	18.25	4.19	3.20	0.01
5.50	0.29	0.01	0.00	18.50	4.21	3.22	0.01
5.75	0.31	0.01	0.00	18.75	4.23	3.24	0.01
6.00	0.32	0.01	0.00	19.00	4.24	3.25	0.01
6.25	0.34	0.02	0.00	19.25	4.26	3.27	0.01
6.50	0.36	0.02	0.00	19.50	4.28	3.28	0.01
6.75	0.38	0.03	0.00	19.75	4.29	3.30	0.01
7.00	0.41	0.04	0.00	20.00	4.31	3.31	0.01
7.25	0.43	0.04	0.00	20.25	4.32	3.33	0.01
7.50	0.46	0.05	0.01	20.50	4.34	3.34	0.01
7.75	0.48	0.06	0.01	20.75	4.35	3.35	0.01
8.00	0.51	0.08	0.01	21.00	4.36	3.37	0.01
8.25	0.54	0.09	0.01	21.25	4.38	3.38	0.01
8.50	0.58	0.11	0.01	21.50	4.39	3.39	0.01
8.75	0.62	0.12	0.01	21.75	4.40	3.40	0.01
9.00	0.66	0.15	0.01	22.00	4.41	3.41	0.01
9.25	0.70	0.17	0.01	22.25	4.43	3.43	0.01
9.50	0.75	0.20	0.01	22.50	4.44	3.44	0.01
9.75	0.80	0.23	0.02	22.75	4.45	3.45	0.01
10.00	0.85	0.26	0.02	23.00	4.46	3.46	0.01
10.25	0.91	0.30	0.02	23.25	4.47	3.47	0.01
10.50	0.97	0.34	0.02	23.50	4.48	3.48	0.01
10.75	1.05	0.39	0.03	23.75	4.49	3.49	0.01
11.00	1.13	0.45	0.03	24.00	**4.50**	**3.50**	0.01
11.25	1.22	0.52	0.04				
11.50	1.34	0.61	0.05				
11.75	1.60	0.82	0.13				
12.00	2.25	1.38	**0.33**				
12.25	2.90	1.98	**0.25**				
12.50	3.16	2.22	0.11				
12.75	3.28	2.33	0.06				

Summary for Subcatchment EX-4:

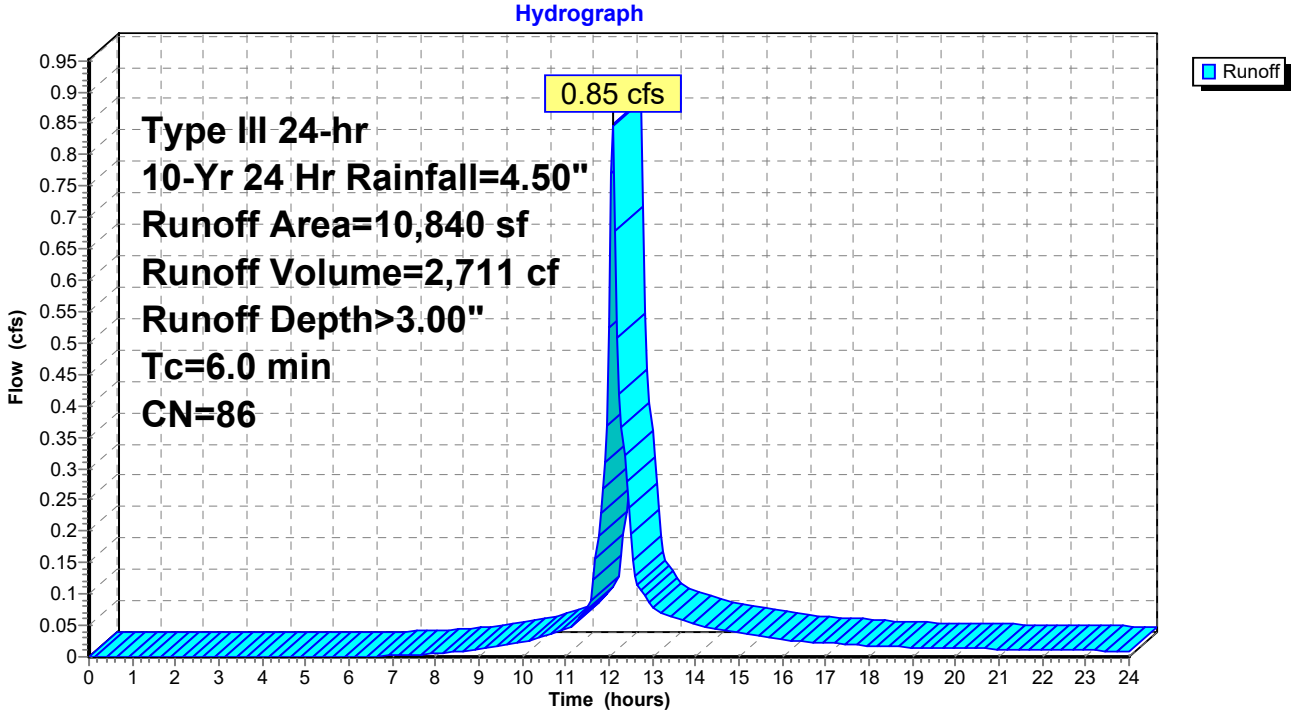
Runoff = 0.85 cfs @ 12.09 hrs, Volume= 2,711 cf, Depth> 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr 24 Hr Rainfall=4.50"

Area (sf)	CN	Description
6,258	77	Woods, Good, HSG D
4,582	98	Paved parking, HSG D
10,840	86	Weighted Average
6,258		57.73% Pervious Area
4,582		42.27% Impervious Area

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

Subcatchment EX-4:



Hydrograph for Subcatchment EX-4:

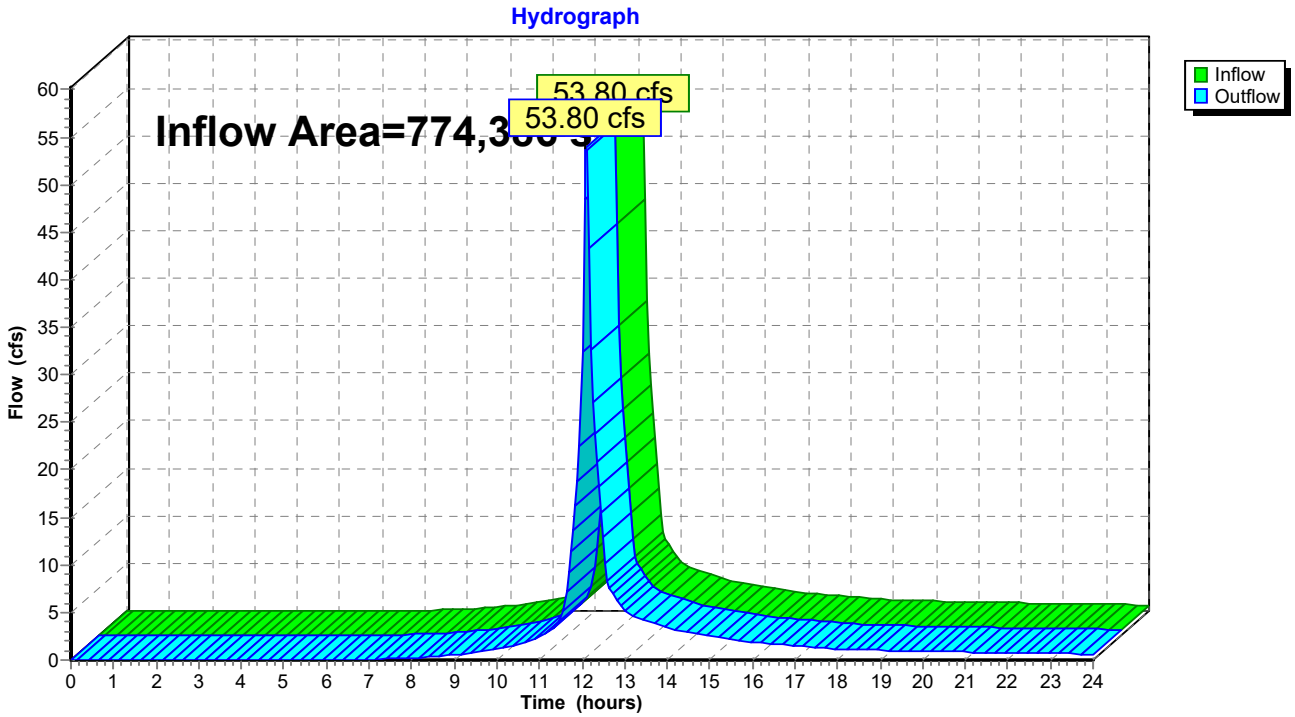
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	3.37	1.99	0.08
0.25	0.01	0.00	0.00	13.25	3.45	2.06	0.07
0.50	0.02	0.00	0.00	13.50	3.53	2.12	0.06
0.75	0.03	0.00	0.00	13.75	3.59	2.18	0.06
1.00	0.04	0.00	0.00	14.00	3.65	2.23	0.05
1.25	0.06	0.00	0.00	14.25	3.70	2.28	0.05
1.50	0.07	0.00	0.00	14.50	3.75	2.32	0.04
1.75	0.08	0.00	0.00	14.75	3.80	2.37	0.04
2.00	0.09	0.00	0.00	15.00	3.84	2.41	0.04
2.25	0.10	0.00	0.00	15.25	3.88	2.44	0.04
2.50	0.11	0.00	0.00	15.50	3.92	2.48	0.03
2.75	0.13	0.00	0.00	15.75	3.96	2.51	0.03
3.00	0.14	0.00	0.00	16.00	3.99	2.53	0.03
3.25	0.15	0.00	0.00	16.25	4.02	2.56	0.03
3.50	0.17	0.00	0.00	16.50	4.04	2.59	0.02
3.75	0.18	0.00	0.00	16.75	4.07	2.61	0.02
4.00	0.19	0.00	0.00	17.00	4.09	2.63	0.02
4.25	0.21	0.00	0.00	17.25	4.12	2.65	0.02
4.50	0.22	0.00	0.00	17.50	4.14	2.67	0.02
4.75	0.24	0.00	0.00	17.75	4.16	2.69	0.02
5.00	0.26	0.00	0.00	18.00	4.18	2.71	0.02
5.25	0.27	0.00	0.00	18.25	4.19	2.72	0.02
5.50	0.29	0.00	0.00	18.50	4.21	2.74	0.02
5.75	0.31	0.00	0.00	18.75	4.23	2.75	0.02
6.00	0.32	0.00	0.00	19.00	4.24	2.77	0.02
6.25	0.34	0.00	0.00	19.25	4.26	2.78	0.01
6.50	0.36	0.00	0.00	19.50	4.28	2.80	0.01
6.75	0.38	0.00	0.00	19.75	4.29	2.81	0.01
7.00	0.41	0.00	0.00	20.00	4.31	2.83	0.01
7.25	0.43	0.01	0.00	20.25	4.32	2.84	0.01
7.50	0.46	0.01	0.00	20.50	4.34	2.85	0.01
7.75	0.48	0.01	0.00	20.75	4.35	2.86	0.01
8.00	0.51	0.02	0.01	21.00	4.36	2.88	0.01
8.25	0.54	0.03	0.01	21.25	4.38	2.89	0.01
8.50	0.58	0.03	0.01	21.50	4.39	2.90	0.01
8.75	0.62	0.04	0.01	21.75	4.40	2.91	0.01
9.00	0.66	0.06	0.01	22.00	4.41	2.92	0.01
9.25	0.70	0.07	0.01	22.25	4.43	2.93	0.01
9.50	0.75	0.09	0.02	22.50	4.44	2.95	0.01
9.75	0.80	0.11	0.02	22.75	4.45	2.96	0.01
10.00	0.85	0.13	0.02	23.00	4.46	2.97	0.01
10.25	0.91	0.15	0.03	23.25	4.47	2.98	0.01
10.50	0.97	0.18	0.03	23.50	4.48	2.99	0.01
10.75	1.05	0.22	0.04	23.75	4.49	2.99	0.01
11.00	1.13	0.26	0.04	24.00	**4.50**	**3.00**	0.01
11.25	1.22	0.32	0.06				
11.50	1.34	0.39	0.08				
11.75	1.60	0.56	0.19				
12.00	2.25	1.04	**0.52**				
12.25	2.90	1.58	**0.42**				
12.50	3.16	1.80	0.20				
12.75	3.28	1.90	0.10				

Summary for Reach POA-1:

Inflow Area = 774,386 sf, 24.34% Impervious, Inflow Depth > 2.65" for 10-Yr 24 Hr event
Inflow = 53.80 cfs @ 12.09 hrs, Volume= 170,776 cf
Outflow = 53.80 cfs @ 12.09 hrs, Volume= 170,776 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach POA-1:



Hydrograph for Reach POA-1:

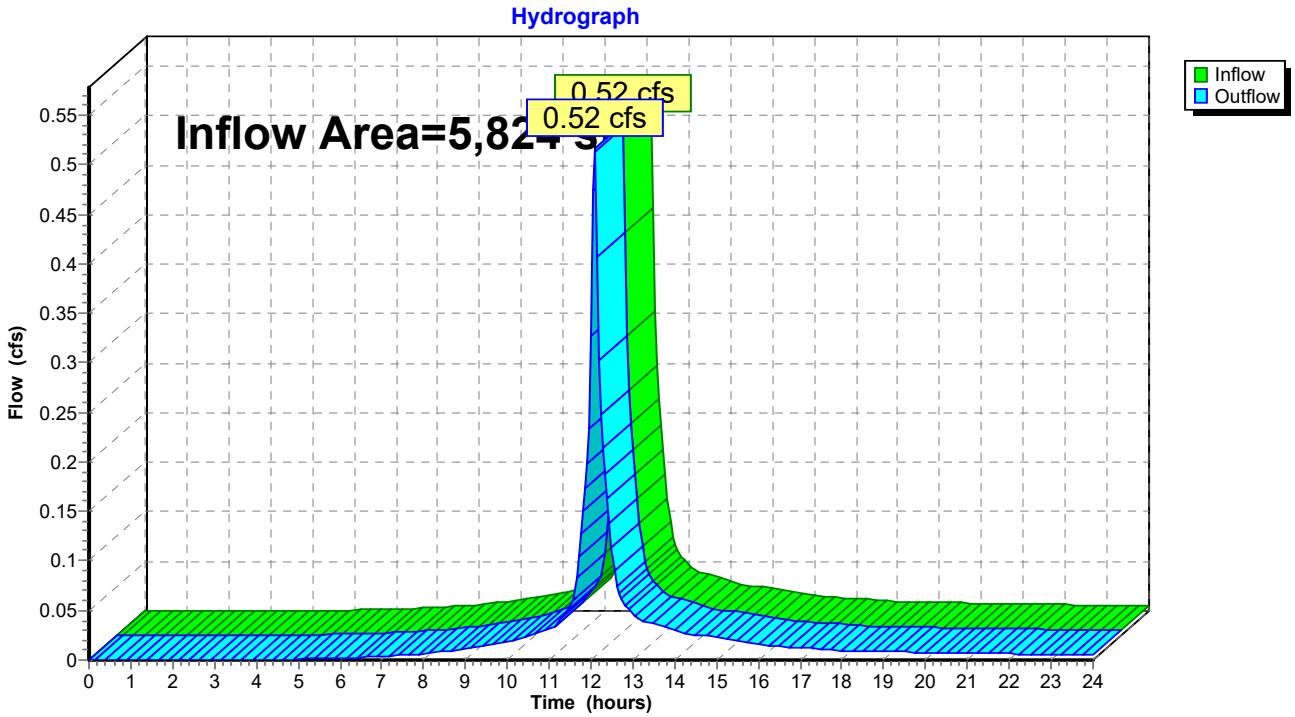
Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	13.00	5.34		5.34
0.25	0.00		0.00	13.25	4.57		4.57
0.50	0.00		0.00	13.50	4.20		4.20
0.75	0.00		0.00	13.75	3.82		3.82
1.00	0.00		0.00	14.00	3.43		3.43
1.25	0.00		0.00	14.25	3.18		3.18
1.50	0.00		0.00	14.50	2.99		2.99
1.75	0.00		0.00	14.75	2.81		2.81
2.00	0.00		0.00	15.00	2.62		2.62
2.25	0.00		0.00	15.25	2.43		2.43
2.50	0.00		0.00	15.50	2.24		2.24
2.75	0.00		0.00	15.75	2.05		2.05
3.00	0.00		0.00	16.00	1.86		1.86
3.25	0.00		0.00	16.25	1.73		1.73
3.50	0.00		0.00	16.50	1.65		1.65
3.75	0.00		0.00	16.75	1.57		1.57
4.00	0.00		0.00	17.00	1.48		1.48
4.25	0.00		0.00	17.25	1.40		1.40
4.50	0.00		0.00	17.50	1.31		1.31
4.75	0.00		0.00	17.75	1.23		1.23
5.00	0.00		0.00	18.00	1.14		1.14
5.25	0.00		0.00	18.25	1.09		1.09
5.50	0.00		0.00	18.50	1.07		1.07
5.75	0.00		0.00	18.75	1.04		1.04
6.00	0.00		0.00	19.00	1.02		1.02
6.25	0.00		0.00	19.25	0.99		0.99
6.50	0.00		0.00	19.50	0.97		0.97
6.75	0.03		0.03	19.75	0.94		0.94
7.00	0.05		0.05	20.00	0.92		0.92
7.25	0.08		0.08	20.25	0.90		0.90
7.50	0.12		0.12	20.50	0.88		0.88
7.75	0.15		0.15	20.75	0.86		0.86
8.00	0.19		0.19	21.00	0.84		0.84
8.25	0.25		0.25	21.25	0.82		0.82
8.50	0.32		0.32	21.50	0.80		0.80
8.75	0.40		0.40	21.75	0.78		0.78
9.00	0.51		0.51	22.00	0.76		0.76
9.25	0.64		0.64	22.25	0.74		0.74
9.50	0.79		0.79	22.50	0.72		0.72
9.75	0.95		0.95	22.75	0.70		0.70
10.00	1.12		1.12	23.00	0.68		0.68
10.25	1.36		1.36	23.25	0.67		0.67
10.50	1.67		1.67	23.50	0.65		0.65
10.75	2.00		2.00	23.75	0.63		0.63
11.00	2.37		2.37	24.00	0.61		0.61
11.25	3.17		3.17				
11.50	4.35		4.35				
11.75	11.34		11.34				
12.00	**32.47**		**32.47**				
12.25	**27.11**		**27.11**				
12.50	12.81		12.81				
12.75	6.80		6.80				

Summary for Reach POA-2:

Inflow Area = 5,824 sf, 66.67% Impervious, Inflow Depth > 3.50" for 10-Yr 24 Hr event
Inflow = 0.52 cfs @ 12.09 hrs, Volume= 1,696 cf
Outflow = 0.52 cfs @ 12.09 hrs, Volume= 1,696 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach POA-2:



Hydrograph for Reach POA-2:

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
0.25	0.00		0.00
0.50	0.00		0.00
0.75	0.00		0.00
1.00	0.00		0.00
1.25	0.00		0.00
1.50	0.00		0.00
1.75	0.00		0.00
2.00	0.00		0.00
2.25	0.00		0.00
2.50	0.00		0.00
2.75	0.00		0.00
3.00	0.00		0.00
3.25	0.00		0.00
3.50	0.00		0.00
3.75	0.00		0.00
4.00	0.00		0.00
4.25	0.00		0.00
4.50	0.00		0.00
4.75	0.00		0.00
5.00	0.00		0.00
5.25	0.00		0.00
5.50	0.00		0.00
5.75	0.00		0.00
6.00	0.00		0.00
6.25	0.00		0.00
6.50	0.00		0.00
6.75	0.00		0.00
7.00	0.00		0.00
7.25	0.00		0.00
7.50	0.01		0.01
7.75	0.01		0.01
8.00	0.01		0.01
8.25	0.01		0.01
8.50	0.01		0.01
8.75	0.01		0.01
9.00	0.01		0.01
9.25	0.01		0.01
9.50	0.01		0.01
9.75	0.02		0.02
10.00	0.02		0.02
10.25	0.02		0.02
10.50	0.02		0.02
10.75	0.03		0.03
11.00	0.03		0.03
11.25	0.04		0.04
11.50	0.05		0.05
11.75	0.13		0.13
12.00	**0.33**		**0.33**
12.25	**0.25**		**0.25**
12.50	0.11		0.11
12.75	0.06		0.06
13.00	0.05		0.05
13.25	0.04		0.04
13.50	0.04		0.04
13.75	0.03		0.03
14.00	0.03		0.03
14.25	0.03		0.03
14.50	0.03		0.03
14.75	0.02		0.02
15.00	0.02		0.02
15.25	0.02		0.02
15.50	0.02		0.02
15.75	0.02		0.02
16.00	0.02		0.02
16.25	0.01		0.01
16.50	0.01		0.01
16.75	0.01		0.01
17.00	0.01		0.01
17.25	0.01		0.01
17.50	0.01		0.01
17.75	0.01		0.01
18.00	0.01		0.01
18.25	0.01		0.01
18.50	0.01		0.01
18.75	0.01		0.01
19.00	0.01		0.01
19.25	0.01		0.01
19.50	0.01		0.01
19.75	0.01		0.01
20.00	0.01		0.01
20.25	0.01		0.01
20.50	0.01		0.01
20.75	0.01		0.01
21.00	0.01		0.01
21.25	0.01		0.01
21.50	0.01		0.01
21.75	0.01		0.01
22.00	0.01		0.01
22.25	0.01		0.01
22.50	0.01		0.01
22.75	0.01		0.01
23.00	0.01		0.01
23.25	0.01		0.01
23.50	0.01		0.01
23.75	0.01		0.01
24.00	0.01		0.01

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Runoff Area=473,312 sf 38.86% Impervious Runoff Depth>3.64"
Tc=6.0 min CN=85 Runoff=44.87 cfs 143,709 cf

Subcatchment EX-2: Runoff Area=290,234 sf 0.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=77 Runoff=22.03 cfs 69,493 cf

Subcatchment EX-3: Runoff Area=5,824 sf 66.67% Impervious Runoff Depth>4.27"
Tc=6.0 min CN=91 Runoff=0.62 cfs 2,073 cf

Subcatchment EX-4: Runoff Area=10,840 sf 42.27% Impervious Runoff Depth>3.75"
Tc=6.0 min CN=86 Runoff=1.05 cfs 3,383 cf

Reach POA-1: Inflow=67.94 cfs 216,585 cf
Outflow=67.94 cfs 216,585 cf

Reach POA-2: Inflow=0.62 cfs 2,073 cf
Outflow=0.62 cfs 2,073 cf

Total Runoff Area = 780,210 sf Runoff Volume = 218,658 cf Average Runoff Depth = 3.36"
75.34% Pervious = 587,806 sf 24.66% Impervious = 192,404 sf

Summary for Subcatchment EX-1:

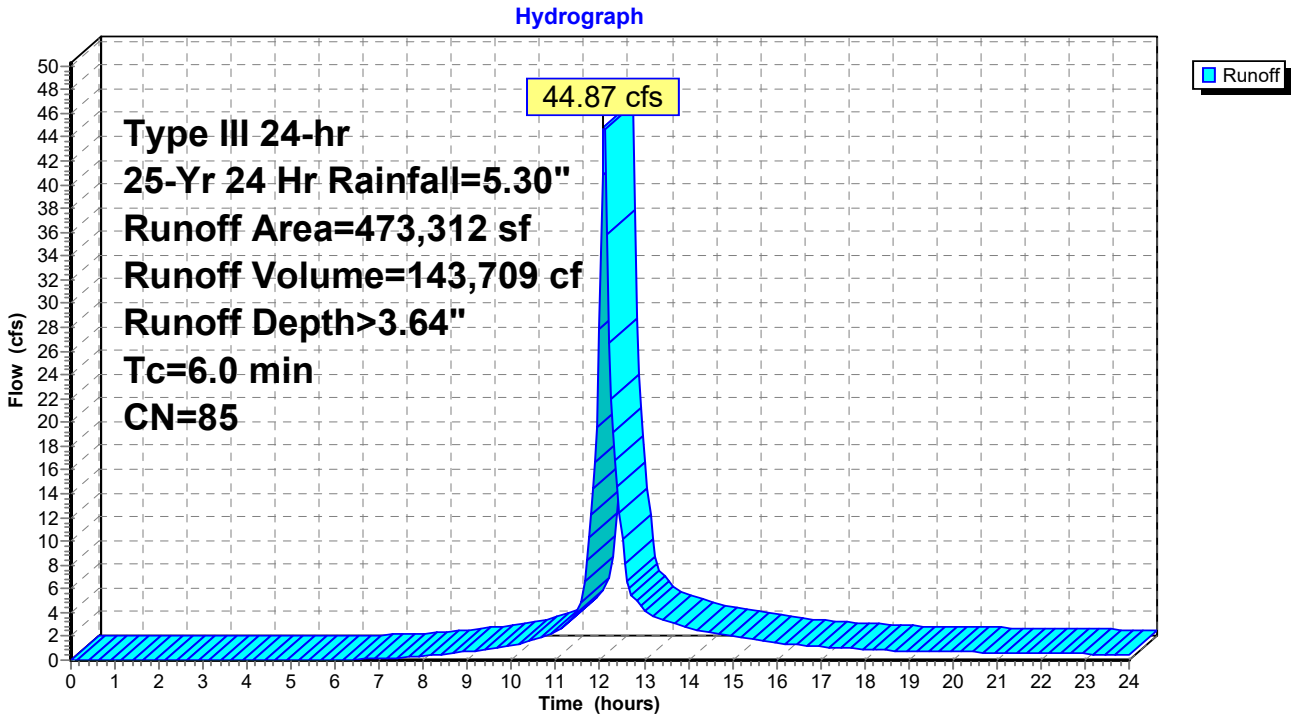
Runoff = 44.87 cfs @ 12.09 hrs, Volume= 143,709 cf, Depth> 3.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr 24 Hr Rainfall=5.30"

	Area (sf)	CN	Description
	30,756	79	Woods/grass comb., Good, HSG D
	236,144	77	Woods, Good, HSG D
	106,156	98	Paved parking, HSG D
	77,783	98	Roofs, HSG D
*	22,473	78	Wetlands
	473,312	85	Weighted Average
	289,373		61.14% Pervious Area
	183,939		38.86% Impervious Area

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

Subcatchment EX-1:



Hydrograph for Subcatchment EX-1:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	3.97	2.44	4.22
0.25	0.01	0.00	0.00	13.25	4.07	2.52	3.60
0.50	0.03	0.00	0.00	13.50	4.15	2.59	3.30
0.75	0.04	0.00	0.00	13.75	4.23	2.66	2.99
1.00	0.05	0.00	0.00	14.00	4.30	2.73	2.69
1.25	0.07	0.00	0.00	14.25	4.36	2.78	2.48
1.50	0.08	0.00	0.00	14.50	4.42	2.84	2.34
1.75	0.09	0.00	0.00	14.75	4.48	2.89	2.19
2.00	0.11	0.00	0.00	15.00	4.53	2.93	2.04
2.25	0.12	0.00	0.00	15.25	4.58	2.98	1.89
2.50	0.13	0.00	0.00	15.50	4.62	3.02	1.74
2.75	0.15	0.00	0.00	15.75	4.66	3.05	1.59
3.00	0.16	0.00	0.00	16.00	4.70	3.09	1.44
3.25	0.18	0.00	0.00	16.25	4.73	3.12	1.34
3.50	0.19	0.00	0.00	16.50	4.76	3.15	1.28
3.75	0.21	0.00	0.00	16.75	4.79	3.18	1.21
4.00	0.23	0.00	0.00	17.00	4.82	3.20	1.15
4.25	0.25	0.00	0.00	17.25	4.85	3.23	1.08
4.50	0.26	0.00	0.00	17.50	4.87	3.25	1.01
4.75	0.28	0.00	0.00	17.75	4.90	3.27	0.95
5.00	0.30	0.00	0.00	18.00	4.92	3.29	0.88
5.25	0.32	0.00	0.00	18.25	4.94	3.31	0.84
5.50	0.34	0.00	0.00	18.50	4.96	3.33	0.82
5.75	0.36	0.00	0.00	18.75	4.98	3.35	0.81
6.00	0.38	0.00	0.02	19.00	5.00	3.37	0.79
6.25	0.40	0.00	0.05	19.25	5.02	3.38	0.77
6.50	0.43	0.00	0.07	19.50	5.04	3.40	0.75
6.75	0.45	0.01	0.11	19.75	5.05	3.42	0.73
7.00	0.48	0.01	0.14	20.00	5.07	3.43	0.71
7.25	0.51	0.01	0.18	20.25	5.09	3.45	0.69
7.50	0.54	0.02	0.23	20.50	5.11	3.47	0.67
7.75	0.57	0.02	0.28	20.75	5.12	3.48	0.66
8.00	0.60	0.03	0.33	21.00	5.14	3.50	0.65
8.25	0.64	0.04	0.40	21.25	5.15	3.51	0.63
8.50	0.68	0.05	0.50	21.50	5.17	3.52	0.62
8.75	0.72	0.06	0.60	21.75	5.18	3.54	0.60
9.00	0.77	0.08	0.71	22.00	5.20	3.55	0.59
9.25	0.82	0.10	0.84	22.25	5.21	3.56	0.57
9.50	0.88	0.12	0.97	22.50	5.23	3.58	0.56
9.75	0.94	0.15	1.11	22.75	5.24	3.59	0.54
10.00	1.00	0.17	1.27	23.00	5.25	3.60	0.53
10.25	1.07	0.21	1.48	23.25	5.26	3.61	0.51
10.50	1.15	0.25	1.75	23.50	5.28	3.62	0.50
10.75	1.23	0.29	2.04	23.75	5.29	3.64	0.48
11.00	1.33	0.35	2.36	24.00	**5.30**	**3.65**	0.46
11.25	1.44	0.41	3.07				
11.50	1.58	0.50	4.10				
11.75	1.88	0.71	10.29				
12.00	2.65	1.30	**27.82**				
12.25	3.42	1.94	**21.99**				
12.50	3.72	2.21	10.22				
12.75	3.86	2.34	5.39				

Summary for Subcatchment EX-2:

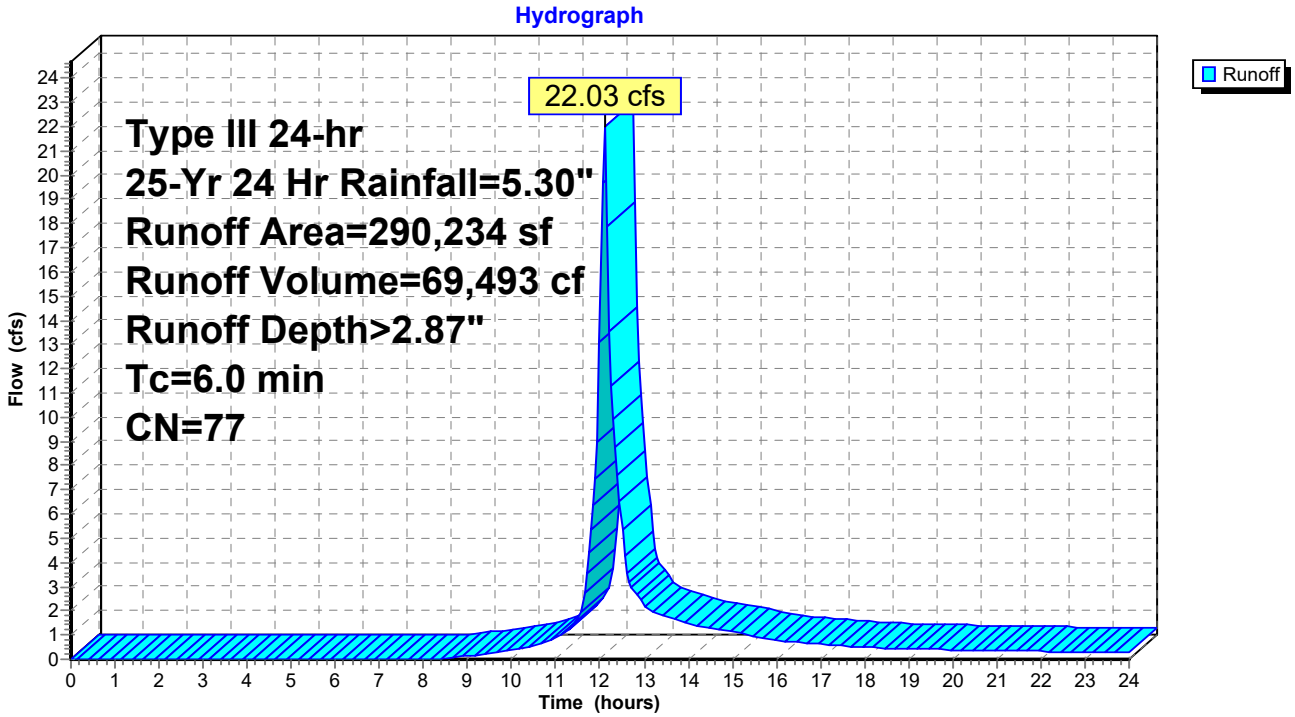
Runoff = 22.03 cfs @ 12.09 hrs, Volume= 69,493 cf, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr 24 Hr Rainfall=5.30"

	Area (sf)	CN	Description
	285,671	77	Woods, Good, HSG D
*	4,563	78	Wetlands
	290,234	77	Weighted Average
	290,234		100.00% Pervious Area

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

Subcatchment EX-2:



Hydrograph for Subcatchment EX-2:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	3.97	1.79	2.26
0.25	0.01	0.00	0.00	13.25	4.07	1.87	1.93
0.50	0.03	0.00	0.00	13.50	4.15	1.93	1.78
0.75	0.04	0.00	0.00	13.75	4.23	1.99	1.62
1.00	0.05	0.00	0.00	14.00	4.30	2.05	1.46
1.25	0.07	0.00	0.00	14.25	4.36	2.10	1.35
1.50	0.08	0.00	0.00	14.50	4.42	2.15	1.27
1.75	0.09	0.00	0.00	14.75	4.48	2.19	1.19
2.00	0.11	0.00	0.00	15.00	4.53	2.23	1.12
2.25	0.12	0.00	0.00	15.25	4.58	2.27	1.04
2.50	0.13	0.00	0.00	15.50	4.62	2.31	0.96
2.75	0.15	0.00	0.00	15.75	4.66	2.34	0.87
3.00	0.16	0.00	0.00	16.00	4.70	2.37	0.79
3.25	0.18	0.00	0.00	16.25	4.73	2.40	0.74
3.50	0.19	0.00	0.00	16.50	4.76	2.42	0.70
3.75	0.21	0.00	0.00	16.75	4.79	2.45	0.67
4.00	0.23	0.00	0.00	17.00	4.82	2.47	0.63
4.25	0.25	0.00	0.00	17.25	4.85	2.50	0.60
4.50	0.26	0.00	0.00	17.50	4.87	2.52	0.56
4.75	0.28	0.00	0.00	17.75	4.90	2.54	0.52
5.00	0.30	0.00	0.00	18.00	4.92	2.55	0.49
5.25	0.32	0.00	0.00	18.25	4.94	2.57	0.47
5.50	0.34	0.00	0.00	18.50	4.96	2.59	0.46
5.75	0.36	0.00	0.00	18.75	4.98	2.61	0.45
6.00	0.38	0.00	0.00	19.00	5.00	2.62	0.44
6.25	0.40	0.00	0.00	19.25	5.02	2.64	0.43
6.50	0.43	0.00	0.00	19.50	5.04	2.65	0.41
6.75	0.45	0.00	0.00	19.75	5.05	2.67	0.40
7.00	0.48	0.00	0.00	20.00	5.07	2.68	0.39
7.25	0.51	0.00	0.00	20.25	5.09	2.70	0.38
7.50	0.54	0.00	0.00	20.50	5.11	2.71	0.38
7.75	0.57	0.00	0.00	20.75	5.12	2.73	0.37
8.00	0.60	0.00	0.00	21.00	5.14	2.74	0.36
8.25	0.64	0.00	0.02	21.25	5.15	2.75	0.35
8.50	0.68	0.00	0.05	21.50	5.17	2.76	0.34
8.75	0.72	0.01	0.08	21.75	5.18	2.78	0.33
9.00	0.77	0.01	0.13	22.00	5.20	2.79	0.33
9.25	0.82	0.02	0.18	22.25	5.21	2.80	0.32
9.50	0.88	0.02	0.23	22.50	5.23	2.81	0.31
9.75	0.94	0.03	0.29	22.75	5.24	2.82	0.30
10.00	1.00	0.05	0.36	23.00	5.25	2.84	0.29
10.25	1.07	0.06	0.46	23.25	5.26	2.85	0.29
10.50	1.15	0.09	0.58	23.50	5.28	2.86	0.28
10.75	1.23	0.11	0.71	23.75	5.29	2.87	0.27
11.00	1.33	0.14	0.86	24.00	**5.30**	**2.88**	0.26
11.25	1.44	0.18	1.17				
11.50	1.58	0.24	1.64				
11.75	1.88	0.39	4.39				
12.00	2.65	0.84	**13.07**				
12.25	3.42	1.37	**11.28**				
12.50	3.72	1.60	5.38				
12.75	3.86	1.71	2.86				

Summary for Subcatchment EX-3:

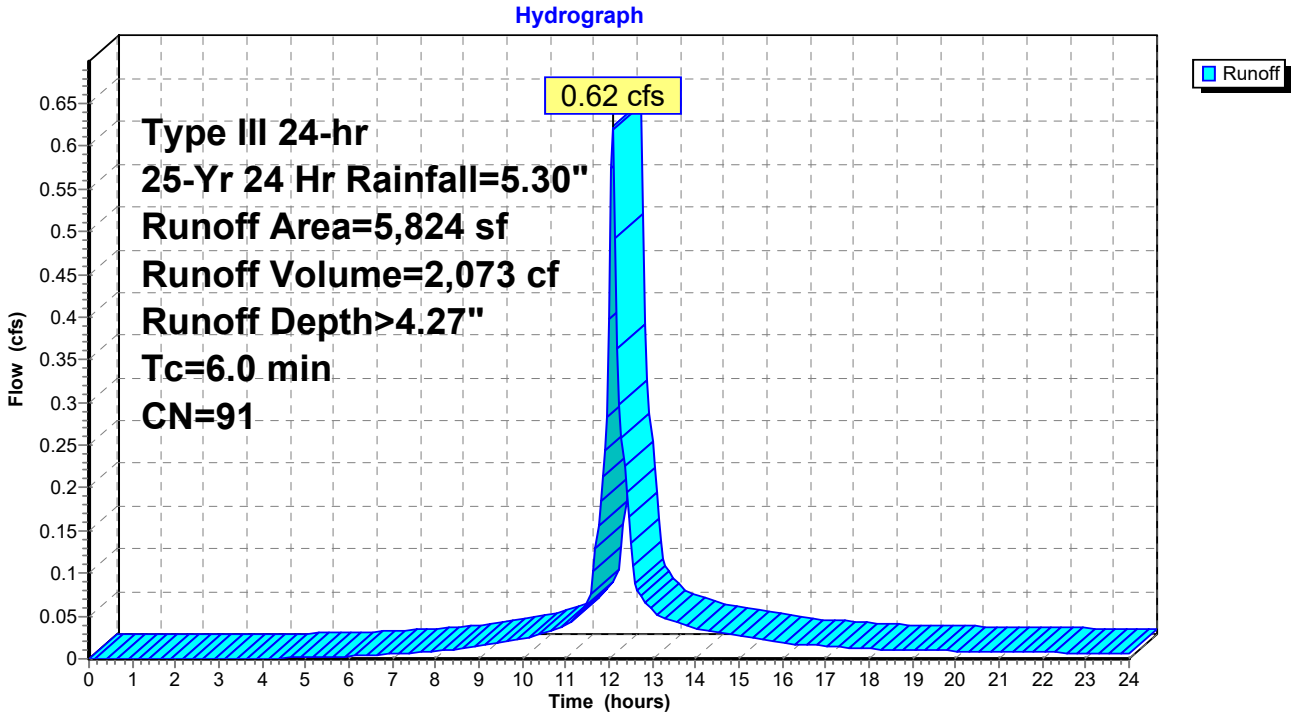
Runoff = 0.62 cfs @ 12.09 hrs, Volume= 2,073 cf, Depth> 4.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr 24 Hr Rainfall=5.30"

Area (sf)	CN	Description
3,883	98	Paved parking, HSG D
1,941	77	Woods, Good, HSG D
5,824	91	Weighted Average
1,941		33.33% Pervious Area
3,883		66.67% Impervious Area

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

Subcatchment EX-3:



Hydrograph for Subcatchment EX-3:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	3.97	2.99	0.06
0.25	0.01	0.00	0.00	13.25	4.07	3.08	0.05
0.50	0.03	0.00	0.00	13.50	4.15	3.16	0.04
0.75	0.04	0.00	0.00	13.75	4.23	3.24	0.04
1.00	0.05	0.00	0.00	14.00	4.30	3.30	0.04
1.25	0.07	0.00	0.00	14.25	4.36	3.36	0.03
1.50	0.08	0.00	0.00	14.50	4.42	3.42	0.03
1.75	0.09	0.00	0.00	14.75	4.48	3.47	0.03
2.00	0.11	0.00	0.00	15.00	4.53	3.52	0.03
2.25	0.12	0.00	0.00	15.25	4.58	3.57	0.02
2.50	0.13	0.00	0.00	15.50	4.62	3.61	0.02
2.75	0.15	0.00	0.00	15.75	4.66	3.65	0.02
3.00	0.16	0.00	0.00	16.00	4.70	3.69	0.02
3.25	0.18	0.00	0.00	16.25	4.73	3.72	0.02
3.50	0.19	0.00	0.00	16.50	4.76	3.75	0.02
3.75	0.21	0.00	0.00	16.75	4.79	3.78	0.02
4.00	0.23	0.00	0.00	17.00	4.82	3.81	0.01
4.25	0.25	0.00	0.00	17.25	4.85	3.83	0.01
4.50	0.26	0.00	0.00	17.50	4.87	3.86	0.01
4.75	0.28	0.01	0.00	17.75	4.90	3.88	0.01
5.00	0.30	0.01	0.00	18.00	4.92	3.90	0.01
5.25	0.32	0.01	0.00	18.25	4.94	3.92	0.01
5.50	0.34	0.02	0.00	18.50	4.96	3.94	0.01
5.75	0.36	0.02	0.00	18.75	4.98	3.96	0.01
6.00	0.38	0.03	0.00	19.00	5.00	3.98	0.01
6.25	0.40	0.04	0.00	19.25	5.02	4.00	0.01
6.50	0.43	0.04	0.00	19.50	5.04	4.02	0.01
6.75	0.45	0.05	0.00	19.75	5.05	4.04	0.01
7.00	0.48	0.06	0.01	20.00	5.07	4.05	0.01
7.25	0.51	0.07	0.01	20.25	5.09	4.07	0.01
7.50	0.54	0.09	0.01	20.50	5.11	4.08	0.01
7.75	0.57	0.10	0.01	20.75	5.12	4.10	0.01
8.00	0.60	0.12	0.01	21.00	5.14	4.12	0.01
8.25	0.64	0.14	0.01	21.25	5.15	4.13	0.01
8.50	0.68	0.16	0.01	21.50	5.17	4.15	0.01
8.75	0.72	0.18	0.01	21.75	5.18	4.16	0.01
9.00	0.77	0.21	0.02	22.00	5.20	4.17	0.01
9.25	0.82	0.24	0.02	22.25	5.21	4.19	0.01
9.50	0.88	0.28	0.02	22.50	5.23	4.20	0.01
9.75	0.94	0.32	0.02	22.75	5.24	4.21	0.01
10.00	1.00	0.36	0.02	23.00	5.25	4.23	0.01
10.25	1.07	0.41	0.03	23.25	5.26	4.24	0.01
10.50	1.15	0.47	0.03	23.50	5.28	4.25	0.01
10.75	1.23	0.53	0.03	23.75	5.29	4.26	0.01
11.00	1.33	0.60	0.04	24.00	**5.30**	**4.27**	0.01
11.25	1.44	0.69	0.05				
11.50	1.58	0.81	0.06				
11.75	1.88	1.06	0.16				
12.00	2.65	1.75	**0.40**				
12.25	3.42	2.46	**0.30**				
12.50	3.72	2.75	0.14				
12.75	3.86	2.89	0.07				

Summary for Subcatchment EX-4:

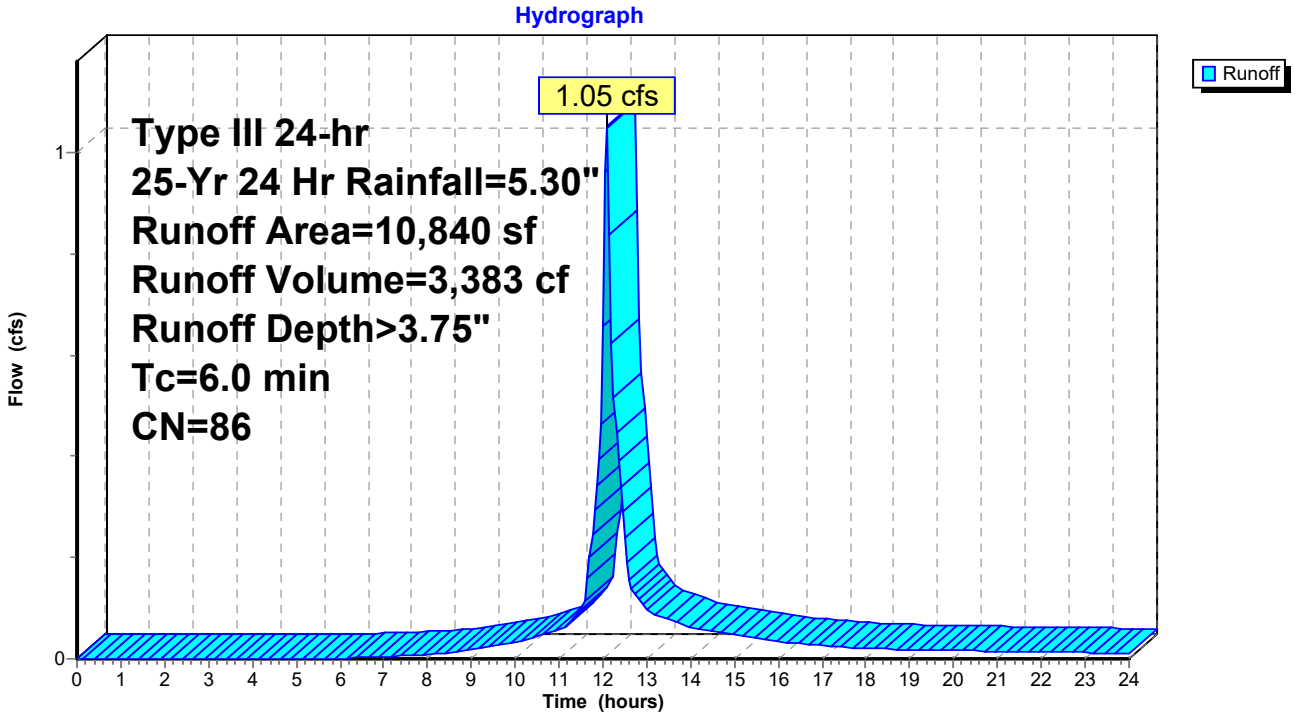
Runoff = 1.05 cfs @ 12.09 hrs, Volume= 3,383 cf, Depth> 3.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr 24 Hr Rainfall=5.30"

Area (sf)	CN	Description
6,258	77	Woods, Good, HSG D
4,582	98	Paved parking, HSG D
10,840	86	Weighted Average
6,258		57.73% Pervious Area
4,582		42.27% Impervious Area

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

Subcatchment EX-4:



Hydrograph for Subcatchment EX-4:

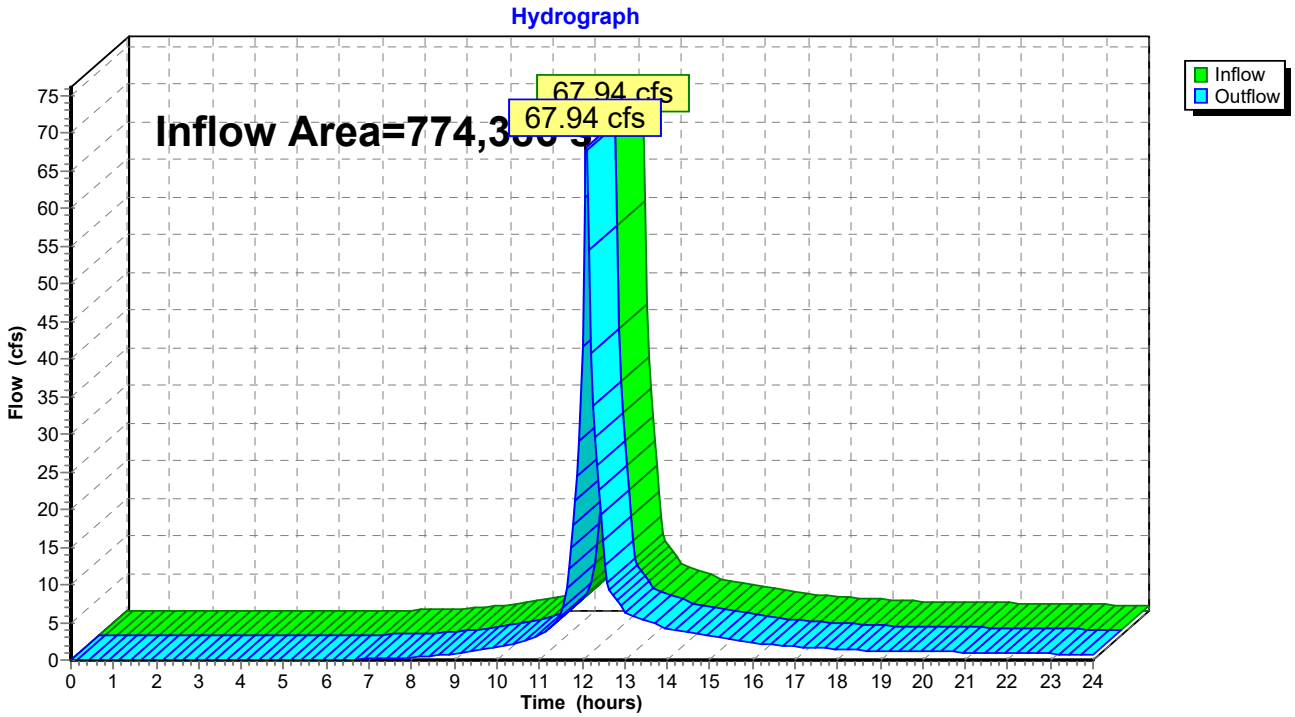
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	3.97	2.52	0.10
0.25	0.01	0.00	0.00	13.25	4.07	2.61	0.08
0.50	0.03	0.00	0.00	13.50	4.15	2.68	0.08
0.75	0.04	0.00	0.00	13.75	4.23	2.75	0.07
1.00	0.05	0.00	0.00	14.00	4.30	2.82	0.06
1.25	0.07	0.00	0.00	14.25	4.36	2.88	0.06
1.50	0.08	0.00	0.00	14.50	4.42	2.93	0.05
1.75	0.09	0.00	0.00	14.75	4.48	2.98	0.05
2.00	0.11	0.00	0.00	15.00	4.53	3.03	0.05
2.25	0.12	0.00	0.00	15.25	4.58	3.07	0.04
2.50	0.13	0.00	0.00	15.50	4.62	3.11	0.04
2.75	0.15	0.00	0.00	15.75	4.66	3.15	0.04
3.00	0.16	0.00	0.00	16.00	4.70	3.18	0.03
3.25	0.18	0.00	0.00	16.25	4.73	3.22	0.03
3.50	0.19	0.00	0.00	16.50	4.76	3.24	0.03
3.75	0.21	0.00	0.00	16.75	4.79	3.27	0.03
4.00	0.23	0.00	0.00	17.00	4.82	3.30	0.03
4.25	0.25	0.00	0.00	17.25	4.85	3.32	0.02
4.50	0.26	0.00	0.00	17.50	4.87	3.35	0.02
4.75	0.28	0.00	0.00	17.75	4.90	3.37	0.02
5.00	0.30	0.00	0.00	18.00	4.92	3.39	0.02
5.25	0.32	0.00	0.00	18.25	4.94	3.41	0.02
5.50	0.34	0.00	0.00	18.50	4.96	3.43	0.02
5.75	0.36	0.00	0.00	18.75	4.98	3.45	0.02
6.00	0.38	0.00	0.00	19.00	5.00	3.47	0.02
6.25	0.40	0.00	0.00	19.25	5.02	3.48	0.02
6.50	0.43	0.01	0.00	19.50	5.04	3.50	0.02
6.75	0.45	0.01	0.00	19.75	5.05	3.52	0.02
7.00	0.48	0.01	0.00	20.00	5.07	3.53	0.02
7.25	0.51	0.02	0.01	20.25	5.09	3.55	0.02
7.50	0.54	0.02	0.01	20.50	5.11	3.57	0.02
7.75	0.57	0.03	0.01	20.75	5.12	3.58	0.02
8.00	0.60	0.04	0.01	21.00	5.14	3.60	0.01
8.25	0.64	0.05	0.01	21.25	5.15	3.61	0.01
8.50	0.68	0.06	0.01	21.50	5.17	3.62	0.01
8.75	0.72	0.08	0.02	21.75	5.18	3.64	0.01
9.00	0.77	0.10	0.02	22.00	5.20	3.65	0.01
9.25	0.82	0.12	0.02	22.25	5.21	3.67	0.01
9.50	0.88	0.14	0.02	22.50	5.23	3.68	0.01
9.75	0.94	0.17	0.03	22.75	5.24	3.69	0.01
10.00	1.00	0.20	0.03	23.00	5.25	3.70	0.01
10.25	1.07	0.23	0.04	23.25	5.26	3.71	0.01
10.50	1.15	0.28	0.04	23.50	5.28	3.73	0.01
10.75	1.23	0.32	0.05	23.75	5.29	3.74	0.01
11.00	1.33	0.38	0.06	24.00	**5.30**	**3.75**	0.01
11.25	1.44	0.45	0.07				
11.50	1.58	0.55	0.10				
11.75	1.88	0.76	0.25				
12.00	2.65	1.37	**0.66**				
12.25	3.42	2.03	**0.51**				
12.50	3.72	2.29	0.24				
12.75	3.86	2.42	0.13				

Summary for Reach POA-1:

Inflow Area = 774,386 sf, 24.34% Impervious, Inflow Depth > 3.36" for 25-Yr 24 Hr event
Inflow = 67.94 cfs @ 12.09 hrs, Volume= 216,585 cf
Outflow = 67.94 cfs @ 12.09 hrs, Volume= 216,585 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach POA-1:



Hydrograph for Reach POA-1:

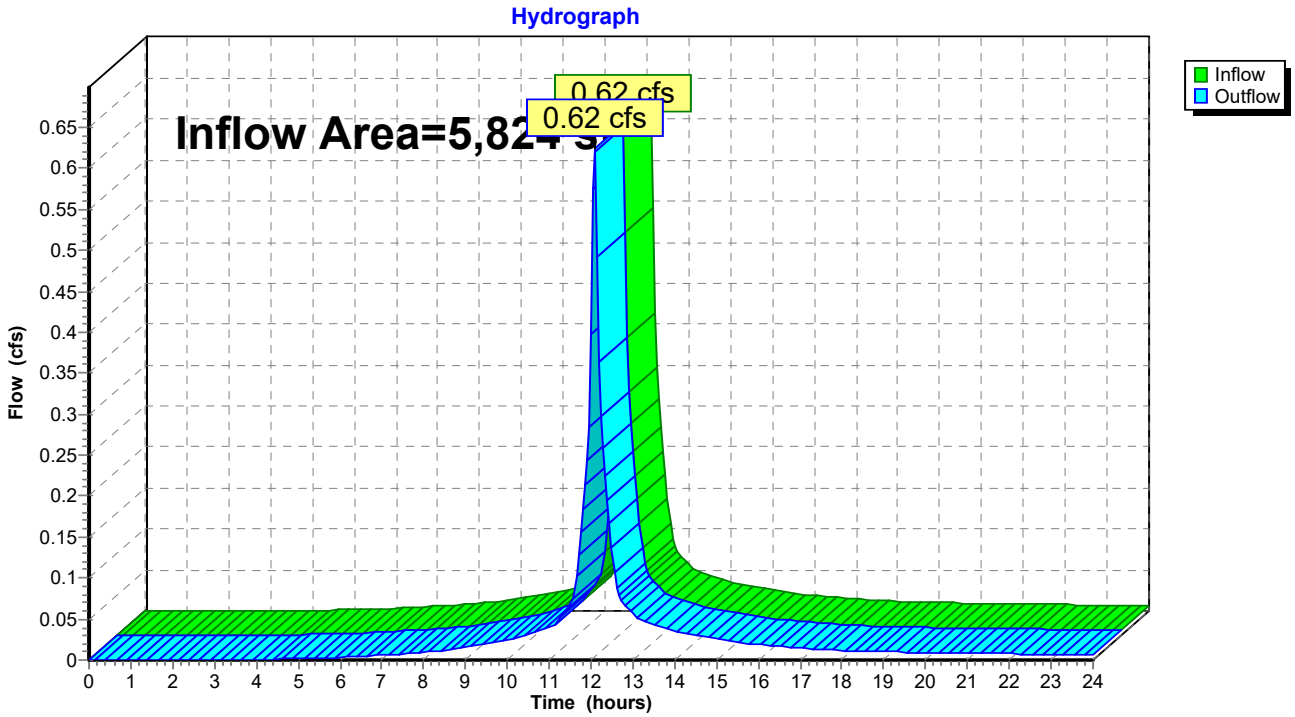
Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	13.00	6.57		6.57
0.25	0.00		0.00	13.25	5.61		5.61
0.50	0.00		0.00	13.50	5.15		5.15
0.75	0.00		0.00	13.75	4.68		4.68
1.00	0.00		0.00	14.00	4.21		4.21
1.25	0.00		0.00	14.25	3.89		3.89
1.50	0.00		0.00	14.50	3.66		3.66
1.75	0.00		0.00	14.75	3.43		3.43
2.00	0.00		0.00	15.00	3.20		3.20
2.25	0.00		0.00	15.25	2.97		2.97
2.50	0.00		0.00	15.50	2.74		2.74
2.75	0.00		0.00	15.75	2.50		2.50
3.00	0.00		0.00	16.00	2.27		2.27
3.25	0.00		0.00	16.25	2.11		2.11
3.50	0.00		0.00	16.50	2.01		2.01
3.75	0.00		0.00	16.75	1.91		1.91
4.00	0.00		0.00	17.00	1.81		1.81
4.25	0.00		0.00	17.25	1.70		1.70
4.50	0.00		0.00	17.50	1.60		1.60
4.75	0.00		0.00	17.75	1.49		1.49
5.00	0.00		0.00	18.00	1.39		1.39
5.25	0.00		0.00	18.25	1.33		1.33
5.50	0.00		0.00	18.50	1.30		1.30
5.75	0.00		0.00	18.75	1.27		1.27
6.00	0.02		0.02	19.00	1.24		1.24
6.25	0.05		0.05	19.25	1.21		1.21
6.50	0.08		0.08	19.50	1.18		1.18
6.75	0.11		0.11	19.75	1.15		1.15
7.00	0.15		0.15	20.00	1.12		1.12
7.25	0.19		0.19	20.25	1.09		1.09
7.50	0.24		0.24	20.50	1.07		1.07
7.75	0.29		0.29	20.75	1.04		1.04
8.00	0.34		0.34	21.00	1.02		1.02
8.25	0.43		0.43	21.25	1.00		1.00
8.50	0.56		0.56	21.50	0.97		0.97
8.75	0.70		0.70	21.75	0.95		0.95
9.00	0.86		0.86	22.00	0.93		0.93
9.25	1.03		1.03	22.25	0.90		0.90
9.50	1.23		1.23	22.50	0.88		0.88
9.75	1.44		1.44	22.75	0.85		0.85
10.00	1.66		1.66	23.00	0.83		0.83
10.25	1.98		1.98	23.25	0.81		0.81
10.50	2.37		2.37	23.50	0.78		0.78
10.75	2.80		2.80	23.75	0.76		0.76
11.00	3.27		3.27	24.00	0.74		0.74
11.25	4.32		4.32				
11.50	5.84		5.84				
11.75	14.93		14.93				
12.00	**41.55**		**41.55**				
12.25	**33.78**		**33.78**				
12.50	15.84		15.84				
12.75	8.38		8.38				

Summary for Reach POA-2:

Inflow Area = 5,824 sf, 66.67% Impervious, Inflow Depth > 4.27" for 25-Yr 24 Hr event
Inflow = 0.62 cfs @ 12.09 hrs, Volume= 2,073 cf
Outflow = 0.62 cfs @ 12.09 hrs, Volume= 2,073 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach POA-2:



Hydrograph for Reach POA-2:

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	13.00	0.06		0.06
0.25	0.00		0.00	13.25	0.05		0.05
0.50	0.00		0.00	13.50	0.04		0.04
0.75	0.00		0.00	13.75	0.04		0.04
1.00	0.00		0.00	14.00	0.04		0.04
1.25	0.00		0.00	14.25	0.03		0.03
1.50	0.00		0.00	14.50	0.03		0.03
1.75	0.00		0.00	14.75	0.03		0.03
2.00	0.00		0.00	15.00	0.03		0.03
2.25	0.00		0.00	15.25	0.02		0.02
2.50	0.00		0.00	15.50	0.02		0.02
2.75	0.00		0.00	15.75	0.02		0.02
3.00	0.00		0.00	16.00	0.02		0.02
3.25	0.00		0.00	16.25	0.02		0.02
3.50	0.00		0.00	16.50	0.02		0.02
3.75	0.00		0.00	16.75	0.02		0.02
4.00	0.00		0.00	17.00	0.01		0.01
4.25	0.00		0.00	17.25	0.01		0.01
4.50	0.00		0.00	17.50	0.01		0.01
4.75	0.00		0.00	17.75	0.01		0.01
5.00	0.00		0.00	18.00	0.01		0.01
5.25	0.00		0.00	18.25	0.01		0.01
5.50	0.00		0.00	18.50	0.01		0.01
5.75	0.00		0.00	18.75	0.01		0.01
6.00	0.00		0.00	19.00	0.01		0.01
6.25	0.00		0.00	19.25	0.01		0.01
6.50	0.00		0.00	19.50	0.01		0.01
6.75	0.00		0.00	19.75	0.01		0.01
7.00	0.01		0.01	20.00	0.01		0.01
7.25	0.01		0.01	20.25	0.01		0.01
7.50	0.01		0.01	20.50	0.01		0.01
7.75	0.01		0.01	20.75	0.01		0.01
8.00	0.01		0.01	21.00	0.01		0.01
8.25	0.01		0.01	21.25	0.01		0.01
8.50	0.01		0.01	21.50	0.01		0.01
8.75	0.01		0.01	21.75	0.01		0.01
9.00	0.02		0.02	22.00	0.01		0.01
9.25	0.02		0.02	22.25	0.01		0.01
9.50	0.02		0.02	22.50	0.01		0.01
9.75	0.02		0.02	22.75	0.01		0.01
10.00	0.02		0.02	23.00	0.01		0.01
10.25	0.03		0.03	23.25	0.01		0.01
10.50	0.03		0.03	23.50	0.01		0.01
10.75	0.03		0.03	23.75	0.01		0.01
11.00	0.04		0.04	24.00	0.01		0.01
11.25	0.05		0.05				
11.50	0.06		0.06				
11.75	0.16		0.16				
12.00	**0.40**		**0.40**				
12.25	**0.30**		**0.30**				
12.50	0.14		0.14				
12.75	0.07		0.07				

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Runoff Area=473,312 sf 38.86% Impervious Runoff Depth>4.77"
Tc=6.0 min CN=85 Runoff=58.10 cfs 188,236 cf

Subcatchment EX-2: Runoff Area=290,234 sf 0.00% Impervious Runoff Depth>3.92"
Tc=6.0 min CN=77 Runoff=29.94 cfs 94,711 cf

Subcatchment EX-3: Runoff Area=5,824 sf 66.67% Impervious Runoff Depth>5.44"
Tc=6.0 min CN=91 Runoff=0.78 cfs 2,642 cf

Subcatchment EX-4: Runoff Area=10,840 sf 42.27% Impervious Runoff Depth>4.88"
Tc=6.0 min CN=86 Runoff=1.35 cfs 4,411 cf

Reach POA-1: Inflow=89.39 cfs 287,357 cf
Outflow=89.39 cfs 287,357 cf

Reach POA-2: Inflow=0.78 cfs 2,642 cf
Outflow=0.78 cfs 2,642 cf

Total Runoff Area = 780,210 sf Runoff Volume = 289,999 cf Average Runoff Depth = 4.46"
75.34% Pervious = 587,806 sf 24.66% Impervious = 192,404 sf

Summary for Subcatchment EX-1:

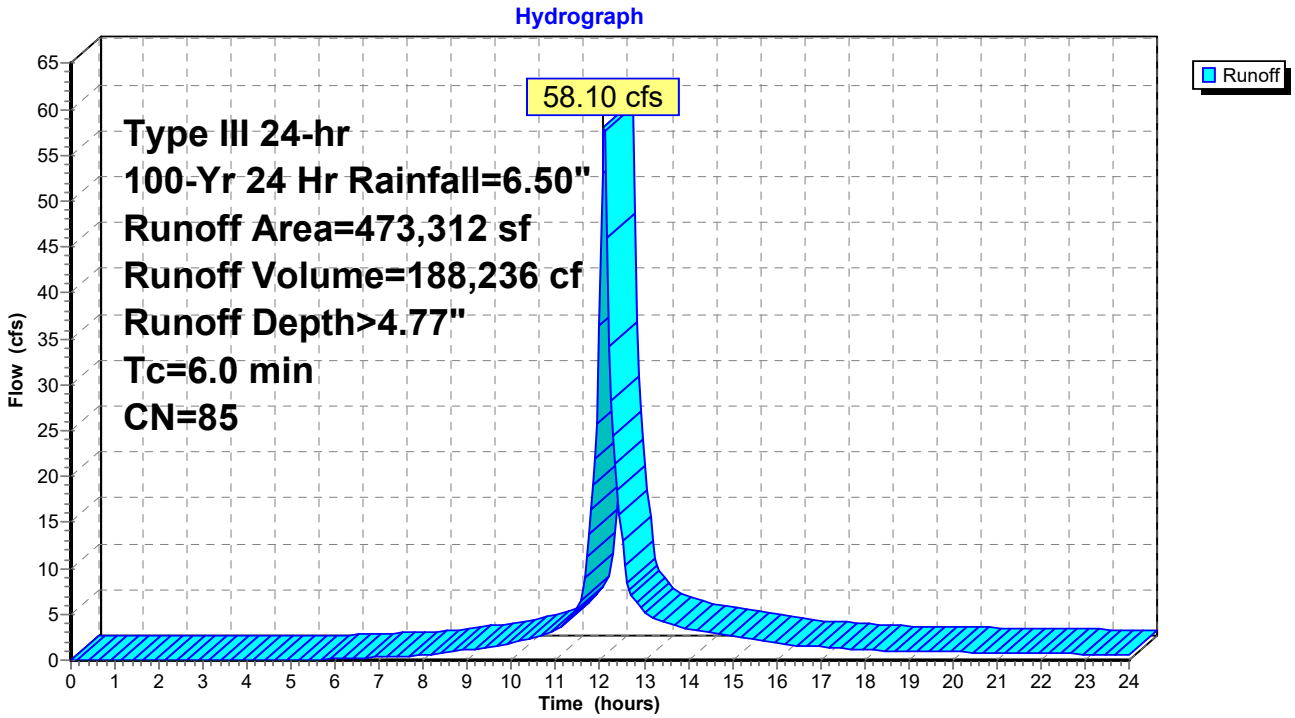
Runoff = 58.10 cfs @ 12.09 hrs, Volume= 188,236 cf, Depth> 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Yr 24 Hr Rainfall=6.50"

	Area (sf)	CN	Description
	30,756	79	Woods/grass comb., Good, HSG D
	236,144	77	Woods, Good, HSG D
	106,156	98	Paved parking, HSG D
	77,783	98	Roofs, HSG D
*	22,473	78	Wetlands
	473,312	85	Weighted Average
	289,373		61.14% Pervious Area
	183,939		38.86% Impervious Area

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

Subcatchment EX-1:



Hydrograph for Subcatchment EX-1:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	4.87	3.25	5.34
0.25	0.02	0.00	0.00	13.25	4.99	3.36	4.55
0.50	0.03	0.00	0.00	13.50	5.09	3.45	4.17
0.75	0.05	0.00	0.00	13.75	5.19	3.54	3.78
1.00	0.07	0.00	0.00	14.00	5.27	3.62	3.39
1.25	0.08	0.00	0.00	14.25	5.35	3.69	3.13
1.50	0.10	0.00	0.00	14.50	5.42	3.76	2.94
1.75	0.11	0.00	0.00	14.75	5.49	3.82	2.76
2.00	0.13	0.00	0.00	15.00	5.55	3.88	2.57
2.25	0.15	0.00	0.00	15.25	5.61	3.94	2.38
2.50	0.16	0.00	0.00	15.50	5.67	3.99	2.19
2.75	0.18	0.00	0.00	15.75	5.71	4.03	2.00
3.00	0.20	0.00	0.00	16.00	5.76	4.08	1.81
3.25	0.22	0.00	0.00	16.25	5.80	4.11	1.69
3.50	0.24	0.00	0.00	16.50	5.84	4.15	1.61
3.75	0.26	0.00	0.00	16.75	5.88	4.19	1.52
4.00	0.28	0.00	0.00	17.00	5.91	4.22	1.44
4.25	0.30	0.00	0.00	17.25	5.94	4.25	1.36
4.50	0.32	0.00	0.00	17.50	5.98	4.28	1.27
4.75	0.35	0.00	0.00	17.75	6.00	4.31	1.19
5.00	0.37	0.00	0.01	18.00	6.03	4.33	1.11
5.25	0.39	0.00	0.04	18.25	6.06	4.36	1.06
5.50	0.42	0.00	0.06	18.50	6.08	4.38	1.03
5.75	0.44	0.00	0.09	18.75	6.11	4.40	1.01
6.00	0.47	0.01	0.12	19.00	6.13	4.43	0.99
6.25	0.50	0.01	0.16	19.25	6.15	4.45	0.96
6.50	0.52	0.02	0.20	19.50	6.18	4.47	0.94
6.75	0.56	0.02	0.25	19.75	6.20	4.49	0.91
7.00	0.59	0.03	0.31	20.00	6.22	4.51	0.89
7.25	0.62	0.04	0.37	20.25	6.24	4.53	0.86
7.50	0.66	0.05	0.43	20.50	6.26	4.55	0.85
7.75	0.70	0.06	0.50	20.75	6.28	4.57	0.83
8.00	0.74	0.07	0.58	21.00	6.30	4.59	0.81
8.25	0.79	0.09	0.68	21.25	6.32	4.61	0.79
8.50	0.83	0.10	0.81	21.50	6.34	4.62	0.77
8.75	0.89	0.12	0.96	21.75	6.36	4.64	0.75
9.00	0.95	0.15	1.12	22.00	6.37	4.66	0.73
9.25	1.01	0.18	1.28	22.25	6.39	4.67	0.71
9.50	1.08	0.21	1.46	22.50	6.41	4.69	0.70
9.75	1.15	0.25	1.65	22.75	6.43	4.70	0.68
10.00	1.23	0.29	1.85	23.00	6.44	4.72	0.66
10.25	1.31	0.34	2.14	23.25	6.46	4.73	0.64
10.50	1.41	0.39	2.50	23.50	6.47	4.75	0.62
10.75	1.51	0.46	2.89	23.75	6.49	4.76	0.60
11.00	1.63	0.53	3.29	24.00	**6.50**	**4.78**	0.58
11.25	1.76	0.63	4.24				
11.50	1.94	0.75	5.59				
11.75	2.31	1.03	13.83				
12.00	3.25	1.80	**36.45**				
12.25	4.19	2.63	**28.15**				
12.50	4.56	2.97	12.99				
12.75	4.74	3.13	6.83				

Summary for Subcatchment EX-2:

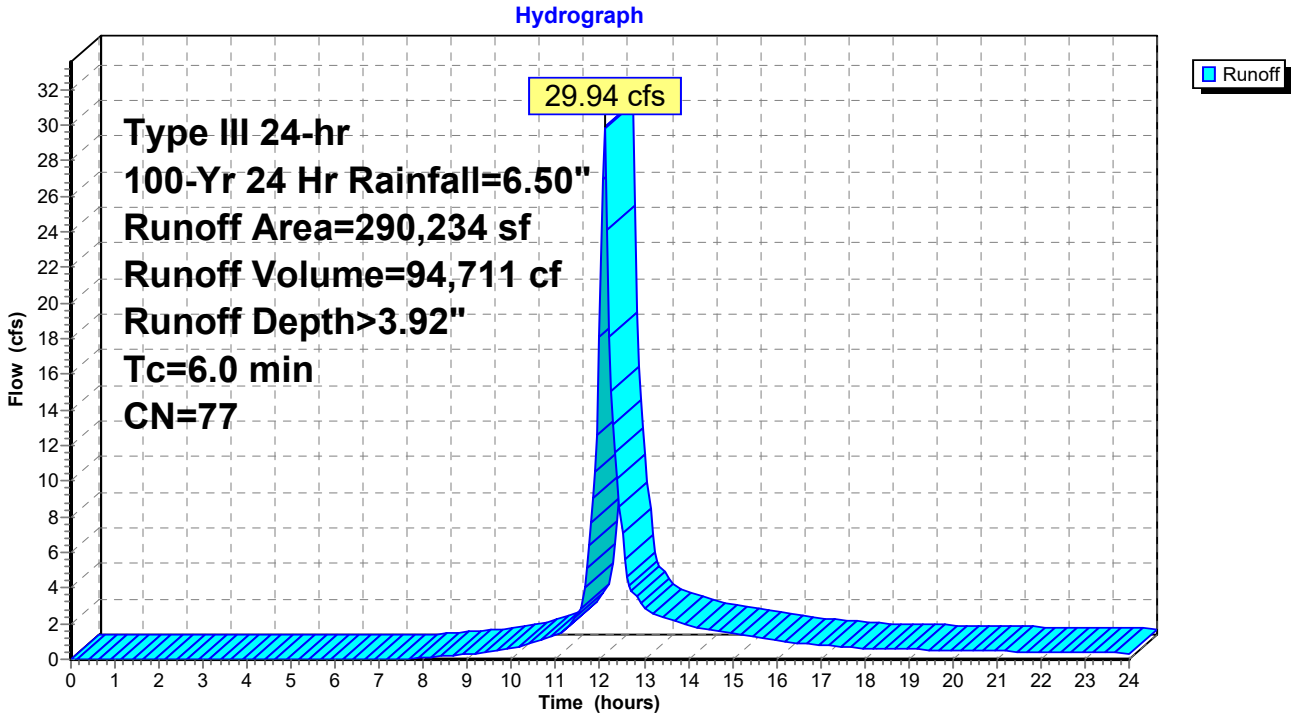
Runoff = 29.94 cfs @ 12.09 hrs, Volume= 94,711 cf, Depth> 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Yr 24 Hr Rainfall=6.50"

	Area (sf)	CN	Description
	285,671	77	Woods, Good, HSG D
*	4,563	78	Wetlands
	290,234	77	Weighted Average
	290,234		100.00% Pervious Area

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

Subcatchment EX-2:



Hydrograph for Subcatchment EX-2:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	4.87	2.52	2.95
0.25	0.02	0.00	0.00	13.25	4.99	2.61	2.52
0.50	0.03	0.00	0.00	13.50	5.09	2.70	2.32
0.75	0.05	0.00	0.00	13.75	5.19	2.78	2.11
1.00	0.07	0.00	0.00	14.00	5.27	2.85	1.89
1.25	0.08	0.00	0.00	14.25	5.35	2.92	1.75
1.50	0.10	0.00	0.00	14.50	5.42	2.98	1.65
1.75	0.11	0.00	0.00	14.75	5.49	3.04	1.55
2.00	0.13	0.00	0.00	15.00	5.55	3.09	1.44
2.25	0.15	0.00	0.00	15.25	5.61	3.14	1.34
2.50	0.16	0.00	0.00	15.50	5.67	3.19	1.23
2.75	0.18	0.00	0.00	15.75	5.71	3.23	1.13
3.00	0.20	0.00	0.00	16.00	5.76	3.27	1.02
3.25	0.22	0.00	0.00	16.25	5.80	3.31	0.95
3.50	0.24	0.00	0.00	16.50	5.84	3.34	0.91
3.75	0.26	0.00	0.00	16.75	5.88	3.37	0.86
4.00	0.28	0.00	0.00	17.00	5.91	3.40	0.82
4.25	0.30	0.00	0.00	17.25	5.94	3.43	0.77
4.50	0.32	0.00	0.00	17.50	5.98	3.46	0.72
4.75	0.35	0.00	0.00	17.75	6.00	3.48	0.68
5.00	0.37	0.00	0.00	18.00	6.03	3.51	0.63
5.25	0.39	0.00	0.00	18.25	6.06	3.53	0.60
5.50	0.42	0.00	0.00	18.50	6.08	3.55	0.59
5.75	0.44	0.00	0.00	18.75	6.11	3.57	0.57
6.00	0.47	0.00	0.00	19.00	6.13	3.59	0.56
6.25	0.50	0.00	0.00	19.25	6.15	3.61	0.55
6.50	0.52	0.00	0.00	19.50	6.18	3.63	0.53
6.75	0.56	0.00	0.00	19.75	6.20	3.65	0.52
7.00	0.59	0.00	0.00	20.00	6.22	3.67	0.50
7.25	0.62	0.00	0.01	20.25	6.24	3.69	0.49
7.50	0.66	0.00	0.03	20.50	6.26	3.71	0.48
7.75	0.70	0.00	0.06	20.75	6.28	3.73	0.47
8.00	0.74	0.01	0.09	21.00	6.30	3.74	0.46
8.25	0.79	0.01	0.13	21.25	6.32	3.76	0.45
8.50	0.83	0.02	0.18	21.50	6.34	3.78	0.44
8.75	0.89	0.03	0.23	21.75	6.36	3.79	0.43
9.00	0.95	0.04	0.30	22.00	6.37	3.81	0.42
9.25	1.01	0.05	0.37	22.25	6.39	3.82	0.41
9.50	1.08	0.07	0.46	22.50	6.41	3.84	0.40
9.75	1.15	0.09	0.55	22.75	6.43	3.85	0.39
10.00	1.23	0.11	0.64	23.00	6.44	3.87	0.38
10.25	1.31	0.14	0.78	23.25	6.46	3.88	0.37
10.50	1.41	0.17	0.95	23.50	6.47	3.89	0.35
10.75	1.51	0.21	1.14	23.75	6.49	3.91	0.34
11.00	1.63	0.26	1.34	24.00	**6.50**	**3.92**	0.33
11.25	1.76	0.33	1.79				
11.50	1.94	0.41	2.45				
11.75	2.31	0.62	6.37				
12.00	3.25	1.25	**18.13**				
12.25	4.19	1.96	**15.03**				
12.50	4.56	2.26	7.09				
12.75	4.74	2.41	3.76				

Summary for Subcatchment EX-3:

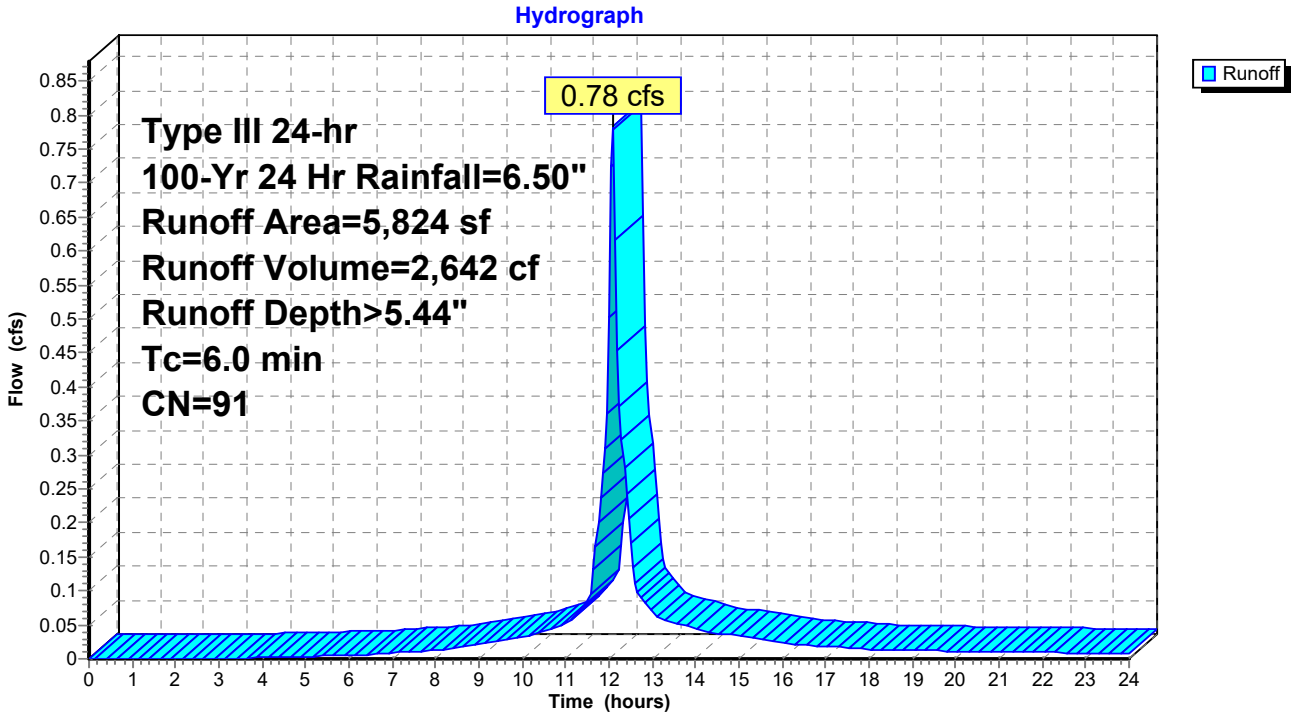
Runoff = 0.78 cfs @ 12.09 hrs, Volume= 2,642 cf, Depth> 5.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Yr 24 Hr Rainfall=6.50"

Area (sf)	CN	Description
3,883	98	Paved parking, HSG D
1,941	77	Woods, Good, HSG D
5,824	91	Weighted Average
1,941		33.33% Pervious Area
3,883		66.67% Impervious Area

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

Subcatchment EX-3:



Hydrograph for Subcatchment EX-3:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	4.87	3.86	0.07
0.25	0.02	0.00	0.00	13.25	4.99	3.97	0.06
0.50	0.03	0.00	0.00	13.50	5.09	4.07	0.05
0.75	0.05	0.00	0.00	13.75	5.19	4.16	0.05
1.00	0.07	0.00	0.00	14.00	5.27	4.25	0.04
1.25	0.08	0.00	0.00	14.25	5.35	4.32	0.04
1.50	0.10	0.00	0.00	14.50	5.42	4.39	0.04
1.75	0.11	0.00	0.00	14.75	5.49	4.46	0.04
2.00	0.13	0.00	0.00	15.00	5.55	4.52	0.03
2.25	0.15	0.00	0.00	15.25	5.61	4.58	0.03
2.50	0.16	0.00	0.00	15.50	5.67	4.63	0.03
2.75	0.18	0.00	0.00	15.75	5.71	4.68	0.03
3.00	0.20	0.00	0.00	16.00	5.76	4.72	0.02
3.25	0.22	0.00	0.00	16.25	5.80	4.76	0.02
3.50	0.24	0.00	0.00	16.50	5.84	4.80	0.02
3.75	0.26	0.00	0.00	16.75	5.88	4.84	0.02
4.00	0.28	0.01	0.00	17.00	5.91	4.87	0.02
4.25	0.30	0.01	0.00	17.25	5.94	4.90	0.02
4.50	0.32	0.01	0.00	17.50	5.98	4.93	0.02
4.75	0.35	0.02	0.00	17.75	6.00	4.96	0.02
5.00	0.37	0.03	0.00	18.00	6.03	4.99	0.01
5.25	0.39	0.03	0.00	18.25	6.06	5.01	0.01
5.50	0.42	0.04	0.00	18.50	6.08	5.04	0.01
5.75	0.44	0.05	0.00	18.75	6.11	5.06	0.01
6.00	0.47	0.06	0.01	19.00	6.13	5.09	0.01
6.25	0.50	0.07	0.01	19.25	6.15	5.11	0.01
6.50	0.52	0.08	0.01	19.50	6.18	5.13	0.01
6.75	0.56	0.09	0.01	19.75	6.20	5.15	0.01
7.00	0.59	0.11	0.01	20.00	6.22	5.17	0.01
7.25	0.62	0.13	0.01	20.25	6.24	5.19	0.01
7.50	0.66	0.15	0.01	20.50	6.26	5.21	0.01
7.75	0.70	0.17	0.01	20.75	6.28	5.23	0.01
8.00	0.74	0.19	0.01	21.00	6.30	5.25	0.01
8.25	0.79	0.22	0.01	21.25	6.32	5.27	0.01
8.50	0.83	0.25	0.02	21.50	6.34	5.29	0.01
8.75	0.89	0.28	0.02	21.75	6.36	5.31	0.01
9.00	0.95	0.32	0.02	22.00	6.37	5.32	0.01
9.25	1.01	0.37	0.02	22.25	6.39	5.34	0.01
9.50	1.08	0.41	0.03	22.50	6.41	5.36	0.01
9.75	1.15	0.47	0.03	22.75	6.43	5.37	0.01
10.00	1.23	0.53	0.03	23.00	6.44	5.39	0.01
10.25	1.31	0.59	0.04	23.25	6.46	5.40	0.01
10.50	1.41	0.67	0.04	23.50	6.47	5.42	0.01
10.75	1.51	0.75	0.05	23.75	6.49	5.43	0.01
11.00	1.63	0.84	0.05	24.00	**6.50**	**5.45**	0.01
11.25	1.76	0.96	0.06				
11.50	1.94	1.11	0.08				
11.75	2.31	1.44	0.20				
12.00	3.25	2.31	**0.50**				
12.25	4.19	3.20	**0.37**				
12.50	4.56	3.56	0.17				
12.75	4.74	3.73	0.09				

Summary for Subcatchment EX-4:

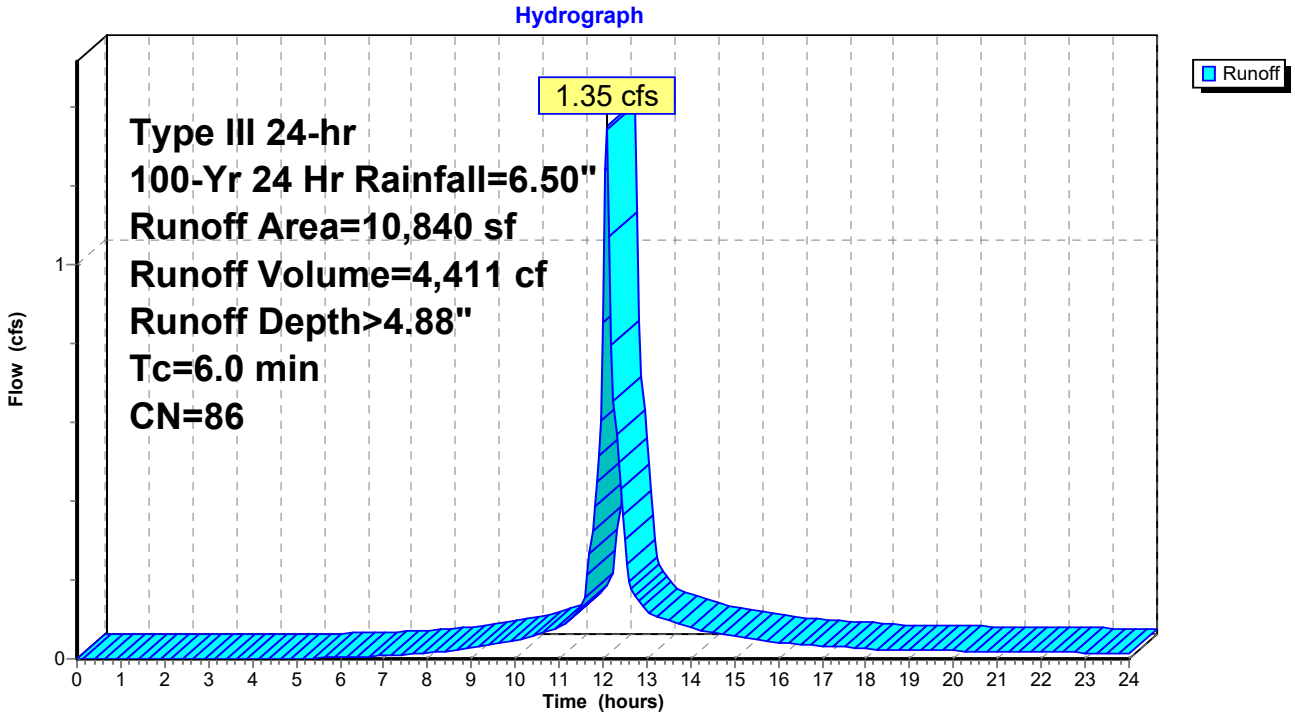
Runoff = 1.35 cfs @ 12.09 hrs, Volume= 4,411 cf, Depth> 4.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Yr 24 Hr Rainfall=6.50"

Area (sf)	CN	Description
6,258	77	Woods, Good, HSG D
4,582	98	Paved parking, HSG D
10,840	86	Weighted Average
6,258		57.73% Pervious Area
4,582		42.27% Impervious Area

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

Subcatchment EX-4:



Hydrograph for Subcatchment EX-4:

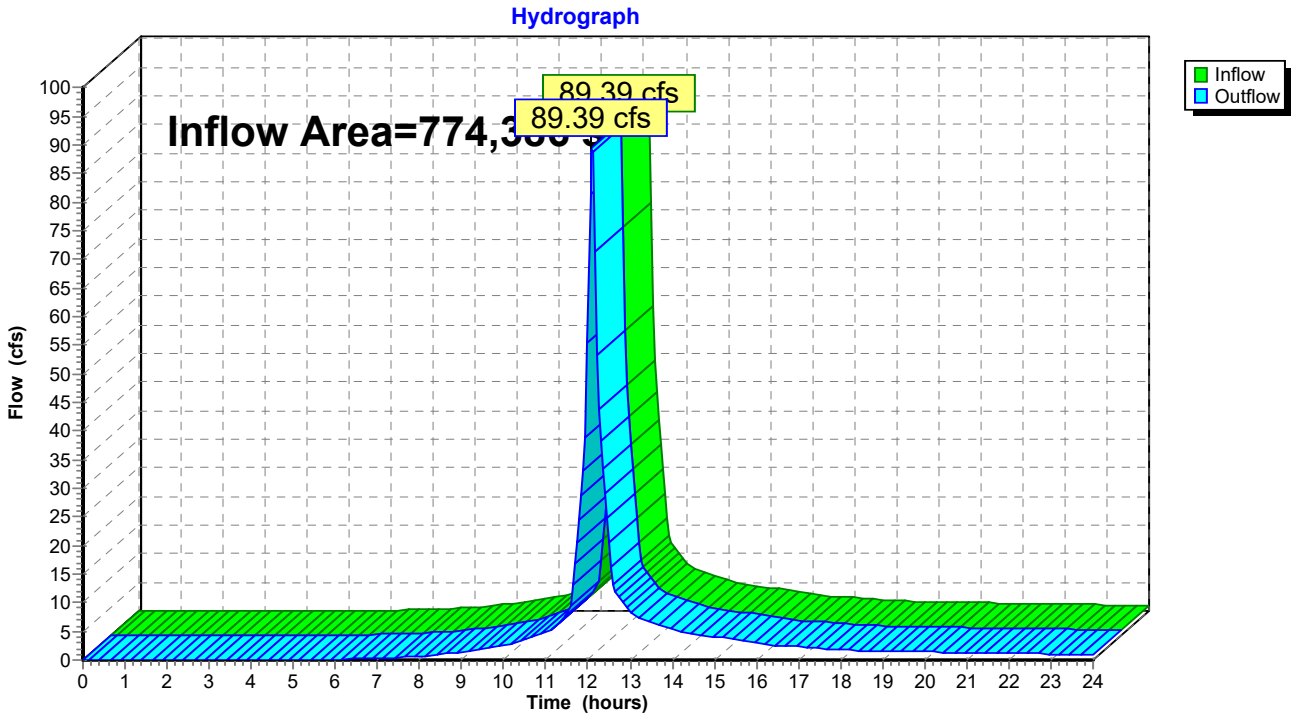
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	4.87	3.35	0.12
0.25	0.02	0.00	0.00	13.25	4.99	3.46	0.11
0.50	0.03	0.00	0.00	13.50	5.09	3.55	0.10
0.75	0.05	0.00	0.00	13.75	5.19	3.64	0.09
1.00	0.07	0.00	0.00	14.00	5.27	3.72	0.08
1.25	0.08	0.00	0.00	14.25	5.35	3.79	0.07
1.50	0.10	0.00	0.00	14.50	5.42	3.86	0.07
1.75	0.11	0.00	0.00	14.75	5.49	3.93	0.06
2.00	0.13	0.00	0.00	15.00	5.55	3.99	0.06
2.25	0.15	0.00	0.00	15.25	5.61	4.04	0.05
2.50	0.16	0.00	0.00	15.50	5.67	4.09	0.05
2.75	0.18	0.00	0.00	15.75	5.71	4.14	0.05
3.00	0.20	0.00	0.00	16.00	5.76	4.18	0.04
3.25	0.22	0.00	0.00	16.25	5.80	4.22	0.04
3.50	0.24	0.00	0.00	16.50	5.84	4.26	0.04
3.75	0.26	0.00	0.00	16.75	5.88	4.29	0.04
4.00	0.28	0.00	0.00	17.00	5.91	4.33	0.03
4.25	0.30	0.00	0.00	17.25	5.94	4.36	0.03
4.50	0.32	0.00	0.00	17.50	5.98	4.39	0.03
4.75	0.35	0.00	0.00	17.75	6.00	4.41	0.03
5.00	0.37	0.00	0.00	18.00	6.03	4.44	0.03
5.25	0.39	0.00	0.00	18.25	6.06	4.46	0.02
5.50	0.42	0.00	0.00	18.50	6.08	4.49	0.02
5.75	0.44	0.01	0.00	18.75	6.11	4.51	0.02
6.00	0.47	0.01	0.00	19.00	6.13	4.53	0.02
6.25	0.50	0.02	0.00	19.25	6.15	4.56	0.02
6.50	0.52	0.02	0.01	19.50	6.18	4.58	0.02
6.75	0.56	0.03	0.01	19.75	6.20	4.60	0.02
7.00	0.59	0.04	0.01	20.00	6.22	4.62	0.02
7.25	0.62	0.05	0.01	20.25	6.24	4.64	0.02
7.50	0.66	0.06	0.01	20.50	6.26	4.66	0.02
7.75	0.70	0.07	0.01	20.75	6.28	4.68	0.02
8.00	0.74	0.08	0.01	21.00	6.30	4.70	0.02
8.25	0.79	0.10	0.02	21.25	6.32	4.71	0.02
8.50	0.83	0.12	0.02	21.50	6.34	4.73	0.02
8.75	0.89	0.14	0.02	21.75	6.36	4.75	0.02
9.00	0.95	0.17	0.03	22.00	6.37	4.77	0.02
9.25	1.01	0.20	0.03	22.25	6.39	4.78	0.02
9.50	1.08	0.24	0.04	22.50	6.41	4.80	0.02
9.75	1.15	0.28	0.04	22.75	6.43	4.81	0.02
10.00	1.23	0.32	0.05	23.00	6.44	4.83	0.02
10.25	1.31	0.37	0.05	23.25	6.46	4.84	0.01
10.50	1.41	0.43	0.06	23.50	6.47	4.86	0.01
10.75	1.51	0.50	0.07	23.75	6.49	4.87	0.01
11.00	1.63	0.58	0.08	24.00	**6.50**	**4.89**	0.01
11.25	1.76	0.67	0.10				
11.50	1.94	0.80	0.13				
11.75	2.31	1.09	0.33				
12.00	3.25	1.88	**0.85**				
12.25	4.19	2.72	**0.65**				
12.50	4.56	3.06	0.30				
12.75	4.74	3.22	0.16				

Summary for Reach POA-1:

Inflow Area = 774,386 sf, 24.34% Impervious, Inflow Depth > 4.45" for 100-Yr 24 Hr event
Inflow = 89.39 cfs @ 12.09 hrs, Volume= 287,357 cf
Outflow = 89.39 cfs @ 12.09 hrs, Volume= 287,357 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach POA-1:



Hydrograph for Reach POA-1:

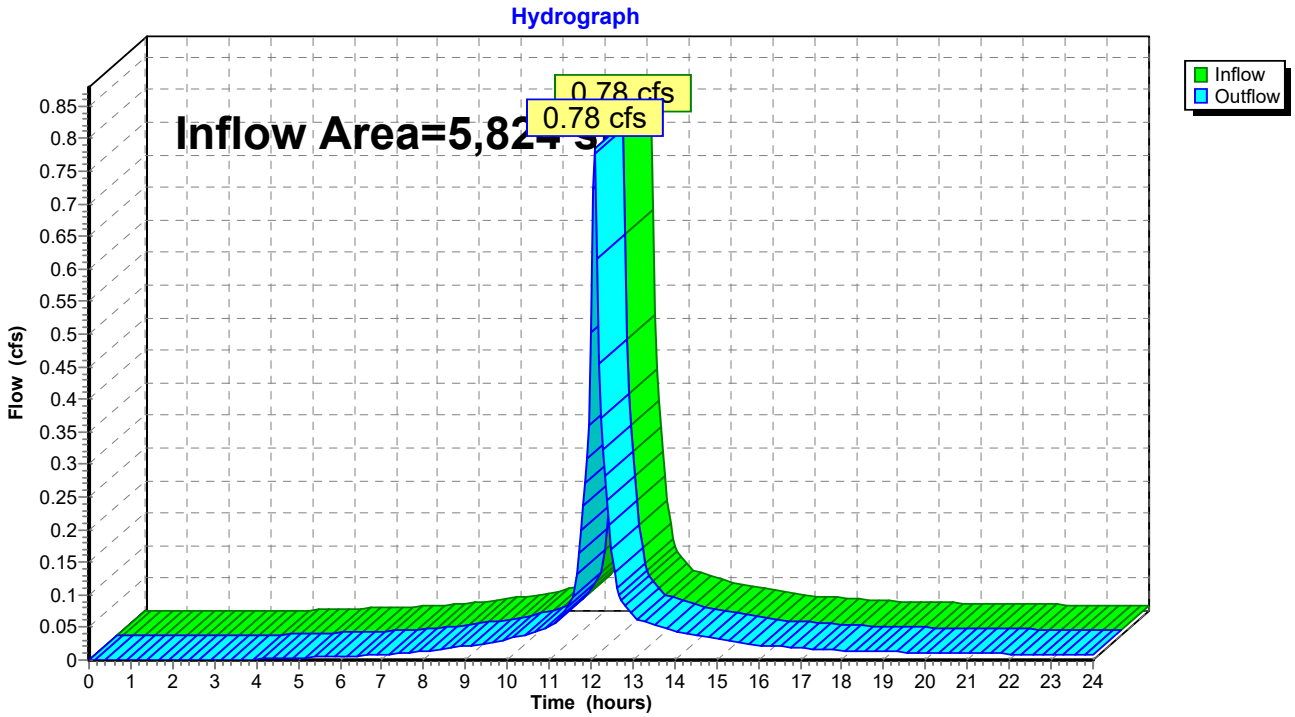
Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	13.00	8.42		8.42
0.25	0.00		0.00	13.25	7.18		7.18
0.50	0.00		0.00	13.50	6.58		6.58
0.75	0.00		0.00	13.75	5.98		5.98
1.00	0.00		0.00	14.00	5.36		5.36
1.25	0.00		0.00	14.25	4.95		4.95
1.50	0.00		0.00	14.50	4.66		4.66
1.75	0.00		0.00	14.75	4.37		4.37
2.00	0.00		0.00	15.00	4.07		4.07
2.25	0.00		0.00	15.25	3.78		3.78
2.50	0.00		0.00	15.50	3.48		3.48
2.75	0.00		0.00	15.75	3.18		3.18
3.00	0.00		0.00	16.00	2.87		2.87
3.25	0.00		0.00	16.25	2.68		2.68
3.50	0.00		0.00	16.50	2.55		2.55
3.75	0.00		0.00	16.75	2.42		2.42
4.00	0.00		0.00	17.00	2.29		2.29
4.25	0.00		0.00	17.25	2.16		2.16
4.50	0.00		0.00	17.50	2.02		2.02
4.75	0.00		0.00	17.75	1.89		1.89
5.00	0.01		0.01	18.00	1.76		1.76
5.25	0.04		0.04	18.25	1.69		1.69
5.50	0.07		0.07	18.50	1.65		1.65
5.75	0.10		0.10	18.75	1.61		1.61
6.00	0.13		0.13	19.00	1.57		1.57
6.25	0.17		0.17	19.25	1.53		1.53
6.50	0.21		0.21	19.50	1.49		1.49
6.75	0.26		0.26	19.75	1.45		1.45
7.00	0.32		0.32	20.00	1.41		1.41
7.25	0.39		0.39	20.25	1.38		1.38
7.50	0.48		0.48	20.50	1.35		1.35
7.75	0.58		0.58	20.75	1.32		1.32
8.00	0.68		0.68	21.00	1.29		1.29
8.25	0.83		0.83	21.25	1.26		1.26
8.50	1.01		1.01	21.50	1.23		1.23
8.75	1.22		1.22	21.75	1.20		1.20
9.00	1.44		1.44	22.00	1.17		1.17
9.25	1.69		1.69	22.25	1.14		1.14
9.50	1.96		1.96	22.50	1.11		1.11
9.75	2.24		2.24	22.75	1.08		1.08
10.00	2.54		2.54	23.00	1.05		1.05
10.25	2.97		2.97	23.25	1.02		1.02
10.50	3.51		3.51	23.50	0.99		0.99
10.75	4.09		4.09	23.75	0.96		0.96
11.00	4.71		4.71	24.00	0.93		0.93
11.25	6.13		6.13				
11.50	8.18		8.18				
11.75	20.52		20.52				
12.00	**55.43**		**55.43**				
12.25	**43.84**		**43.84**				
12.50	20.38		20.38				
12.75	10.74		10.74				

Summary for Reach POA-2:

Inflow Area = 5,824 sf, 66.67% Impervious, Inflow Depth > 5.44" for 100-Yr 24 Hr event
Inflow = 0.78 cfs @ 12.09 hrs, Volume= 2,642 cf
Outflow = 0.78 cfs @ 12.09 hrs, Volume= 2,642 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach POA-2:



Hydrograph for Reach POA-2:

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
0.25	0.00		0.00
0.50	0.00		0.00
0.75	0.00		0.00
1.00	0.00		0.00
1.25	0.00		0.00
1.50	0.00		0.00
1.75	0.00		0.00
2.00	0.00		0.00
2.25	0.00		0.00
2.50	0.00		0.00
2.75	0.00		0.00
3.00	0.00		0.00
3.25	0.00		0.00
3.50	0.00		0.00
3.75	0.00		0.00
4.00	0.00		0.00
4.25	0.00		0.00
4.50	0.00		0.00
4.75	0.00		0.00
5.00	0.00		0.00
5.25	0.00		0.00
5.50	0.00		0.00
5.75	0.00		0.00
6.00	0.01		0.01
6.25	0.01		0.01
6.50	0.01		0.01
6.75	0.01		0.01
7.00	0.01		0.01
7.25	0.01		0.01
7.50	0.01		0.01
7.75	0.01		0.01
8.00	0.01		0.01
8.25	0.01		0.01
8.50	0.02		0.02
8.75	0.02		0.02
9.00	0.02		0.02
9.25	0.02		0.02
9.50	0.03		0.03
9.75	0.03		0.03
10.00	0.03		0.03
10.25	0.04		0.04
10.50	0.04		0.04
10.75	0.05		0.05
11.00	0.05		0.05
11.25	0.06		0.06
11.50	0.08		0.08
11.75	0.20		0.20
12.00	**0.50**		**0.50**
12.25	**0.37**		**0.37**
12.50	0.17		0.17
12.75	0.09		0.09
13.00	0.07		0.07
13.25	0.06		0.06
13.50	0.05		0.05
13.75	0.05		0.05
14.00	0.04		0.04
14.25	0.04		0.04
14.50	0.04		0.04
14.75	0.04		0.04
15.00	0.03		0.03
15.25	0.03		0.03
15.50	0.03		0.03
15.75	0.03		0.03
16.00	0.02		0.02
16.25	0.02		0.02
16.50	0.02		0.02
16.75	0.02		0.02
17.00	0.02		0.02
17.25	0.02		0.02
17.50	0.02		0.02
17.75	0.02		0.02
18.00	0.01		0.01
18.25	0.01		0.01
18.50	0.01		0.01
18.75	0.01		0.01
19.00	0.01		0.01
19.25	0.01		0.01
19.50	0.01		0.01
19.75	0.01		0.01
20.00	0.01		0.01
20.25	0.01		0.01
20.50	0.01		0.01
20.75	0.01		0.01
21.00	0.01		0.01
21.25	0.01		0.01
21.50	0.01		0.01
21.75	0.01		0.01
22.00	0.01		0.01
22.25	0.01		0.01
22.50	0.01		0.01
22.75	0.01		0.01
23.00	0.01		0.01
23.25	0.01		0.01
23.50	0.01		0.01
23.75	0.01		0.01
24.00	0.01		0.01

Post-Development Hydrologic Computations

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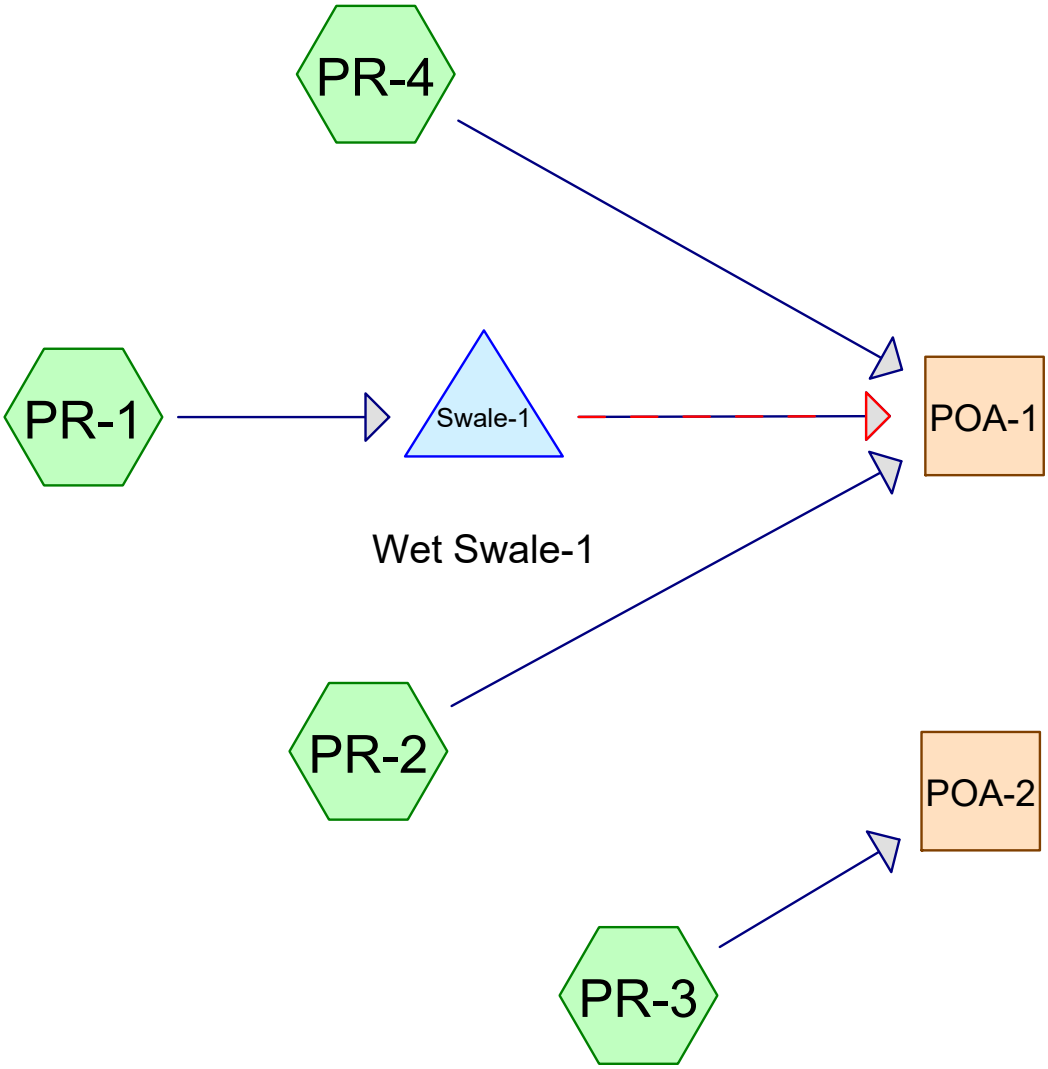

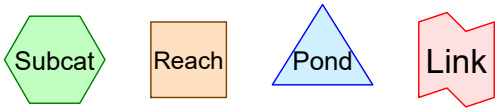

Routing Diagram for 19078_Proposed Conditions_TP-40 - Def Subdivision
Prepared by RJ O'Connell & Associates, Inc., Printed 4/3/2020
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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
218,095	80	>75% Grass cover, Good, HSG D (PR-1, PR-2, PR-3, PR-4)
29,665	98	Paved Road, HSG D (PR-1)
8,072	98	Paved parking, HSG D (PR-4)
7,585	98	Sidewalk, HSG D (PR-1)
22,552	77	Wetlands, HSG D (PR-2)
494,276	77	Woods, Good, HSG D (PR-2, PR-3)
780,245	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
0	HSG C	
780,245	HSG D	PR-1, PR-2, PR-3, PR-4
0	Other	
780,245		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchm Numbers
0	0	0	218,095	0	218,095	>75% Grass cover, Good	
0	0	0	29,665	0	29,665	Paved Road	
0	0	0	8,072	0	8,072	Paved parking	
0	0	0	7,585	0	7,585	Sidewalk	
0	0	0	22,552	0	22,552	Wetlands	
0	0	0	494,276	0	494,276	Woods, Good	
0	**0**	**0**	**780,245**	**0**	**780,245**	**TOTAL AREA**	

Time span=0.00-32.00 hrs, dt=0.01 hrs, 3201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Runoff Area=87,495 sf 42.57% Impervious Runoff Depth=1.91"
Tc=6.0 min CN=88 Runoff=4.48 cfs 13,907 cf

Subcatchment PR-2: Runoff Area=676,086 sf 0.00% Impervious Runoff Depth=1.20"
Tc=6.0 min CN=78 Runoff=21.33 cfs 67,641 cf

Subcatchment PR-3: Runoff Area=5,824 sf 0.00% Impervious Runoff Depth=1.26"
Tc=6.0 min CN=79 Runoff=0.19 cfs 613 cf

Subcatchment PR-4: Runoff Area=10,840 sf 74.46% Impervious Runoff Depth=2.35"
Tc=6.0 min CN=93 Runoff=0.67 cfs 2,123 cf

Reach POA-1: Inflow=22.00 cfs 76,238 cf
Outflow=22.00 cfs 76,238 cf

Reach POA-2: Inflow=0.19 cfs 613 cf
Outflow=0.19 cfs 613 cf

Pond Swale-1: Wet Swale-1 Peak Elev=73.08' Storage=7,942 cf Inflow=4.48 cfs 13,907 cf
Outflow=0.55 cfs 6,474 cf

Total Runoff Area = 780,245 sf Runoff Volume = 84,283 cf Average Runoff Depth = 1.30"
94.19% Pervious = 734,923 sf 5.81% Impervious = 45,322 sf

Summary for Subcatchment PR-1:

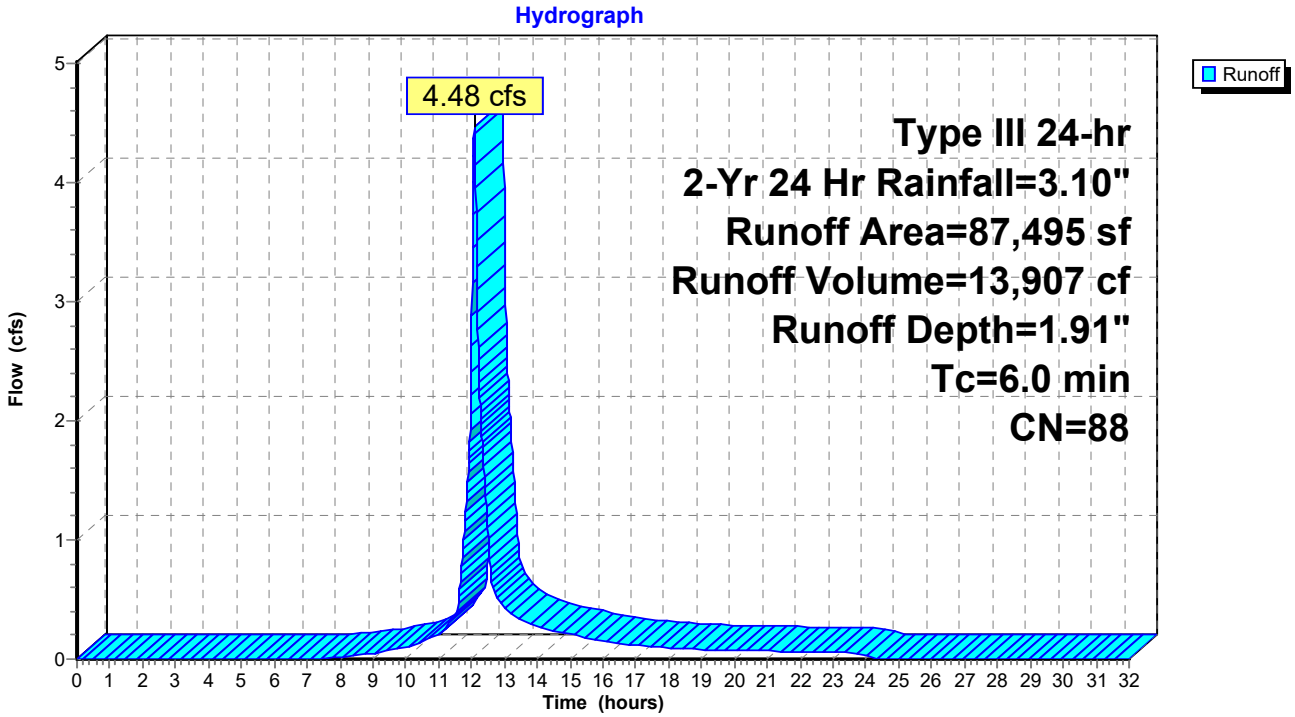
Runoff = 4.48 cfs @ 12.09 hrs, Volume= 13,907 cf, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr 24 Hr Rainfall=3.10"

	Area (sf)	CN	Description
	50,245	80	>75% Grass cover, Good, HSG D
*	7,585	98	Sidewalk, HSG D
*	29,665	98	Paved Road, HSG D
	87,495	88	Weighted Average
	50,245		57.43% Pervious Area
	37,250		42.57% Impervious Area

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

Subcatchment PR-1:



Hydrograph for Subcatchment PR-1:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	3.10	1.91	0.00
0.50	0.02	0.00	0.00	26.50	3.10	1.91	0.00
1.00	0.03	0.00	0.00	27.00	3.10	1.91	0.00
1.50	0.05	0.00	0.00	27.50	3.10	1.91	0.00
2.00	0.06	0.00	0.00	28.00	3.10	1.91	0.00
2.50	0.08	0.00	0.00	28.50	3.10	1.91	0.00
3.00	0.10	0.00	0.00	29.00	3.10	1.91	0.00
3.50	0.11	0.00	0.00	29.50	3.10	1.91	0.00
4.00	0.13	0.00	0.00	30.00	3.10	1.91	0.00
4.50	0.15	0.00	0.00	30.50	3.10	1.91	0.00
5.00	0.18	0.00	0.00	31.00	3.10	1.91	0.00
5.50	0.20	0.00	0.00	31.50	3.10	1.91	0.00
6.00	0.22	0.00	0.00	32.00	3.10	1.91	0.00
6.50	0.25	0.00	0.00				
7.00	0.28	0.00	0.00				
7.50	0.32	0.00	0.01				
8.00	0.35	0.00	0.02				
8.50	0.40	0.01	0.03				
9.00	0.45	0.02	0.05				
9.50	0.51	0.04	0.07				
10.00	0.59	0.06	0.10				
10.50	0.67	0.09	0.14				
11.00	0.77	0.14	0.20				
11.50	0.92	0.21	0.37				
12.00	1.55	0.62	**2.64**				
12.50	2.18	1.11	**1.03**				
13.00	2.32	1.23	0.43				
13.50	2.43	1.32	0.34				
14.00	2.51	1.39	0.28				
14.50	2.59	1.46	0.24				
15.00	2.65	1.51	0.21				
15.50	2.70	1.56	0.18				
16.00	2.75	1.59	0.15				
16.50	2.78	1.63	0.13				
17.00	2.82	1.66	0.12				
17.50	2.85	1.69	0.10				
18.00	2.88	1.71	0.09				
18.50	2.90	1.73	0.09				
19.00	2.92	1.75	0.08				
19.50	2.95	1.77	0.08				
20.00	2.97	1.79	0.07				
20.50	2.99	1.81	0.07				
21.00	3.01	1.82	0.07				
21.50	3.02	1.84	0.06				
22.00	3.04	1.85	0.06				
22.50	3.06	1.87	0.06				
23.00	3.07	1.88	0.05				
23.50	3.09	1.90	0.05				
24.00	**3.10**	**1.91**	0.05				
24.50	3.10	1.91	0.00				
25.00	3.10	1.91	0.00				
25.50	3.10	1.91	0.00				

Summary for Subcatchment PR-2:

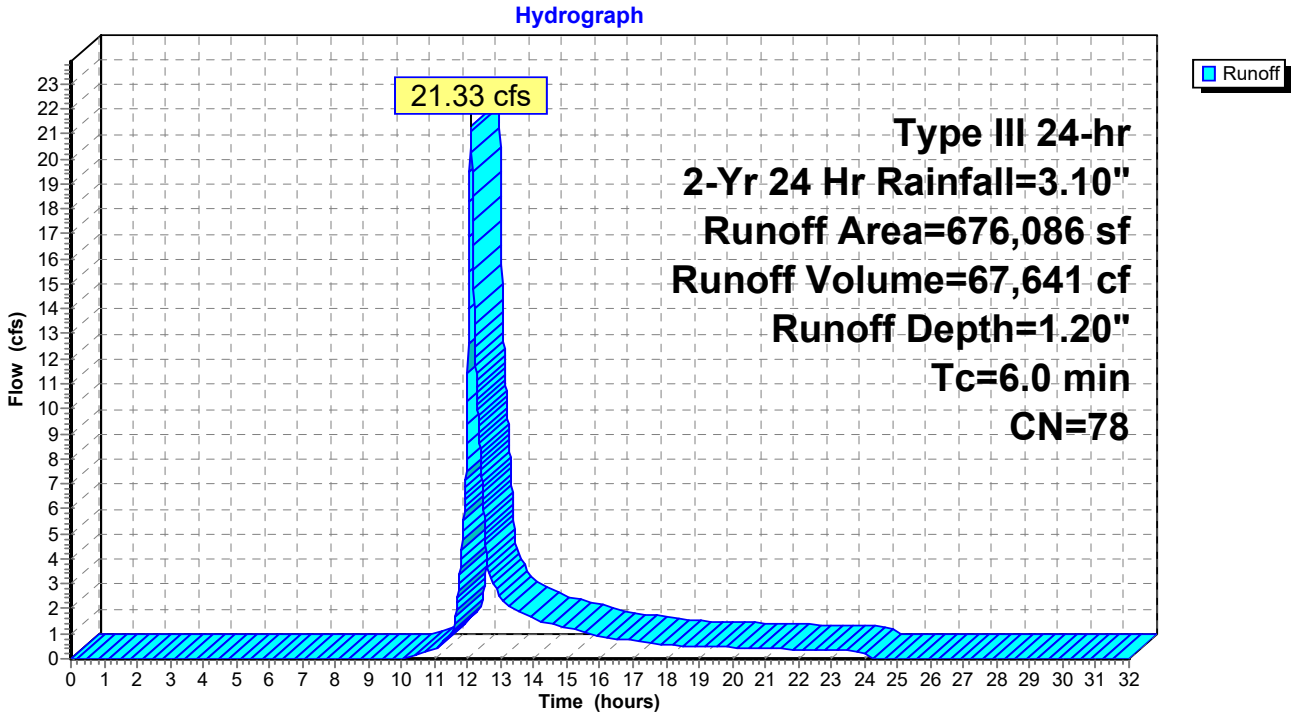
Runoff = 21.33 cfs @ 12.09 hrs, Volume= 67,641 cf, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr 24 Hr Rainfall=3.10"

	Area (sf)	CN	Description
	161,199	80	>75% Grass cover, Good, HSG D
	492,335	77	Woods, Good, HSG D
*	22,552	77	Wetlands, HSG D
	676,086	78	Weighted Average
	676,086		100.00% Pervious Area

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

Subcatchment PR-2:



Hydrograph for Subcatchment PR-2:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	3.10	1.20	0.00
0.50	0.02	0.00	0.00	26.50	3.10	1.20	0.00
1.00	0.03	0.00	0.00	27.00	3.10	1.20	0.00
1.50	0.05	0.00	0.00	27.50	3.10	1.20	0.00
2.00	0.06	0.00	0.00	28.00	3.10	1.20	0.00
2.50	0.08	0.00	0.00	28.50	3.10	1.20	0.00
3.00	0.10	0.00	0.00	29.00	3.10	1.20	0.00
3.50	0.11	0.00	0.00	29.50	3.10	1.20	0.00
4.00	0.13	0.00	0.00	30.00	3.10	1.20	0.00
4.50	0.15	0.00	0.00	30.50	3.10	1.20	0.00
5.00	0.18	0.00	0.00	31.00	3.10	1.20	0.00
5.50	0.20	0.00	0.00	31.50	3.10	1.20	0.00
6.00	0.22	0.00	0.00	32.00	3.10	1.20	0.00
6.50	0.25	0.00	0.00				
7.00	0.28	0.00	0.00				
7.50	0.32	0.00	0.00				
8.00	0.35	0.00	0.00				
8.50	0.40	0.00	0.00				
9.00	0.45	0.00	0.00				
9.50	0.51	0.00	0.00				
10.00	0.59	0.00	0.01				
10.50	0.67	0.00	0.17				
11.00	0.77	0.01	0.42				
11.50	0.92	0.04	1.06				
12.00	1.55	0.26	**11.40**				
12.50	2.18	0.59	**5.69**				
13.00	2.32	0.68	2.44				
13.50	2.43	0.74	1.95				
14.00	2.51	0.80	1.61				
14.50	2.59	0.84	1.42				
15.00	2.65	0.89	1.25				
15.50	2.70	0.92	1.08				
16.00	2.75	0.95	0.89				
16.50	2.78	0.98	0.80				
17.00	2.82	1.00	0.72				
17.50	2.85	1.02	0.64				
18.00	2.88	1.04	0.56				
18.50	2.90	1.06	0.52				
19.00	2.92	1.08	0.50				
19.50	2.95	1.09	0.48				
20.00	2.97	1.11	0.45				
20.50	2.99	1.12	0.43				
21.00	3.01	1.13	0.41				
21.50	3.02	1.15	0.40				
22.00	3.04	1.16	0.38				
22.50	3.06	1.17	0.36				
23.00	3.07	1.18	0.34				
23.50	3.09	1.19	0.32				
24.00	**3.10**	**1.20**	0.30				
24.50	3.10	1.20	0.00				
25.00	3.10	1.20	0.00				
25.50	3.10	1.20	0.00				

Summary for Subcatchment PR-3:

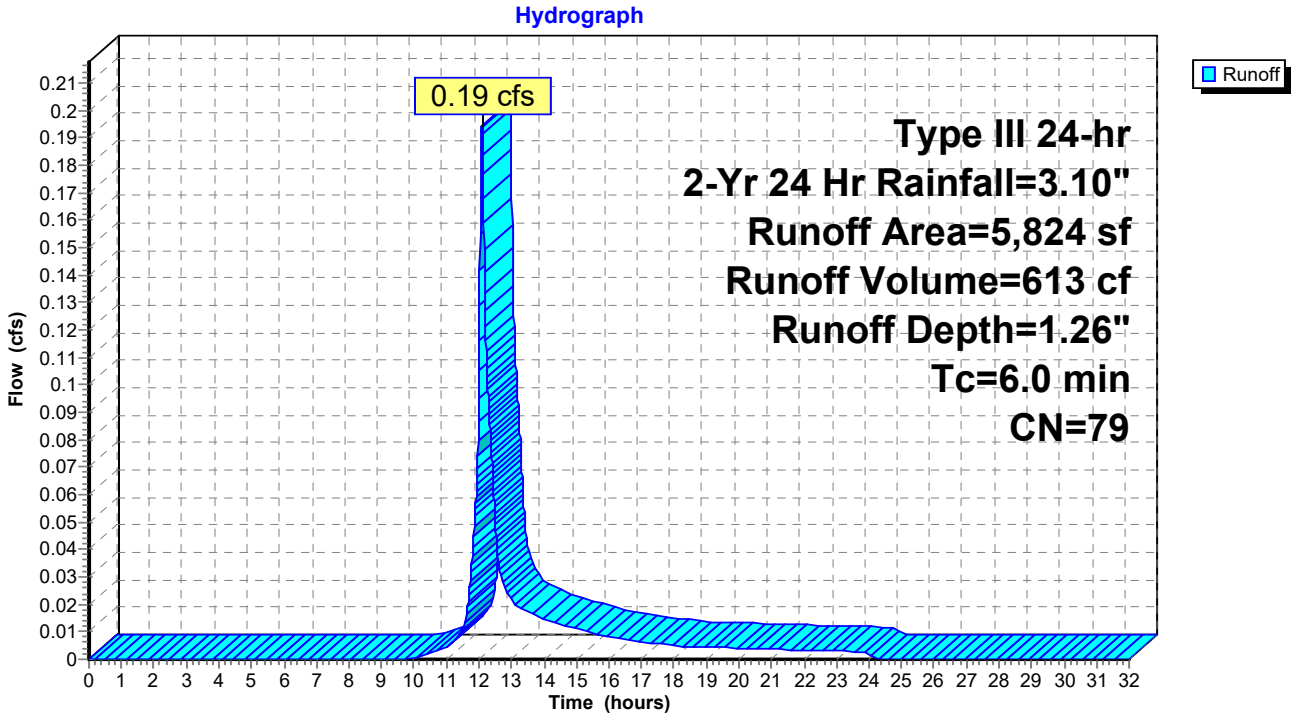
Runoff = 0.19 cfs @ 12.09 hrs, Volume= 613 cf, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr 24 Hr Rainfall=3.10"

Area (sf)	CN	Description
3,883	80	>75% Grass cover, Good, HSG D
1,941	77	Woods, Good, HSG D
5,824	79	Weighted Average
5,824		100.00% Pervious Area

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

Subcatchment PR-3:



Hydrograph for Subcatchment PR-3:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	3.10	1.26	0.00
0.50	0.02	0.00	0.00	26.50	3.10	1.26	0.00
1.00	0.03	0.00	0.00	27.00	3.10	1.26	0.00
1.50	0.05	0.00	0.00	27.50	3.10	1.26	0.00
2.00	0.06	0.00	0.00	28.00	3.10	1.26	0.00
2.50	0.08	0.00	0.00	28.50	3.10	1.26	0.00
3.00	0.10	0.00	0.00	29.00	3.10	1.26	0.00
3.50	0.11	0.00	0.00	29.50	3.10	1.26	0.00
4.00	0.13	0.00	0.00	30.00	3.10	1.26	0.00
4.50	0.15	0.00	0.00	30.50	3.10	1.26	0.00
5.00	0.18	0.00	0.00	31.00	3.10	1.26	0.00
5.50	0.20	0.00	0.00	31.50	3.10	1.26	0.00
6.00	0.22	0.00	0.00	32.00	3.10	1.26	0.00
6.50	0.25	0.00	0.00				
7.00	0.28	0.00	0.00				
7.50	0.32	0.00	0.00				
8.00	0.35	0.00	0.00				
8.50	0.40	0.00	0.00				
9.00	0.45	0.00	0.00				
9.50	0.51	0.00	0.00				
10.00	0.59	0.00	0.00				
10.50	0.67	0.01	0.00				
11.00	0.77	0.02	0.00				
11.50	0.92	0.05	0.01				
12.00	1.55	0.28	**0.11**				
12.50	2.18	0.63	**0.05**				
13.00	2.32	0.72	0.02				
13.50	2.43	0.79	0.02				
14.00	2.51	0.85	0.01				
14.50	2.59	0.90	0.01				
15.00	2.65	0.94	0.01				
15.50	2.70	0.98	0.01				
16.00	2.75	1.01	0.01				
16.50	2.78	1.03	0.01				
17.00	2.82	1.06	0.01				
17.50	2.85	1.08	0.01				
18.00	2.88	1.10	0.00				
18.50	2.90	1.12	0.00				
19.00	2.92	1.13	0.00				
19.50	2.95	1.15	0.00				
20.00	2.97	1.16	0.00				
20.50	2.99	1.18	0.00				
21.00	3.01	1.19	0.00				
21.50	3.02	1.21	0.00				
22.00	3.04	1.22	0.00				
22.50	3.06	1.23	0.00				
23.00	3.07	1.24	0.00				
23.50	3.09	1.25	0.00				
24.00	**3.10**	**1.26**	0.00				
24.50	3.10	1.26	0.00				
25.00	3.10	1.26	0.00				
25.50	3.10	1.26	0.00				

Summary for Subcatchment PR-4:

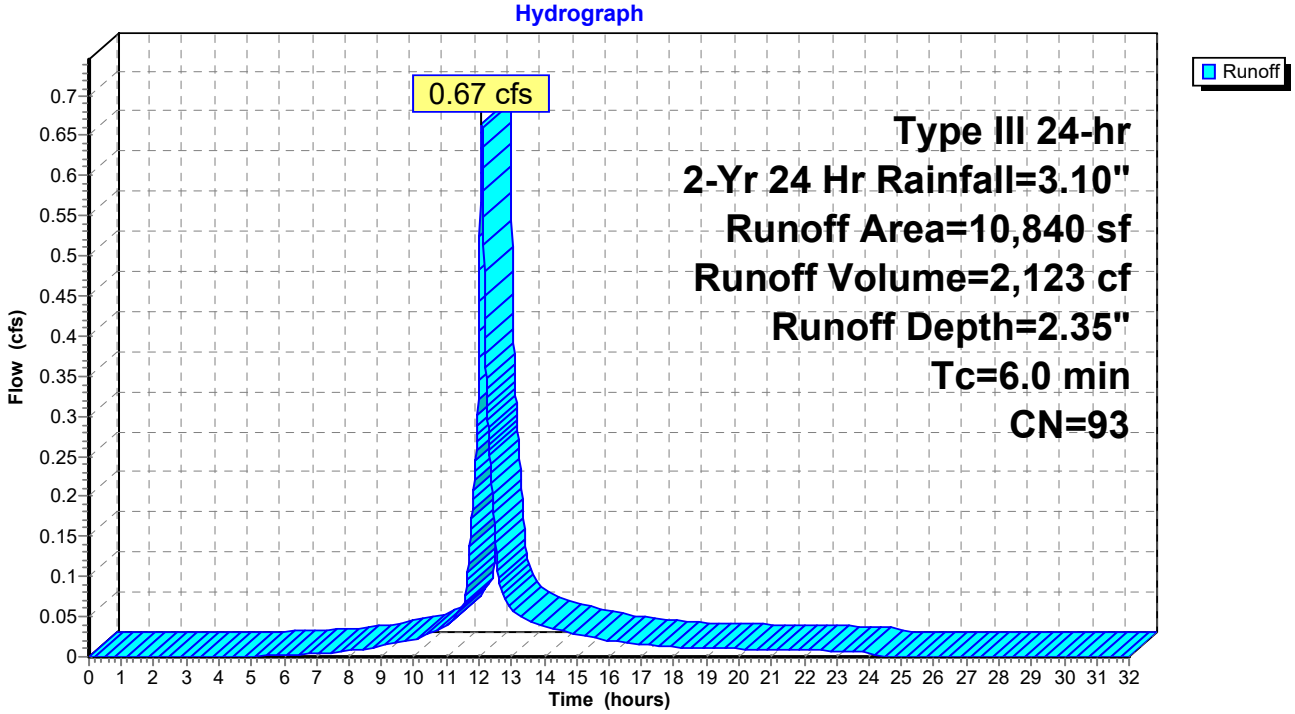
Runoff = 0.67 cfs @ 12.09 hrs, Volume= 2,123 cf, Depth= 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr 24 Hr Rainfall=3.10"

Area (sf)	CN	Description
8,072	98	Paved parking, HSG D
2,768	80	>75% Grass cover, Good, HSG D
10,840	93	Weighted Average
2,768		25.54% Pervious Area
8,072		74.46% Impervious Area

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

Subcatchment PR-4:



Hydrograph for Subcatchment PR-4:

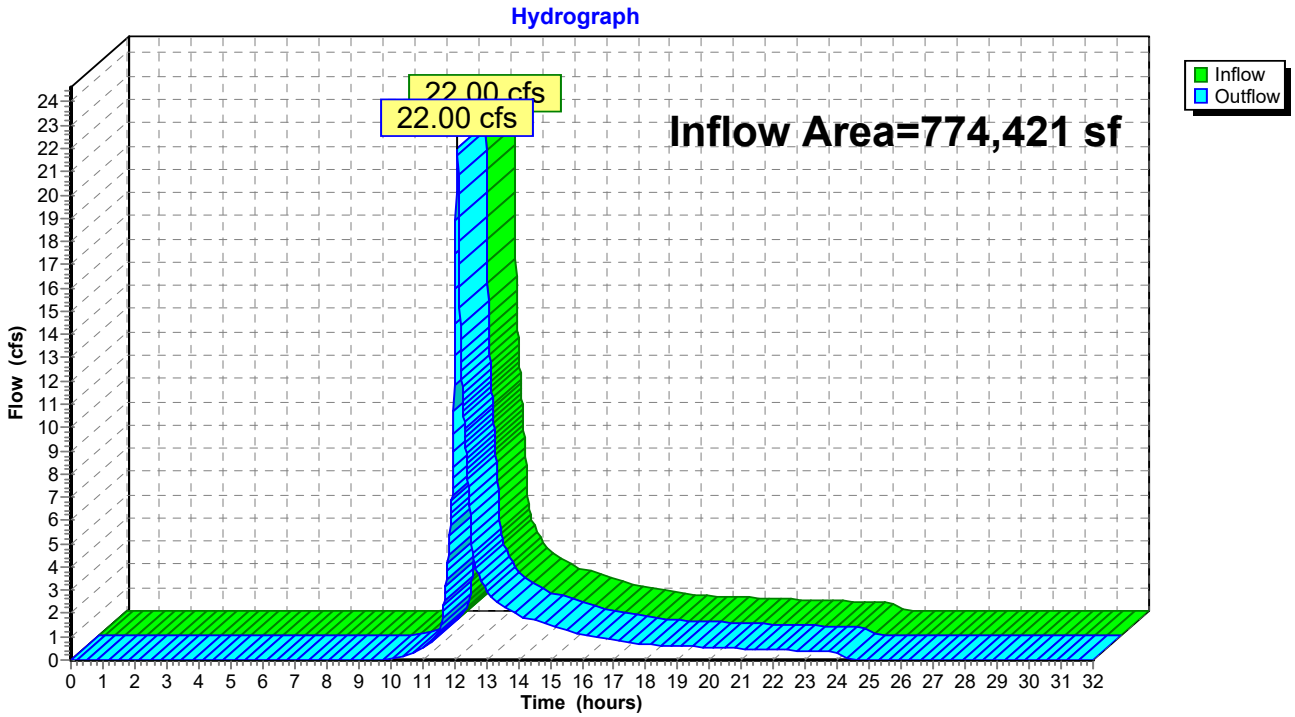
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	3.10	2.35	0.00
0.50	0.02	0.00	0.00	26.50	3.10	2.35	0.00
1.00	0.03	0.00	0.00	27.00	3.10	2.35	0.00
1.50	0.05	0.00	0.00	27.50	3.10	2.35	0.00
2.00	0.06	0.00	0.00	28.00	3.10	2.35	0.00
2.50	0.08	0.00	0.00	28.50	3.10	2.35	0.00
3.00	0.10	0.00	0.00	29.00	3.10	2.35	0.00
3.50	0.11	0.00	0.00	29.50	3.10	2.35	0.00
4.00	0.13	0.00	0.00	30.00	3.10	2.35	0.00
4.50	0.15	0.00	0.00	30.50	3.10	2.35	0.00
5.00	0.18	0.00	0.00	31.00	3.10	2.35	0.00
5.50	0.20	0.00	0.00	31.50	3.10	2.35	0.00
6.00	0.22	0.01	0.00	32.00	3.10	2.35	0.00
6.50	0.25	0.01	0.00				
7.00	0.28	0.02	0.00				
7.50	0.32	0.03	0.01				
8.00	0.35	0.04	0.01				
8.50	0.40	0.06	0.01				
9.00	0.45	0.09	0.01				
9.50	0.51	0.12	0.02				
10.00	0.59	0.16	0.02				
10.50	0.67	0.21	0.03				
11.00	0.77	0.28	0.04				
11.50	0.92	0.39	0.06				
12.00	1.55	0.91	**0.41**				
12.50	2.18	1.48	**0.14**				
13.00	2.32	1.62	0.06				
13.50	2.43	1.71	0.05				
14.00	2.51	1.79	0.04				
14.50	2.59	1.86	0.03				
15.00	2.65	1.92	0.03				
15.50	2.70	1.97	0.02				
16.00	2.75	2.01	0.02				
16.50	2.78	2.05	0.02				
17.00	2.82	2.08	0.02				
17.50	2.85	2.11	0.01				
18.00	2.88	2.14	0.01				
18.50	2.90	2.16	0.01				
19.00	2.92	2.18	0.01				
19.50	2.95	2.20	0.01				
20.00	2.97	2.22	0.01				
20.50	2.99	2.24	0.01				
21.00	3.01	2.26	0.01				
21.50	3.02	2.28	0.01				
22.00	3.04	2.29	0.01				
22.50	3.06	2.31	0.01				
23.00	3.07	2.32	0.01				
23.50	3.09	2.34	0.01				
24.00	**3.10**	**2.35**	0.01				
24.50	3.10	2.35	0.00				
25.00	3.10	2.35	0.00				
25.50	3.10	2.35	0.00				

Summary for Reach POA-1:

Inflow Area = 774,421 sf, 5.85% Impervious, Inflow Depth = 1.18" for 2-Yr 24 Hr event
Inflow = 22.00 cfs @ 12.09 hrs, Volume= 76,238 cf
Outflow = 22.00 cfs @ 12.09 hrs, Volume= 76,238 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs

Reach POA-1:



Hydrograph for Reach POA-1:

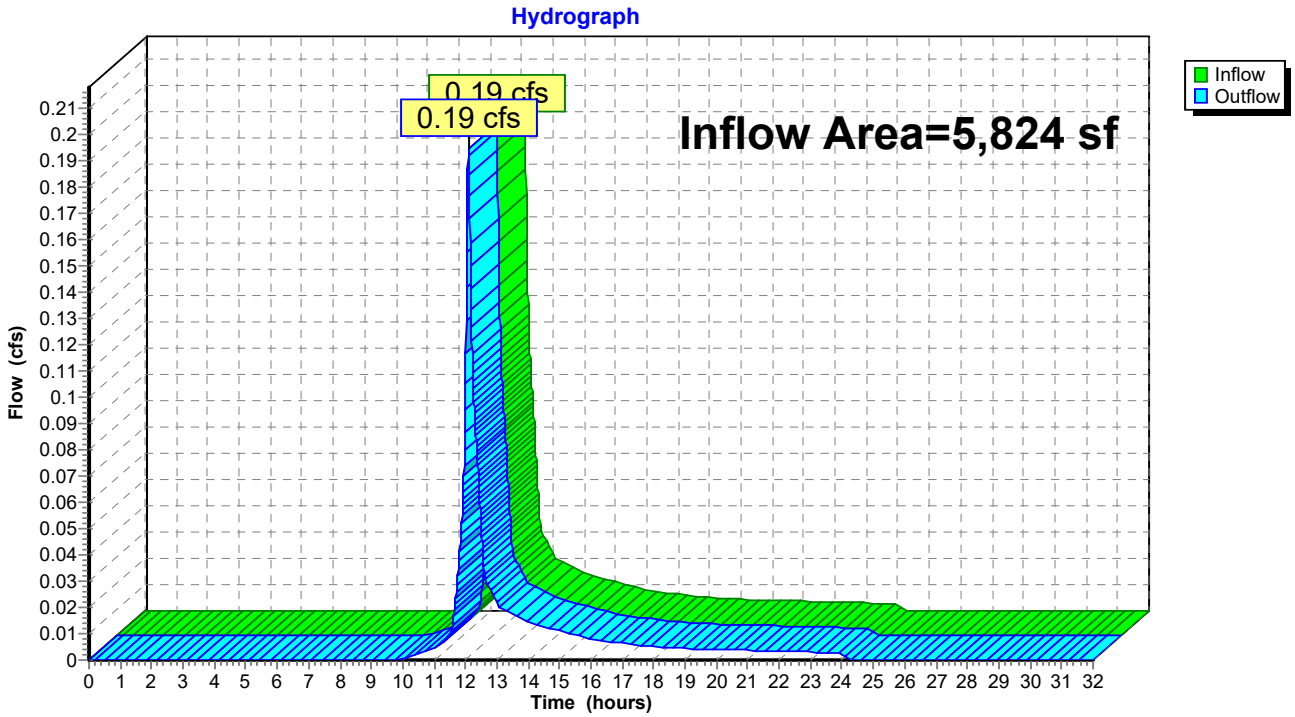
Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	26.00	0.00		0.00
0.50	0.00		0.00	26.50	0.00		0.00
1.00	0.00		0.00	27.00	0.00		0.00
1.50	0.00		0.00	27.50	0.00		0.00
2.00	0.00		0.00	28.00	0.00		0.00
2.50	0.00		0.00	28.50	0.00		0.00
3.00	0.00		0.00	29.00	0.00		0.00
3.50	0.00		0.00	29.50	0.00		0.00
4.00	0.00		0.00	30.00	0.00		0.00
4.50	0.00		0.00	30.50	0.00		0.00
5.00	0.00		0.00	31.00	0.00		0.00
5.50	0.00		0.00	31.50	0.00		0.00
6.00	0.00		0.00	32.00	0.00		0.00
6.50	0.00		0.00				
7.00	0.00		0.00				
7.50	0.01		0.01				
8.00	0.01		0.01				
8.50	0.01		0.01				
9.00	0.01		0.01				
9.50	0.02		0.02				
10.00	0.04		0.04				
10.50	0.20		0.20				
11.00	0.46		0.46				
11.50	1.12		1.12				
12.00	**11.81**		**11.81**				
12.50	**6.12**		**6.12**				
13.00	2.99		2.99				
13.50	2.36		2.36				
14.00	1.95		1.95				
14.50	1.70		1.70				
15.00	1.50		1.50				
15.50	1.29		1.29				
16.00	1.08		1.08				
16.50	0.96		0.96				
17.00	0.86		0.86				
17.50	0.77		0.77				
18.00	0.67		0.67				
18.50	0.62		0.62				
19.00	0.59		0.59				
19.50	0.57		0.57				
20.00	0.54		0.54				
20.50	0.51		0.51				
21.00	0.49		0.49				
21.50	0.47		0.47				
22.00	0.45		0.45				
22.50	0.43		0.43				
23.00	0.40		0.40				
23.50	0.38		0.38				
24.00	0.36		0.36				
24.50	0.02		0.02				
25.00	0.01		0.01				
25.50	0.00		0.00				

Summary for Reach POA-2:

Inflow Area = 5,824 sf, 0.00% Impervious, Inflow Depth = 1.26" for 2-Yr 24 Hr event
Inflow = 0.19 cfs @ 12.09 hrs, Volume= 613 cf
Outflow = 0.19 cfs @ 12.09 hrs, Volume= 613 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs

Reach POA-2:



Hydrograph for Reach POA-2:

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	26.00	0.00		0.00
0.50	0.00		0.00	26.50	0.00		0.00
1.00	0.00		0.00	27.00	0.00		0.00
1.50	0.00		0.00	27.50	0.00		0.00
2.00	0.00		0.00	28.00	0.00		0.00
2.50	0.00		0.00	28.50	0.00		0.00
3.00	0.00		0.00	29.00	0.00		0.00
3.50	0.00		0.00	29.50	0.00		0.00
4.00	0.00		0.00	30.00	0.00		0.00
4.50	0.00		0.00	30.50	0.00		0.00
5.00	0.00		0.00	31.00	0.00		0.00
5.50	0.00		0.00	31.50	0.00		0.00
6.00	0.00		0.00	32.00	0.00		0.00
6.50	0.00		0.00				
7.00	0.00		0.00				
7.50	0.00		0.00				
8.00	0.00		0.00				
8.50	0.00		0.00				
9.00	0.00		0.00				
9.50	0.00		0.00				
10.00	0.00		0.00				
10.50	0.00		0.00				
11.00	0.00		0.00				
11.50	0.01		0.01				
12.00	**0.11**		**0.11**				
12.50	**0.05**		**0.05**				
13.00	0.02		0.02				
13.50	0.02		0.02				
14.00	0.01		0.01				
14.50	0.01		0.01				
15.00	0.01		0.01				
15.50	0.01		0.01				
16.00	0.01		0.01				
16.50	0.01		0.01				
17.00	0.01		0.01				
17.50	0.01		0.01				
18.00	0.00		0.00				
18.50	0.00		0.00				
19.00	0.00		0.00				
19.50	0.00		0.00				
20.00	0.00		0.00				
20.50	0.00		0.00				
21.00	0.00		0.00				
21.50	0.00		0.00				
22.00	0.00		0.00				
22.50	0.00		0.00				
23.00	0.00		0.00				
23.50	0.00		0.00				
24.00	0.00		0.00				
24.50	0.00		0.00				
25.00	0.00		0.00				
25.50	0.00		0.00				

Summary for Pond Swale-1: Wet Swale-1

Inflow Area = 87,495 sf, 42.57% Impervious, Inflow Depth = 1.91" for 2-Yr 24 Hr event
Inflow = 4.48 cfs @ 12.09 hrs, Volume= 13,907 cf
Outflow = 0.55 cfs @ 12.75 hrs, Volume= 6,474 cf, Atten= 88%, Lag= 39.7 min
Primary = 0.55 cfs @ 12.75 hrs, Volume= 6,474 cf

Routing by Stor-Ind method, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Peak Elev= 73.08' @ 12.75 hrs Surf.Area= 5,543 sf Storage= 7,942 cf

Plug-Flow detention time= 266.0 min calculated for 6,474 cf (47% of inflow)
Center-of-Mass det. time= 149.6 min (965.9 - 816.4)

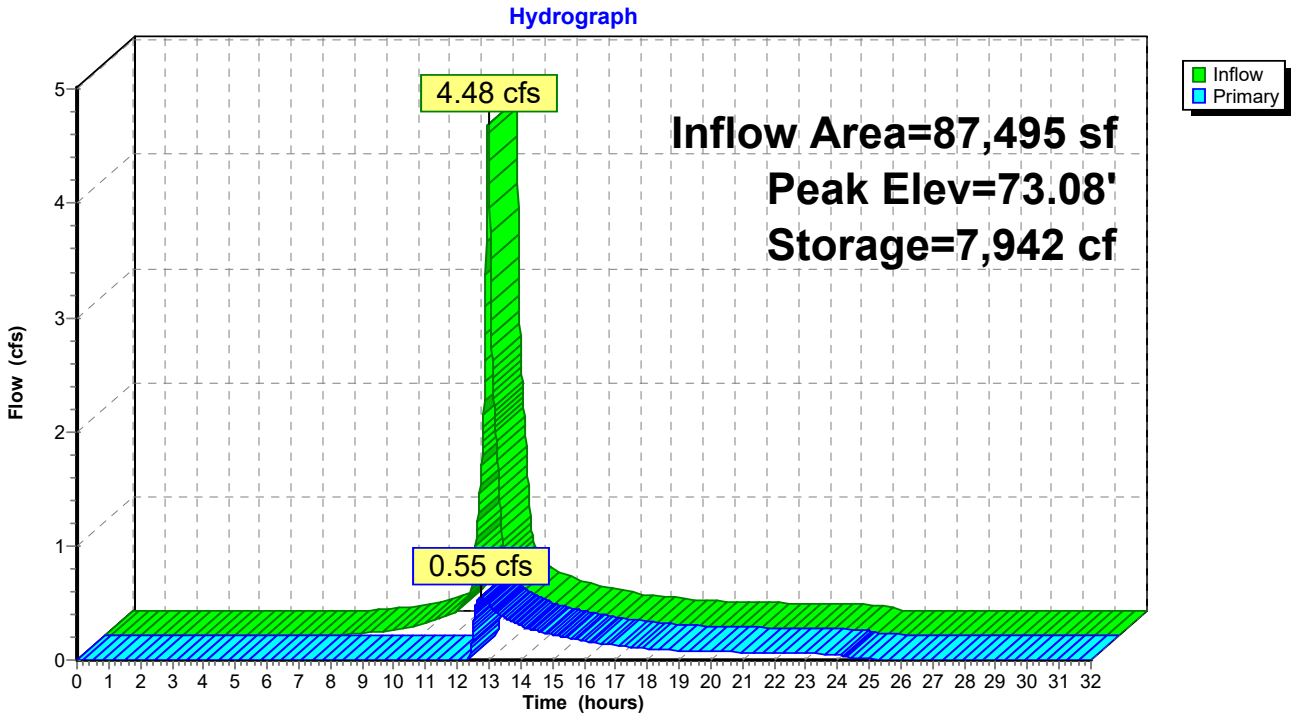
Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	13,739 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	2,093	0	0
72.00	3,688	2,891	2,891
73.00	5,396	4,542	7,433
74.00	7,216	6,306	13,739

Device	Routing	Invert	Outlet Devices
#1	Primary	73.00'	**10.0' long x 5.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86

Primary OutFlow Max=0.54 cfs @ 12.75 hrs HW=73.08' (Free Discharge)
└1=**Broad-Crested Rectangular Weir** (Weir Controls 0.54 cfs @ 0.67 fps)

Pond Swale-1: Wet Swale-1



Hydrograph for Pond Swale-1: Wet Swale-1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	71.00	0.00
1.00	0.00	0	71.00	0.00
2.00	0.00	0	71.00	0.00
3.00	0.00	0	71.00	0.00
4.00	0.00	0	71.00	0.00
5.00	0.00	0	71.00	0.00
6.00	0.00	0	71.00	0.00
7.00	0.00	0	71.00	0.00
8.00	0.02	27	71.01	0.00
9.00	0.05	135	71.05	0.00
10.00	0.10	393	71.14	0.00
11.00	0.20	917	71.32	0.00
12.00	**2.64**	**3,287**	**72.09**	**0.00**
13.00	**0.43**	**7,908**	**73.08**	**0.49**
14.00	0.28	7,772	73.05	0.30
15.00	0.21	7,711	73.04	0.22
16.00	0.15	7,660	73.04	0.17
17.00	0.12	7,615	73.03	0.13
18.00	0.09	7,583	73.02	0.10
19.00	0.08	7,565	73.02	0.08
20.00	0.07	7,556	73.02	0.08
21.00	0.07	7,548	73.02	0.07
22.00	0.06	7,541	73.02	0.06
23.00	0.05	7,534	73.02	0.06
24.00	0.05	7,526	73.01	0.05
25.00	0.00	7,458	73.00	0.01
26.00	0.00	7,439	73.00	0.00
27.00	0.00	7,434	73.00	0.00
28.00	0.00	7,433	73.00	0.00
29.00	0.00	7,433	73.00	0.00
30.00	0.00	7,433	73.00	0.00
31.00	0.00	7,433	73.00	0.00
32.00	0.00	7,433	73.00	0.00

Time span=0.00-32.00 hrs, dt=0.01 hrs, 3201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Runoff Area=87,495 sf 42.57% Impervious Runoff Depth=3.20"
Tc=6.0 min CN=88 Runoff=7.40 cfs 23,305 cf

Subcatchment PR-2: Runoff Area=676,086 sf 0.00% Impervious Runoff Depth=2.29"
Tc=6.0 min CN=78 Runoff=41.69 cfs 129,179 cf

Subcatchment PR-3: Runoff Area=5,824 sf 0.00% Impervious Runoff Depth=2.38"
Tc=6.0 min CN=79 Runoff=0.37 cfs 1,153 cf

Subcatchment PR-4: Runoff Area=10,840 sf 74.46% Impervious Runoff Depth=3.71"
Tc=6.0 min CN=93 Runoff=1.02 cfs 3,349 cf

Reach POA-1: Inflow=44.35 cfs 148,400 cf
Outflow=44.35 cfs 148,400 cf

Reach POA-2: Inflow=0.37 cfs 1,153 cf
Outflow=0.37 cfs 1,153 cf

Pond Swale-1: Wet Swale-1 Peak Elev=73.31' Storage=9,416 cf Inflow=7.40 cfs 23,305 cf
Outflow=4.31 cfs 15,872 cf

Total Runoff Area = 780,245 sf Runoff Volume = 156,986 cf Average Runoff Depth = 2.41"
94.19% Pervious = 734,923 sf 5.81% Impervious = 45,322 sf

Summary for Subcatchment PR-1:

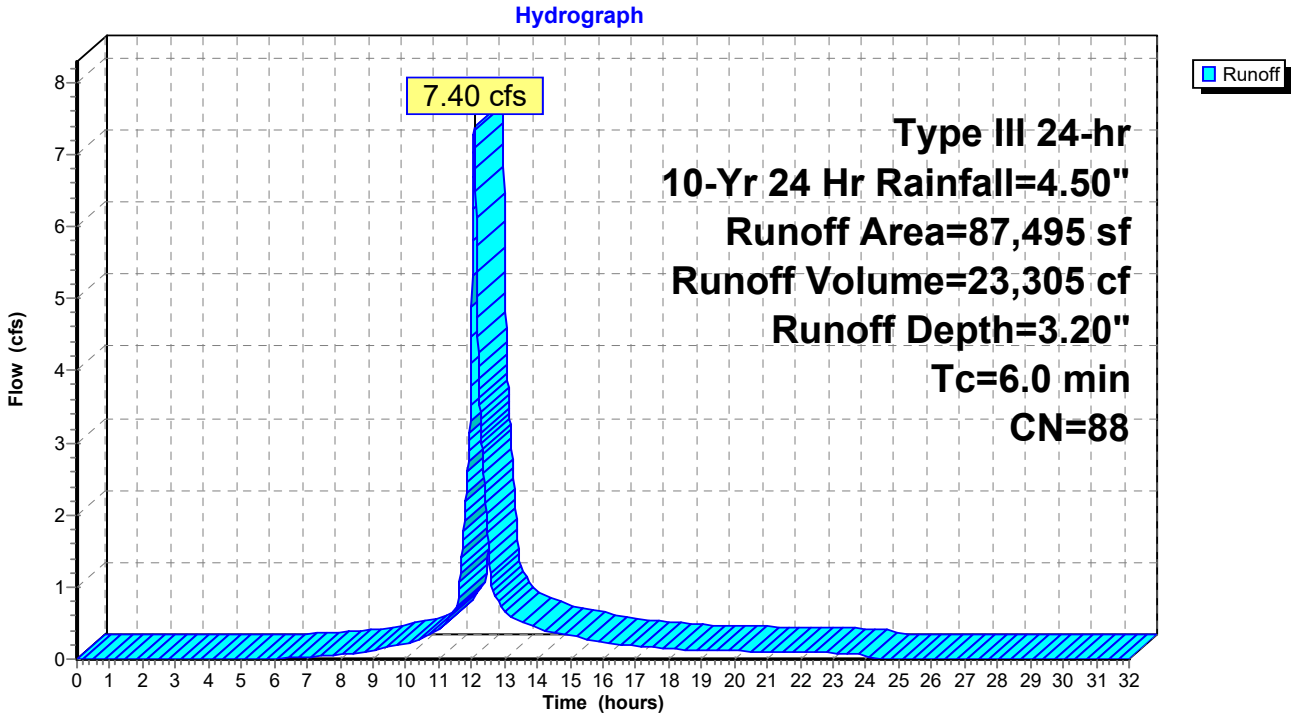
Runoff = 7.40 cfs @ 12.09 hrs, Volume= 23,305 cf, Depth= 3.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr 24 Hr Rainfall=4.50"

	Area (sf)	CN	Description
	50,245	80	>75% Grass cover, Good, HSG D
*	7,585	98	Sidewalk, HSG D
*	29,665	98	Paved Road, HSG D
	87,495	88	Weighted Average
	50,245		57.43% Pervious Area
	37,250		42.57% Impervious Area

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

Subcatchment PR-1:



Hydrograph for Subcatchment PR-1:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	4.50	3.20	0.00
0.50	0.02	0.00	0.00	26.50	4.50	3.20	0.00
1.00	0.04	0.00	0.00	27.00	4.50	3.20	0.00
1.50	0.07	0.00	0.00	27.50	4.50	3.20	0.00
2.00	0.09	0.00	0.00	28.00	4.50	3.20	0.00
2.50	0.11	0.00	0.00	28.50	4.50	3.20	0.00
3.00	0.14	0.00	0.00	29.00	4.50	3.20	0.00
3.50	0.17	0.00	0.00	29.50	4.50	3.20	0.00
4.00	0.19	0.00	0.00	30.00	4.50	3.20	0.00
4.50	0.22	0.00	0.00	30.50	4.50	3.20	0.00
5.00	0.26	0.00	0.00	31.00	4.50	3.20	0.00
5.50	0.29	0.00	0.00	31.50	4.50	3.20	0.00
6.00	0.32	0.00	0.01	32.00	4.50	3.20	0.00
6.50	0.36	0.01	0.02				
7.00	0.41	0.01	0.03				
7.50	0.46	0.02	0.05				
8.00	0.51	0.04	0.06				
8.50	0.58	0.06	0.09				
9.00	0.66	0.08	0.13				
9.50	0.75	0.12	0.17				
10.00	0.85	0.17	0.22				
10.50	0.97	0.24	0.30				
11.00	1.13	0.33	0.39				
11.50	1.34	0.47	0.68				
12.00	2.25	1.17	**4.47**				
12.50	3.16	1.96	**1.63**				
13.00	3.37	2.16	0.67				
13.50	3.53	2.29	0.53				
14.00	3.65	2.41	0.43				
14.50	3.75	2.50	0.37				
15.00	3.84	2.58	0.32				
15.50	3.92	2.66	0.28				
16.00	3.99	2.72	0.23				
16.50	4.04	2.77	0.20				
17.00	4.09	2.82	0.18				
17.50	4.14	2.86	0.16				
18.00	4.18	2.89	0.14				
18.50	4.21	2.93	0.13				
19.00	4.24	2.96	0.12				
19.50	4.28	2.99	0.12				
20.00	4.31	3.01	0.11				
20.50	4.34	3.04	0.11				
21.00	4.36	3.07	0.10				
21.50	4.39	3.09	0.10				
22.00	4.41	3.11	0.09				
22.50	4.44	3.14	0.09				
23.00	4.46	3.16	0.08				
23.50	4.48	3.18	0.08				
24.00	**4.50**	**3.20**	0.07				
24.50	4.50	3.20	0.00				
25.00	4.50	3.20	0.00				
25.50	4.50	3.20	0.00				

Summary for Subcatchment PR-2:

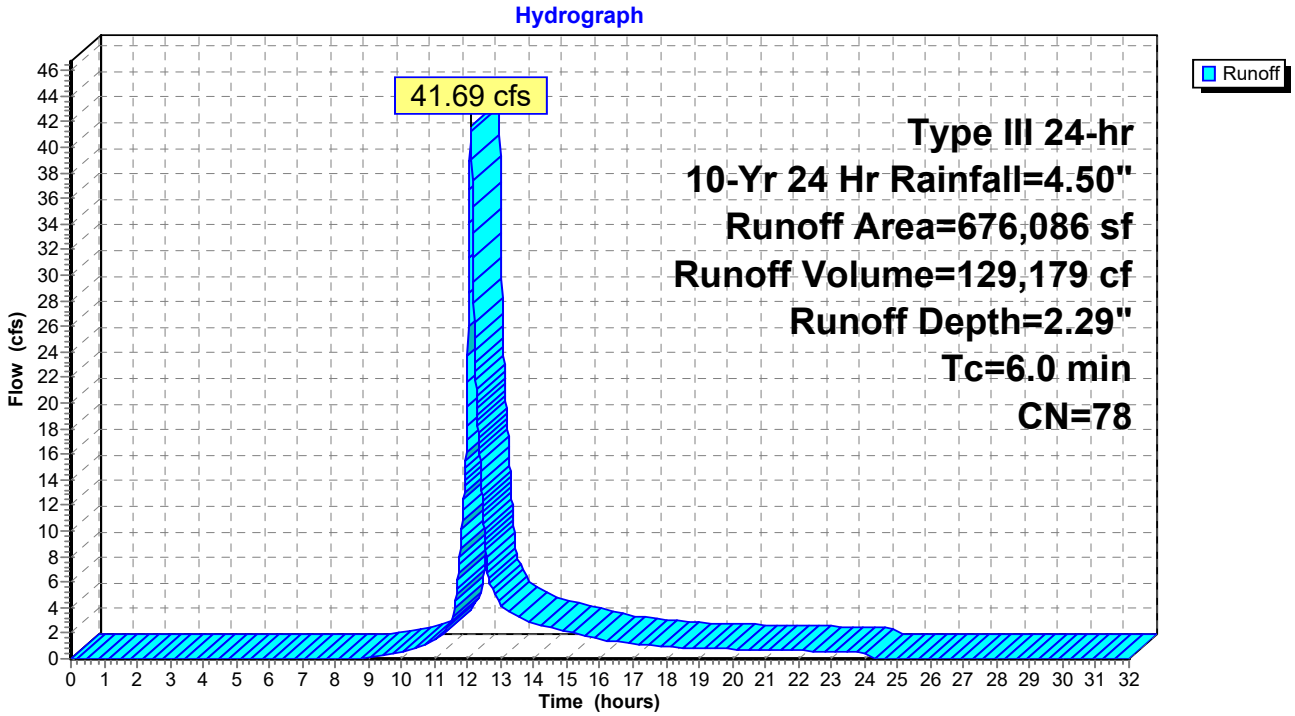
Runoff = 41.69 cfs @ 12.09 hrs, Volume= 129,179 cf, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr 24 Hr Rainfall=4.50"

	Area (sf)	CN	Description
	161,199	80	>75% Grass cover, Good, HSG D
	492,335	77	Woods, Good, HSG D
*	22,552	77	Wetlands, HSG D
	676,086	78	Weighted Average
	676,086		100.00% Pervious Area

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

Subcatchment PR-2:



Hydrograph for Subcatchment PR-2:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	4.50	2.29	0.00
0.50	0.02	0.00	0.00	26.50	4.50	2.29	0.00
1.00	0.04	0.00	0.00	27.00	4.50	2.29	0.00
1.50	0.07	0.00	0.00	27.50	4.50	2.29	0.00
2.00	0.09	0.00	0.00	28.00	4.50	2.29	0.00
2.50	0.11	0.00	0.00	28.50	4.50	2.29	0.00
3.00	0.14	0.00	0.00	29.00	4.50	2.29	0.00
3.50	0.17	0.00	0.00	29.50	4.50	2.29	0.00
4.00	0.19	0.00	0.00	30.00	4.50	2.29	0.00
4.50	0.22	0.00	0.00	30.50	4.50	2.29	0.00
5.00	0.26	0.00	0.00	31.00	4.50	2.29	0.00
5.50	0.29	0.00	0.00	31.50	4.50	2.29	0.00
6.00	0.32	0.00	0.00	32.00	4.50	2.29	0.00
6.50	0.36	0.00	0.00				
7.00	0.41	0.00	0.00				
7.50	0.46	0.00	0.00				
8.00	0.51	0.00	0.00				
8.50	0.58	0.00	0.00				
9.00	0.66	0.00	0.13				
9.50	0.75	0.01	0.32				
10.00	0.85	0.03	0.56				
10.50	0.97	0.05	0.94				
11.00	1.13	0.09	1.45				
11.50	1.34	0.17	2.87				
12.00	2.25	0.63	**23.68**				
12.50	3.16	1.24	**10.18**				
13.00	3.37	1.40	4.28				
13.50	3.53	1.52	3.38				
14.00	3.65	1.61	2.78				
14.50	3.75	1.69	2.43				
15.00	3.84	1.76	2.13				
15.50	3.92	1.83	1.83				
16.00	3.99	1.88	1.52				
16.50	4.04	1.92	1.35				
17.00	4.09	1.96	1.21				
17.50	4.14	2.00	1.08				
18.00	4.18	2.03	0.94				
18.50	4.21	2.06	0.88				
19.00	4.24	2.08	0.84				
19.50	4.28	2.11	0.80				
20.00	4.31	2.13	0.75				
20.50	4.34	2.16	0.72				
21.00	4.36	2.18	0.69				
21.50	4.39	2.20	0.66				
22.00	4.41	2.22	0.63				
22.50	4.44	2.24	0.60				
23.00	4.46	2.26	0.56				
23.50	4.48	2.28	0.53				
24.00	**4.50**	**2.29**	0.50				
24.50	4.50	2.29	0.00				
25.00	4.50	2.29	0.00				
25.50	4.50	2.29	0.00				

Summary for Subcatchment PR-3:

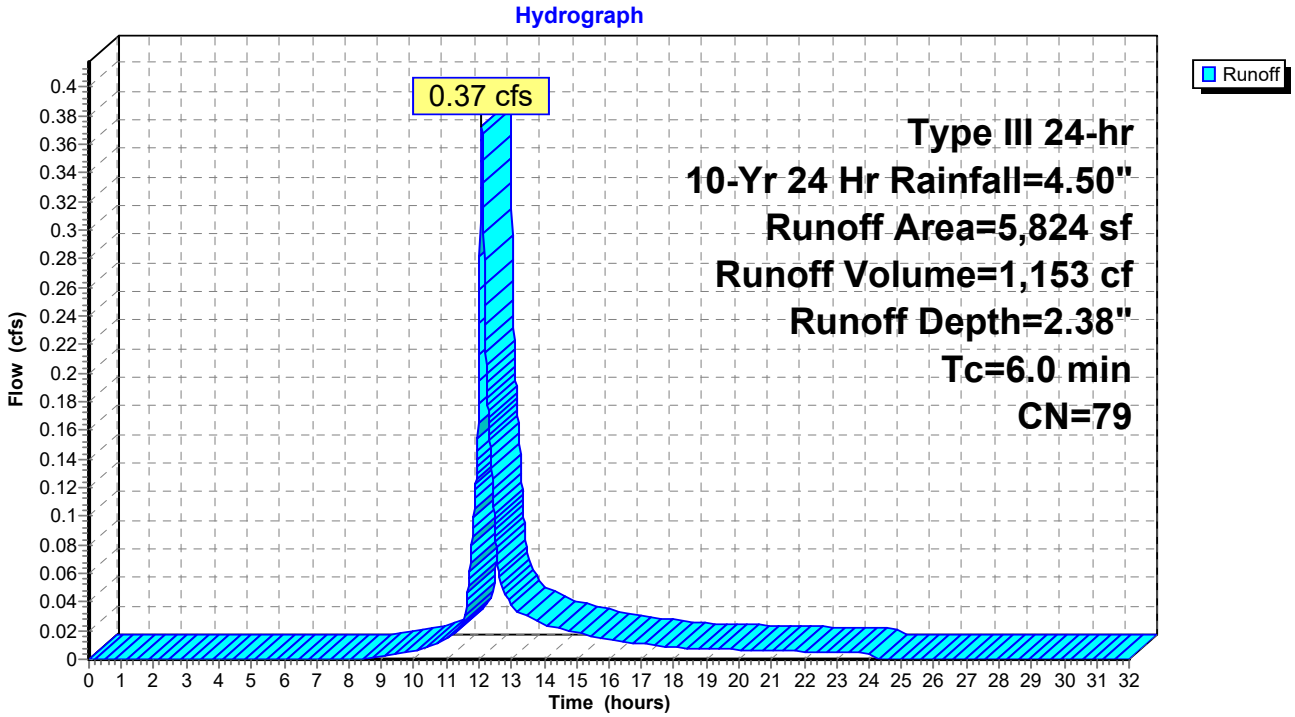
Runoff = 0.37 cfs @ 12.09 hrs, Volume= 1,153 cf, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr 24 Hr Rainfall=4.50"

Area (sf)	CN	Description
3,883	80	>75% Grass cover, Good, HSG D
1,941	77	Woods, Good, HSG D
5,824	79	Weighted Average
5,824		100.00% Pervious Area

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

Subcatchment PR-3:



Hydrograph for Subcatchment PR-3:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	4.50	2.38	0.00
0.50	0.02	0.00	0.00	26.50	4.50	2.38	0.00
1.00	0.04	0.00	0.00	27.00	4.50	2.38	0.00
1.50	0.07	0.00	0.00	27.50	4.50	2.38	0.00
2.00	0.09	0.00	0.00	28.00	4.50	2.38	0.00
2.50	0.11	0.00	0.00	28.50	4.50	2.38	0.00
3.00	0.14	0.00	0.00	29.00	4.50	2.38	0.00
3.50	0.17	0.00	0.00	29.50	4.50	2.38	0.00
4.00	0.19	0.00	0.00	30.00	4.50	2.38	0.00
4.50	0.22	0.00	0.00	30.50	4.50	2.38	0.00
5.00	0.26	0.00	0.00	31.00	4.50	2.38	0.00
5.50	0.29	0.00	0.00	31.50	4.50	2.38	0.00
6.00	0.32	0.00	0.00	32.00	4.50	2.38	0.00
6.50	0.36	0.00	0.00				
7.00	0.41	0.00	0.00				
7.50	0.46	0.00	0.00				
8.00	0.51	0.00	0.00				
8.50	0.58	0.00	0.00				
9.00	0.66	0.01	0.00				
9.50	0.75	0.02	0.00				
10.00	0.85	0.03	0.01				
10.50	0.97	0.06	0.01				
11.00	1.13	0.11	0.01				
11.50	1.34	0.19	0.03				
12.00	2.25	0.67	**0.21**				
12.50	3.16	1.31	**0.09**				
13.00	3.37	1.47	0.04				
13.50	3.53	1.59	0.03				
14.00	3.65	1.68	0.02				
14.50	3.75	1.77	0.02				
15.00	3.84	1.84	0.02				
15.50	3.92	1.90	0.02				
16.00	3.99	1.95	0.01				
16.50	4.04	2.00	0.01				
17.00	4.09	2.04	0.01				
17.50	4.14	2.08	0.01				
18.00	4.18	2.11	0.01				
18.50	4.21	2.14	0.01				
19.00	4.24	2.16	0.01				
19.50	4.28	2.19	0.01				
20.00	4.31	2.22	0.01				
20.50	4.34	2.24	0.01				
21.00	4.36	2.26	0.01				
21.50	4.39	2.28	0.01				
22.00	4.41	2.30	0.01				
22.50	4.44	2.32	0.01				
23.00	4.46	2.34	0.00				
23.50	4.48	2.36	0.00				
24.00	**4.50**	**2.38**	0.00				
24.50	4.50	2.38	0.00				
25.00	4.50	2.38	0.00				
25.50	4.50	2.38	0.00				

Summary for Subcatchment PR-4:

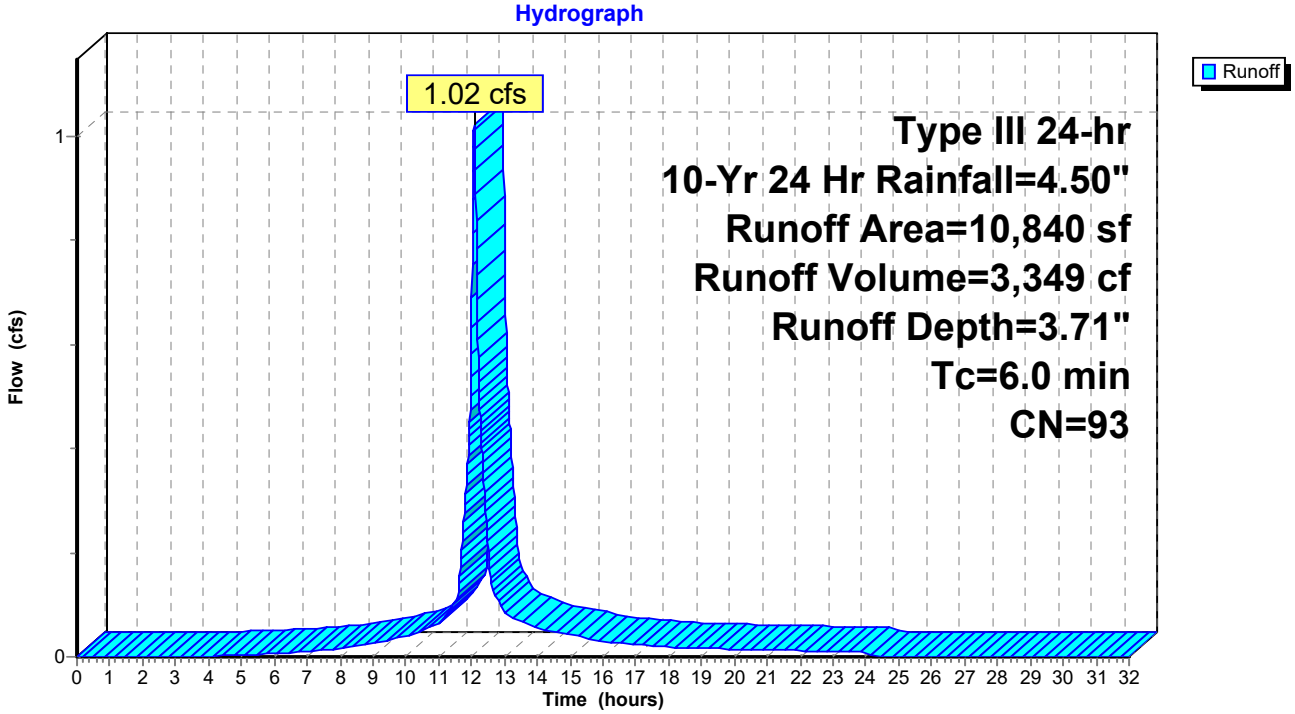
Runoff = 1.02 cfs @ 12.08 hrs, Volume= 3,349 cf, Depth= 3.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr 24 Hr Rainfall=4.50"

Area (sf)	CN	Description
8,072	98	Paved parking, HSG D
2,768	80	>75% Grass cover, Good, HSG D
10,840	93	Weighted Average
2,768		25.54% Pervious Area
8,072		74.46% Impervious Area

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

Subcatchment PR-4:



Hydrograph for Subcatchment PR-4:

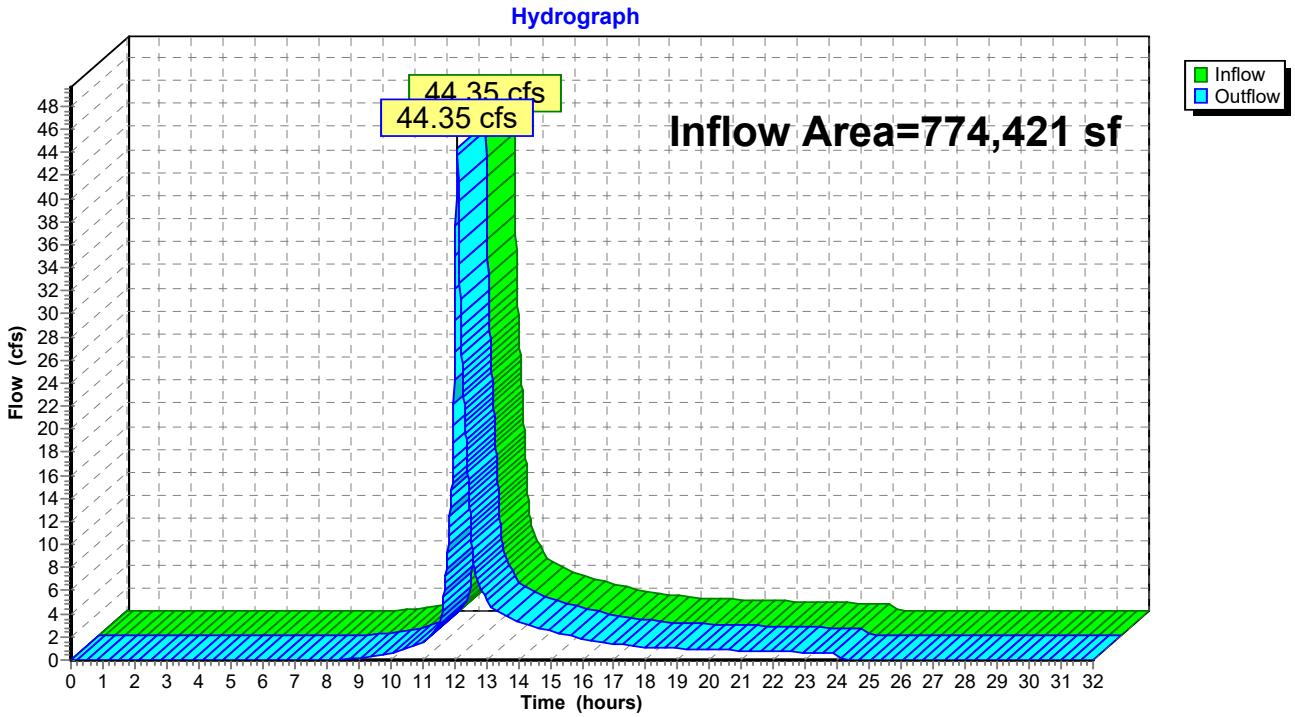
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.02	0.00	0.00
1.00	0.04	0.00	0.00
1.50	0.07	0.00	0.00
2.00	0.09	0.00	0.00
2.50	0.11	0.00	0.00
3.00	0.14	0.00	0.00
3.50	0.17	0.00	0.00
4.00	0.19	0.00	0.00
4.50	0.22	0.01	0.00
5.00	0.26	0.01	0.00
5.50	0.29	0.02	0.00
6.00	0.32	0.03	0.01
6.50	0.36	0.05	0.01
7.00	0.41	0.07	0.01
7.50	0.46	0.09	0.01
8.00	0.51	0.12	0.02
8.50	0.58	0.15	0.02
9.00	0.66	0.20	0.03
9.50	0.75	0.26	0.03
10.00	0.85	0.34	0.04
10.50	0.97	0.43	0.05
11.00	1.13	0.55	0.06
11.50	1.34	0.73	0.11
12.00	2.25	1.55	**0.63**
12.50	3.16	2.41	**0.22**
13.00	3.37	2.61	0.09
13.50	3.53	2.76	0.07
14.00	3.65	2.88	0.06
14.50	3.75	2.98	0.05
15.00	3.84	3.07	0.04
15.50	3.92	3.14	0.04
16.00	3.99	3.21	0.03
16.50	4.04	3.26	0.03
17.00	4.09	3.31	0.02
17.50	4.14	3.35	0.02
18.00	4.18	3.39	0.02
18.50	4.21	3.43	0.02
19.00	4.24	3.46	0.02
19.50	4.28	3.49	0.02
20.00	4.31	3.52	0.01
20.50	4.34	3.55	0.01
21.00	4.36	3.57	0.01
21.50	4.39	3.60	0.01
22.00	4.41	3.62	0.01
22.50	4.44	3.65	0.01
23.00	4.46	3.67	0.01
23.50	4.48	3.69	0.01
24.00	**4.50**	**3.71**	0.01
24.50	4.50	3.71	0.00
25.00	4.50	3.71	0.00
25.50	4.50	3.71	0.00
26.00	4.50	3.71	0.00
26.50	4.50	3.71	0.00
27.00	4.50	3.71	0.00
27.50	4.50	3.71	0.00
28.00	4.50	3.71	0.00
28.50	4.50	3.71	0.00
29.00	4.50	3.71	0.00
29.50	4.50	3.71	0.00
30.00	4.50	3.71	0.00
30.50	4.50	3.71	0.00
31.00	4.50	3.71	0.00
31.50	4.50	3.71	0.00
32.00	4.50	3.71	0.00

Summary for Reach POA-1:

Inflow Area = 774,421 sf, 5.85% Impervious, Inflow Depth = 2.30" for 10-Yr 24 Hr event
Inflow = 44.35 cfs @ 12.10 hrs, Volume= 148,400 cf
Outflow = 44.35 cfs @ 12.10 hrs, Volume= 148,400 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs

Reach POA-1:



Hydrograph for Reach POA-1:

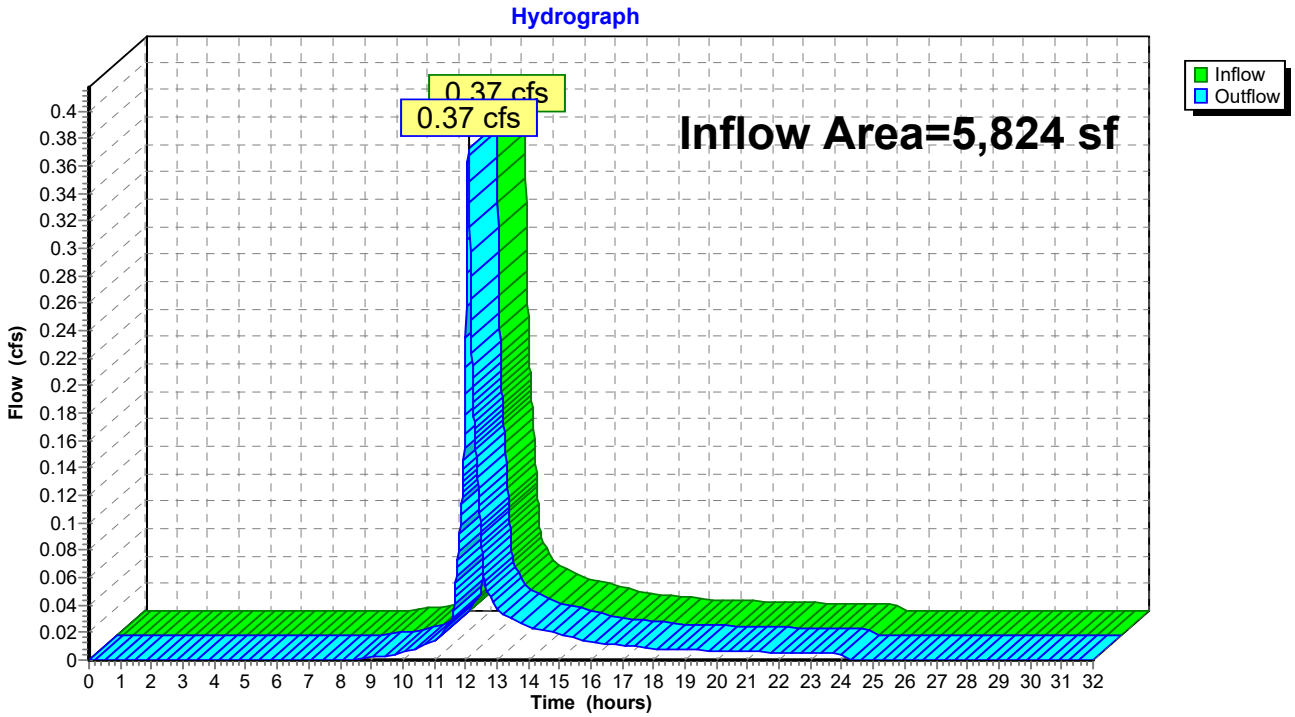
Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	26.00	0.00		0.00
0.50	0.00		0.00	26.50	0.00		0.00
1.00	0.00		0.00	27.00	0.00		0.00
1.50	0.00		0.00	27.50	0.00		0.00
2.00	0.00		0.00	28.00	0.00		0.00
2.50	0.00		0.00	28.50	0.00		0.00
3.00	0.00		0.00	29.00	0.00		0.00
3.50	0.00		0.00	29.50	0.00		0.00
4.00	0.00		0.00	30.00	0.00		0.00
4.50	0.00		0.00	30.50	0.00		0.00
5.00	0.00		0.00	31.00	0.00		0.00
5.50	0.00		0.00	31.50	0.00		0.00
6.00	0.01		0.01	32.00	0.00		0.00
6.50	0.01		0.01				
7.00	0.01		0.01				
7.50	0.01		0.01				
8.00	0.02		0.02				
8.50	0.02		0.02				
9.00	0.16		0.16				
9.50	0.35		0.35				
10.00	0.60		0.60				
10.50	0.99		0.99				
11.00	1.52		1.52				
11.50	2.98		2.98				
12.00	**24.32**		**24.32**				
12.50	**12.71**		**12.71**				
13.00	5.19		5.19				
13.50	4.02		4.02				
14.00	3.30		3.30				
14.50	2.87		2.87				
15.00	2.52		2.52				
15.50	2.16		2.16				
16.00	1.79		1.79				
16.50	1.59		1.59				
17.00	1.43		1.43				
17.50	1.27		1.27				
18.00	1.11		1.11				
18.50	1.03		1.03				
19.00	0.98		0.98				
19.50	0.93		0.93				
20.00	0.88		0.88				
20.50	0.85		0.85				
21.00	0.81		0.81				
21.50	0.77		0.77				
22.00	0.74		0.74				
22.50	0.70		0.70				
23.00	0.66		0.66				
23.50	0.62		0.62				
24.00	0.59		0.59				
24.50	0.02		0.02				
25.00	0.01		0.01				
25.50	0.01		0.01				

Summary for Reach POA-2:

Inflow Area = 5,824 sf, 0.00% Impervious, Inflow Depth = 2.38" for 10-Yr 24 Hr event
Inflow = 0.37 cfs @ 12.09 hrs, Volume= 1,153 cf
Outflow = 0.37 cfs @ 12.09 hrs, Volume= 1,153 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs

Reach POA-2:



Hydrograph for Reach POA-2:

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	26.00	0.00		0.00
0.50	0.00		0.00	26.50	0.00		0.00
1.00	0.00		0.00	27.00	0.00		0.00
1.50	0.00		0.00	27.50	0.00		0.00
2.00	0.00		0.00	28.00	0.00		0.00
2.50	0.00		0.00	28.50	0.00		0.00
3.00	0.00		0.00	29.00	0.00		0.00
3.50	0.00		0.00	29.50	0.00		0.00
4.00	0.00		0.00	30.00	0.00		0.00
4.50	0.00		0.00	30.50	0.00		0.00
5.00	0.00		0.00	31.00	0.00		0.00
5.50	0.00		0.00	31.50	0.00		0.00
6.00	0.00		0.00	32.00	0.00		0.00
6.50	0.00		0.00				
7.00	0.00		0.00				
7.50	0.00		0.00				
8.00	0.00		0.00				
8.50	0.00		0.00				
9.00	0.00		0.00				
9.50	0.00		0.00				
10.00	0.01		0.01				
10.50	0.01		0.01				
11.00	0.01		0.01				
11.50	0.03		0.03				
12.00	**0.21**		**0.21**				
12.50	**0.09**		**0.09**				
13.00	0.04		0.04				
13.50	0.03		0.03				
14.00	0.02		0.02				
14.50	0.02		0.02				
15.00	0.02		0.02				
15.50	0.02		0.02				
16.00	0.01		0.01				
16.50	0.01		0.01				
17.00	0.01		0.01				
17.50	0.01		0.01				
18.00	0.01		0.01				
18.50	0.01		0.01				
19.00	0.01		0.01				
19.50	0.01		0.01				
20.00	0.01		0.01				
20.50	0.01		0.01				
21.00	0.01		0.01				
21.50	0.01		0.01				
22.00	0.01		0.01				
22.50	0.01		0.01				
23.00	0.00		0.00				
23.50	0.00		0.00				
24.00	0.00		0.00				
24.50	0.00		0.00				
25.00	0.00		0.00				
25.50	0.00		0.00				

Summary for Pond Swale-1: Wet Swale-1

Inflow Area = 87,495 sf, 42.57% Impervious, Inflow Depth = 3.20" for 10-Yr 24 Hr event
Inflow = 7.40 cfs @ 12.09 hrs, Volume= 23,305 cf
Outflow = 4.31 cfs @ 12.20 hrs, Volume= 15,872 cf, Atten= 42%, Lag= 6.7 min
Primary = 4.31 cfs @ 12.20 hrs, Volume= 15,872 cf

Routing by Stor-Ind method, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Peak Elev= 73.31' @ 12.20 hrs Surf.Area= 5,968 sf Storage= 9,416 cf

Plug-Flow detention time= 173.6 min calculated for 15,872 cf (68% of inflow)
Center-of-Mass det. time= 78.3 min (880.0 - 801.7)

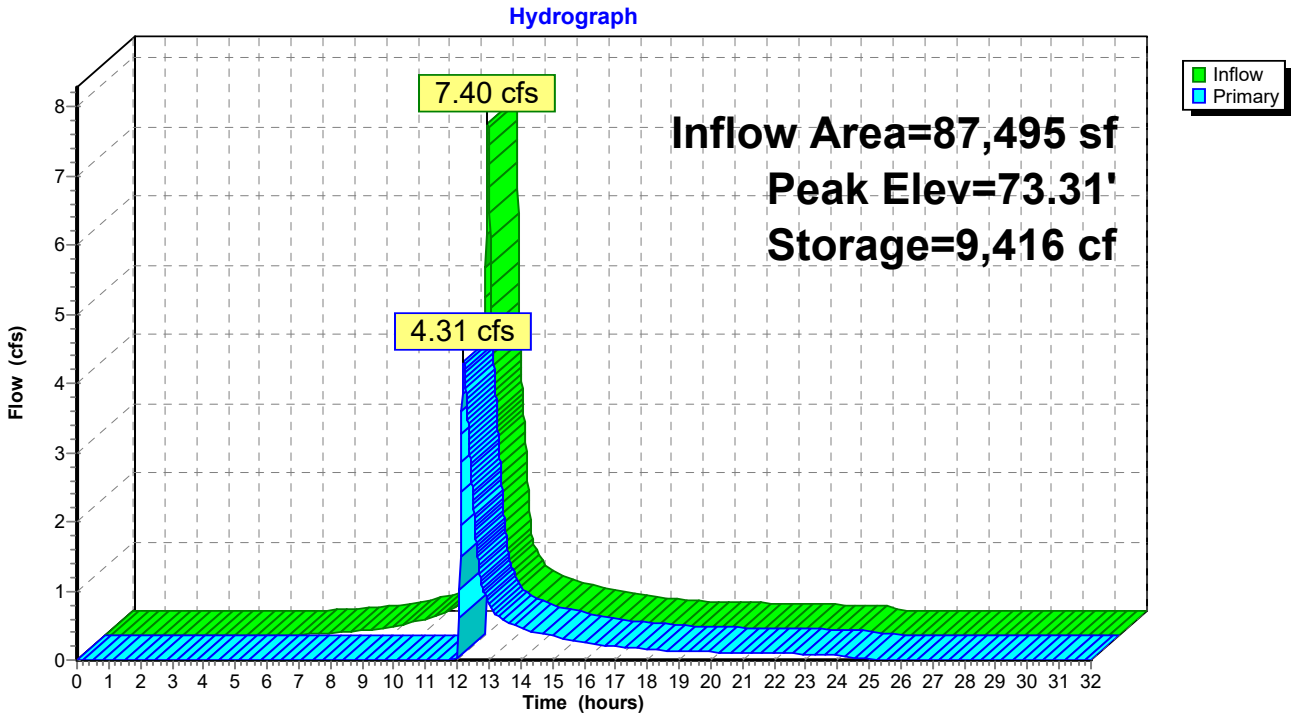
Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	13,739 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	2,093	0	0
72.00	3,688	2,891	2,891
73.00	5,396	4,542	7,433
74.00	7,216	6,306	13,739

Device	Routing	Invert	Outlet Devices
#1	Primary	73.00'	**10.0' long x 5.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86

Primary OutFlow Max=4.30 cfs @ 12.20 hrs HW=73.31' (Free Discharge)
└1=**Broad-Crested Rectangular Weir** (Weir Controls 4.30 cfs @ 1.37 fps)

Pond Swale-1: Wet Swale-1



Hydrograph for Pond Swale-1: Wet Swale-1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	71.00	0.00
1.00	0.00	0	71.00	0.00
2.00	0.00	0	71.00	0.00
3.00	0.00	0	71.00	0.00
4.00	0.00	0	71.00	0.00
5.00	0.00	0	71.00	0.00
6.00	0.01	10	71.00	0.00
7.00	0.03	78	71.03	0.00
8.00	0.06	241	71.08	0.00
9.00	0.13	570	71.20	0.00
10.00	0.22	1,180	71.41	0.00
11.00	0.39	2,256	71.78	0.00
12.00	**4.47**	**6,494**	**72.79**	**0.00**
13.00	**0.67**	**8,101**	**73.11**	**0.82**
14.00	0.43	7,890	73.07	0.46
15.00	0.32	7,805	73.06	0.34
16.00	0.23	7,732	73.05	0.25
17.00	0.18	7,687	73.04	0.19
18.00	0.14	7,645	73.03	0.15
19.00	0.12	7,617	73.03	0.13
20.00	0.11	7,602	73.03	0.12
21.00	0.10	7,590	73.02	0.11
22.00	0.09	7,579	73.02	0.10
23.00	0.08	7,568	73.02	0.09
24.00	0.07	7,557	73.02	0.08
25.00	0.00	7,463	73.00	0.01
26.00	0.00	7,441	73.00	0.00
27.00	0.00	7,435	73.00	0.00
28.00	0.00	7,433	73.00	0.00
29.00	0.00	7,433	73.00	0.00
30.00	0.00	7,433	73.00	0.00
31.00	0.00	7,433	73.00	0.00
32.00	0.00	7,433	73.00	0.00

Time span=0.00-32.00 hrs, dt=0.01 hrs, 3201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Runoff Area=87,495 sf 42.57% Impervious Runoff Depth=3.95"
Tc=6.0 min CN=88 Runoff=9.07 cfs 28,834 cf

Subcatchment PR-2: Runoff Area=676,086 sf 0.00% Impervious Runoff Depth=2.97"
Tc=6.0 min CN=78 Runoff=54.05 cfs 167,228 cf

Subcatchment PR-3: Runoff Area=5,824 sf 0.00% Impervious Runoff Depth=3.06"
Tc=6.0 min CN=79 Runoff=0.48 cfs 1,486 cf

Subcatchment PR-4: Runoff Area=10,840 sf 74.46% Impervious Runoff Depth=4.49"
Tc=6.0 min CN=93 Runoff=1.23 cfs 4,058 cf

Reach POA-1: Inflow=61.00 cfs 192,688 cf
Outflow=61.00 cfs 192,688 cf

Reach POA-2: Inflow=0.48 cfs 1,486 cf
Outflow=0.48 cfs 1,486 cf

Pond Swale-1: Wet Swale-1 Peak Elev=73.43' Storage=10,129 cf Inflow=9.07 cfs 28,834 cf
Outflow=7.09 cfs 21,401 cf

Total Runoff Area = 780,245 sf Runoff Volume = 201,607 cf Average Runoff Depth = 3.10"
94.19% Pervious = 734,923 sf 5.81% Impervious = 45,322 sf

Summary for Subcatchment PR-1:

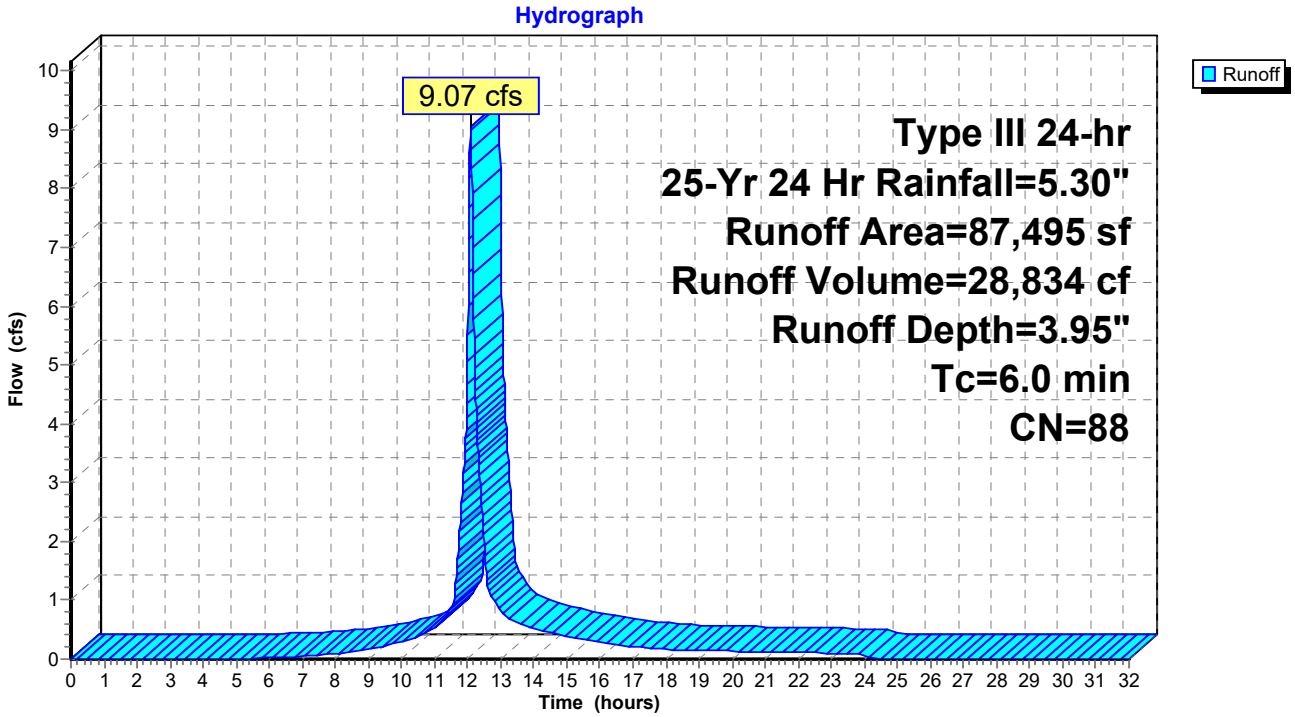
Runoff = 9.07 cfs @ 12.09 hrs, Volume= 28,834 cf, Depth= 3.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr 24 Hr Rainfall=5.30"

	Area (sf)	CN	Description
	50,245	80	>75% Grass cover, Good, HSG D
*	7,585	98	Sidewalk, HSG D
*	29,665	98	Paved Road, HSG D
	87,495	88	Weighted Average
	50,245		57.43% Pervious Area
	37,250		42.57% Impervious Area

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

Subcatchment PR-1:



Hydrograph for Subcatchment PR-1:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	5.30	3.95	0.00
0.50	0.03	0.00	0.00	26.50	5.30	3.95	0.00
1.00	0.05	0.00	0.00	27.00	5.30	3.95	0.00
1.50	0.08	0.00	0.00	27.50	5.30	3.95	0.00
2.00	0.11	0.00	0.00	28.00	5.30	3.95	0.00
2.50	0.13	0.00	0.00	28.50	5.30	3.95	0.00
3.00	0.16	0.00	0.00	29.00	5.30	3.95	0.00
3.50	0.19	0.00	0.00	29.50	5.30	3.95	0.00
4.00	0.23	0.00	0.00	30.00	5.30	3.95	0.00
4.50	0.26	0.00	0.00	30.50	5.30	3.95	0.00
5.00	0.30	0.00	0.00	31.00	5.30	3.95	0.00
5.50	0.34	0.00	0.01	31.50	5.30	3.95	0.00
6.00	0.38	0.01	0.02	32.00	5.30	3.95	0.00
6.50	0.43	0.02	0.04				
7.00	0.48	0.03	0.05				
7.50	0.54	0.04	0.07				
8.00	0.60	0.06	0.09				
8.50	0.68	0.09	0.13				
9.00	0.77	0.13	0.18				
9.50	0.88	0.19	0.23				
10.00	1.00	0.25	0.29				
10.50	1.15	0.34	0.39				
11.00	1.33	0.46	0.51				
11.50	1.58	0.64	0.86				
12.00	2.65	1.51	**5.52**				
12.50	3.72	2.47	**1.97**				
13.00	3.97	2.71	0.81				
13.50	4.15	2.87	0.63				
14.00	4.30	3.01	0.51				
14.50	4.42	3.12	0.45				
15.00	4.53	3.22	0.39				
15.50	4.62	3.31	0.33				
16.00	4.70	3.38	0.27				
16.50	4.76	3.44	0.24				
17.00	4.82	3.50	0.22				
17.50	4.87	3.55	0.19				
18.00	4.92	3.59	0.17				
18.50	4.96	3.63	0.16				
19.00	5.00	3.67	0.15				
19.50	5.04	3.70	0.14				
20.00	5.07	3.74	0.13				
20.50	5.11	3.77	0.13				
21.00	5.14	3.80	0.12				
21.50	5.17	3.83	0.12				
22.00	5.20	3.86	0.11				
22.50	5.23	3.88	0.11				
23.00	5.25	3.91	0.10				
23.50	5.28	3.93	0.09				
24.00	**5.30**	**3.95**	0.09				
24.50	5.30	3.95	0.00				
25.00	5.30	3.95	0.00				
25.50	5.30	3.95	0.00				

Summary for Subcatchment PR-2:

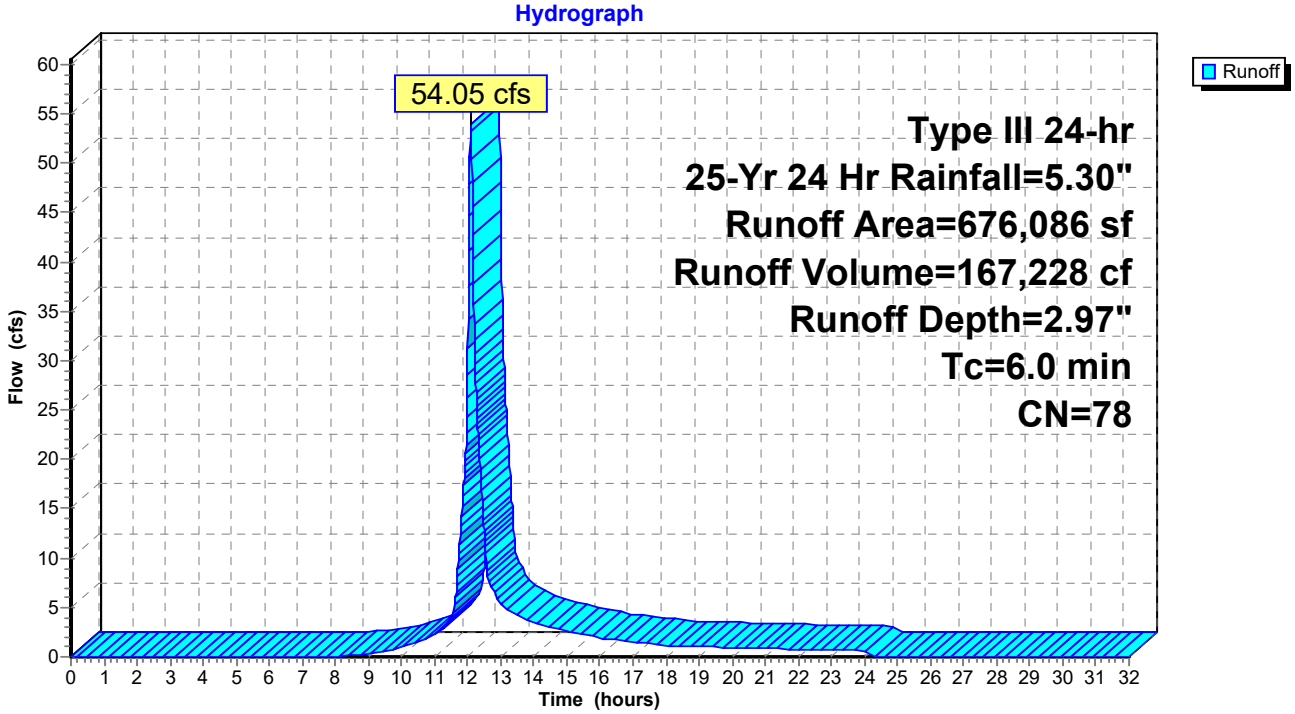
Runoff = 54.05 cfs @ 12.09 hrs, Volume= 167,228 cf, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr 24 Hr Rainfall=5.30"

	Area (sf)	CN	Description
	161,199	80	>75% Grass cover, Good, HSG D
	492,335	77	Woods, Good, HSG D
*	22,552	77	Wetlands, HSG D
	676,086	78	Weighted Average
	676,086		100.00% Pervious Area

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

Subcatchment PR-2:



Hydrograph for Subcatchment PR-2:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	5.30	2.97	0.00
0.50	0.03	0.00	0.00	26.50	5.30	2.97	0.00
1.00	0.05	0.00	0.00	27.00	5.30	2.97	0.00
1.50	0.08	0.00	0.00	27.50	5.30	2.97	0.00
2.00	0.11	0.00	0.00	28.00	5.30	2.97	0.00
2.50	0.13	0.00	0.00	28.50	5.30	2.97	0.00
3.00	0.16	0.00	0.00	29.00	5.30	2.97	0.00
3.50	0.19	0.00	0.00	29.50	5.30	2.97	0.00
4.00	0.23	0.00	0.00	30.00	5.30	2.97	0.00
4.50	0.26	0.00	0.00	30.50	5.30	2.97	0.00
5.00	0.30	0.00	0.00	31.00	5.30	2.97	0.00
5.50	0.34	0.00	0.00	31.50	5.30	2.97	0.00
6.00	0.38	0.00	0.00	32.00	5.30	2.97	0.00
6.50	0.43	0.00	0.00				
7.00	0.48	0.00	0.00				
7.50	0.54	0.00	0.00				
8.00	0.60	0.00	0.04				
8.50	0.68	0.00	0.17				
9.00	0.77	0.01	0.37				
9.50	0.88	0.03	0.63				
10.00	1.00	0.06	0.95				
10.50	1.15	0.10	1.47				
11.00	1.33	0.16	2.16				
11.50	1.58	0.27	4.06				
12.00	2.65	0.89	**31.27**				
12.50	3.72	1.67	**12.82**				
13.00	3.97	1.87	5.36				
13.50	4.15	2.01	4.22				
14.00	4.30	2.13	3.46				
14.50	4.42	2.23	3.02				
15.00	4.53	2.32	2.64				
15.50	4.62	2.39	2.26				
16.00	4.70	2.46	1.87				
16.50	4.76	2.51	1.67				
17.00	4.82	2.56	1.50				
17.50	4.87	2.60	1.33				
18.00	4.92	2.64	1.15				
18.50	4.96	2.68	1.08				
19.00	5.00	2.71	1.03				
19.50	5.04	2.74	0.98				
20.00	5.07	2.77	0.93				
20.50	5.11	2.80	0.89				
21.00	5.14	2.83	0.85				
21.50	5.17	2.86	0.81				
22.00	5.20	2.88	0.77				
22.50	5.23	2.90	0.73				
23.00	5.25	2.93	0.69				
23.50	5.28	2.95	0.65				
24.00	**5.30**	**2.97**	0.61				
24.50	5.30	2.97	0.00				
25.00	5.30	2.97	0.00				
25.50	5.30	2.97	0.00				

Summary for Subcatchment PR-3:

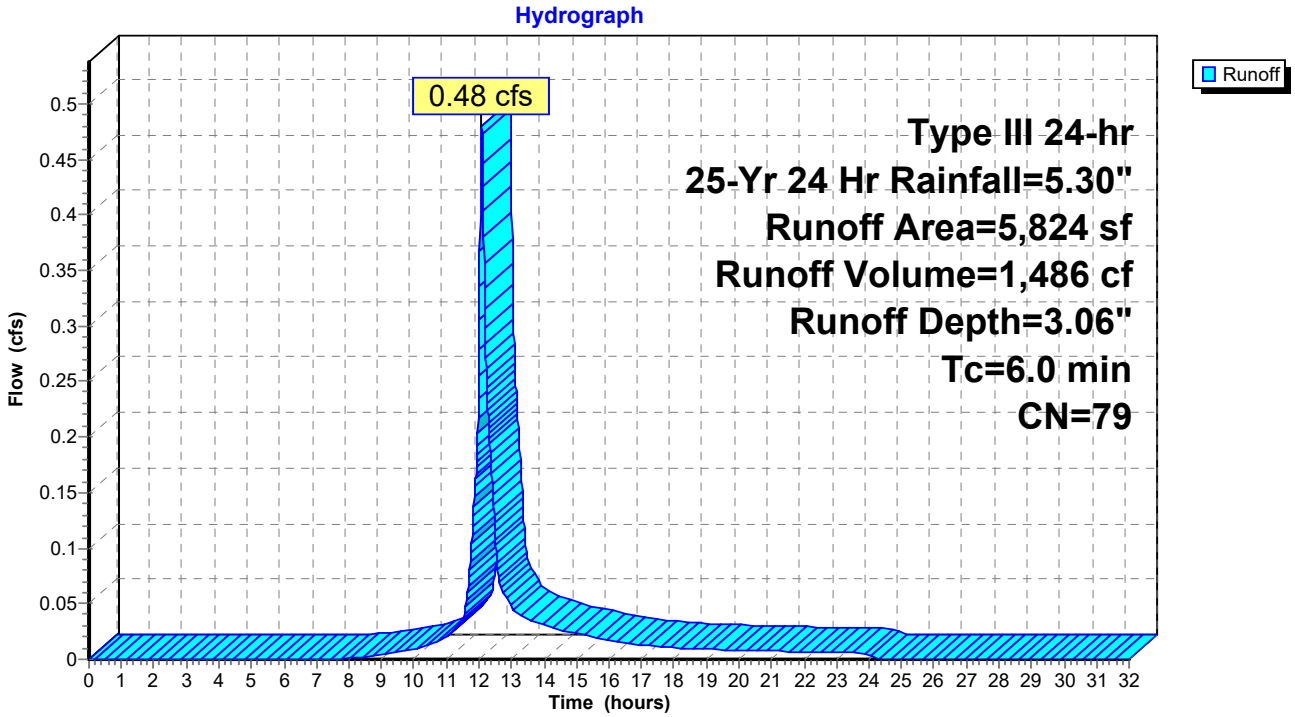
Runoff = 0.48 cfs @ 12.09 hrs, Volume= 1,486 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr 24 Hr Rainfall=5.30"

Area (sf)	CN	Description
3,883	80	>75% Grass cover, Good, HSG D
1,941	77	Woods, Good, HSG D
5,824	79	Weighted Average
5,824		100.00% Pervious Area

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

Subcatchment PR-3:



Hydrograph for Subcatchment PR-3:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	5.30	3.06	0.00
0.50	0.03	0.00	0.00	26.50	5.30	3.06	0.00
1.00	0.05	0.00	0.00	27.00	5.30	3.06	0.00
1.50	0.08	0.00	0.00	27.50	5.30	3.06	0.00
2.00	0.11	0.00	0.00	28.00	5.30	3.06	0.00
2.50	0.13	0.00	0.00	28.50	5.30	3.06	0.00
3.00	0.16	0.00	0.00	29.00	5.30	3.06	0.00
3.50	0.19	0.00	0.00	29.50	5.30	3.06	0.00
4.00	0.23	0.00	0.00	30.00	5.30	3.06	0.00
4.50	0.26	0.00	0.00	30.50	5.30	3.06	0.00
5.00	0.30	0.00	0.00	31.00	5.30	3.06	0.00
5.50	0.34	0.00	0.00	31.50	5.30	3.06	0.00
6.00	0.38	0.00	0.00	32.00	5.30	3.06	0.00
6.50	0.43	0.00	0.00				
7.00	0.48	0.00	0.00				
7.50	0.54	0.00	0.00				
8.00	0.60	0.00	0.00				
8.50	0.68	0.01	0.00				
9.00	0.77	0.02	0.00				
9.50	0.88	0.04	0.01				
10.00	1.00	0.07	0.01				
10.50	1.15	0.12	0.01				
11.00	1.33	0.18	0.02				
11.50	1.58	0.30	0.04				
12.00	2.65	0.94	**0.28**				
12.50	3.72	1.74	**0.11**				
13.00	3.97	1.94	0.05				
13.50	4.15	2.09	0.04				
14.00	4.30	2.21	0.03				
14.50	4.42	2.31	0.03				
15.00	4.53	2.40	0.02				
15.50	4.62	2.48	0.02				
16.00	4.70	2.54	0.02				
16.50	4.76	2.60	0.01				
17.00	4.82	2.65	0.01				
17.50	4.87	2.69	0.01				
18.00	4.92	2.73	0.01				
18.50	4.96	2.77	0.01				
19.00	5.00	2.80	0.01				
19.50	5.04	2.83	0.01				
20.00	5.07	2.86	0.01				
20.50	5.11	2.89	0.01				
21.00	5.14	2.92	0.01				
21.50	5.17	2.95	0.01				
22.00	5.20	2.97	0.01				
22.50	5.23	3.00	0.01				
23.00	5.25	3.02	0.01				
23.50	5.28	3.04	0.01				
24.00	**5.30**	**3.06**	0.01				
24.50	5.30	3.06	0.00				
25.00	5.30	3.06	0.00				
25.50	5.30	3.06	0.00				

Summary for Subcatchment PR-4:

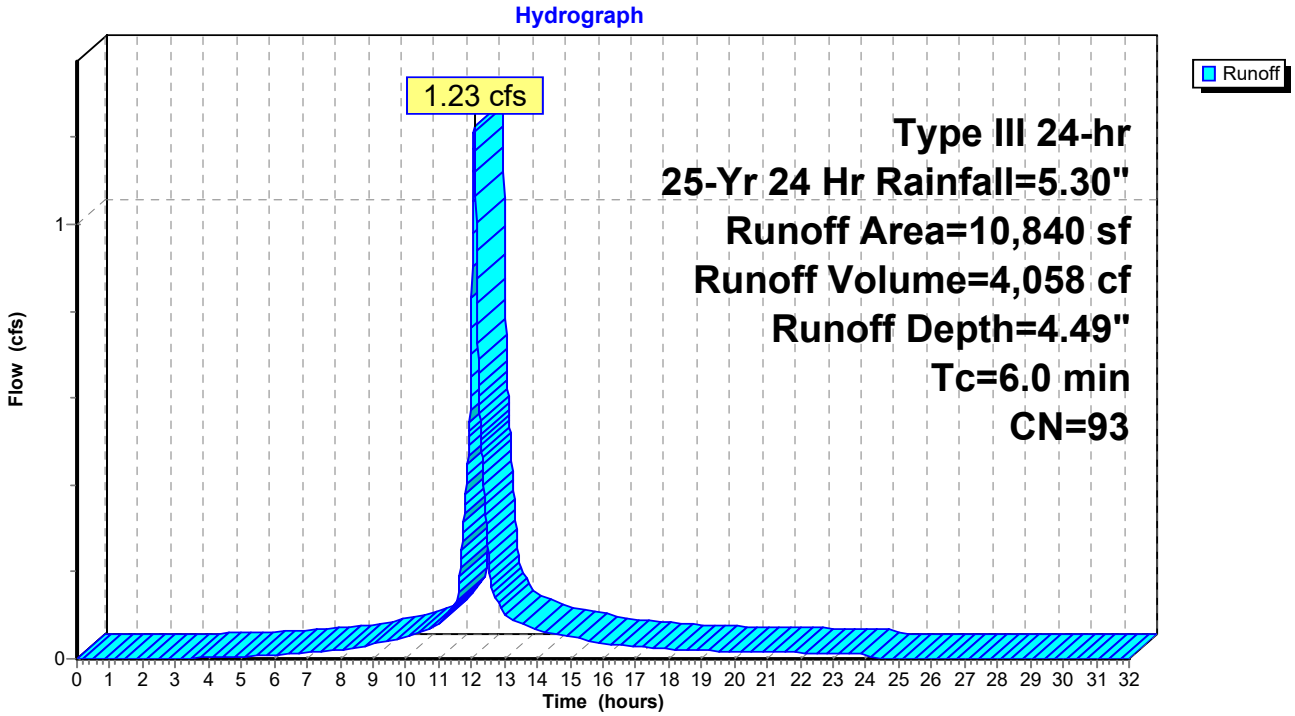
Runoff = 1.23 cfs @ 12.08 hrs, Volume= 4,058 cf, Depth= 4.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr 24 Hr Rainfall=5.30"

Area (sf)	CN	Description
8,072	98	Paved parking, HSG D
2,768	80	>75% Grass cover, Good, HSG D
10,840	93	Weighted Average
2,768		25.54% Pervious Area
8,072		74.46% Impervious Area

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

Subcatchment PR-4:



Hydrograph for Subcatchment PR-4:

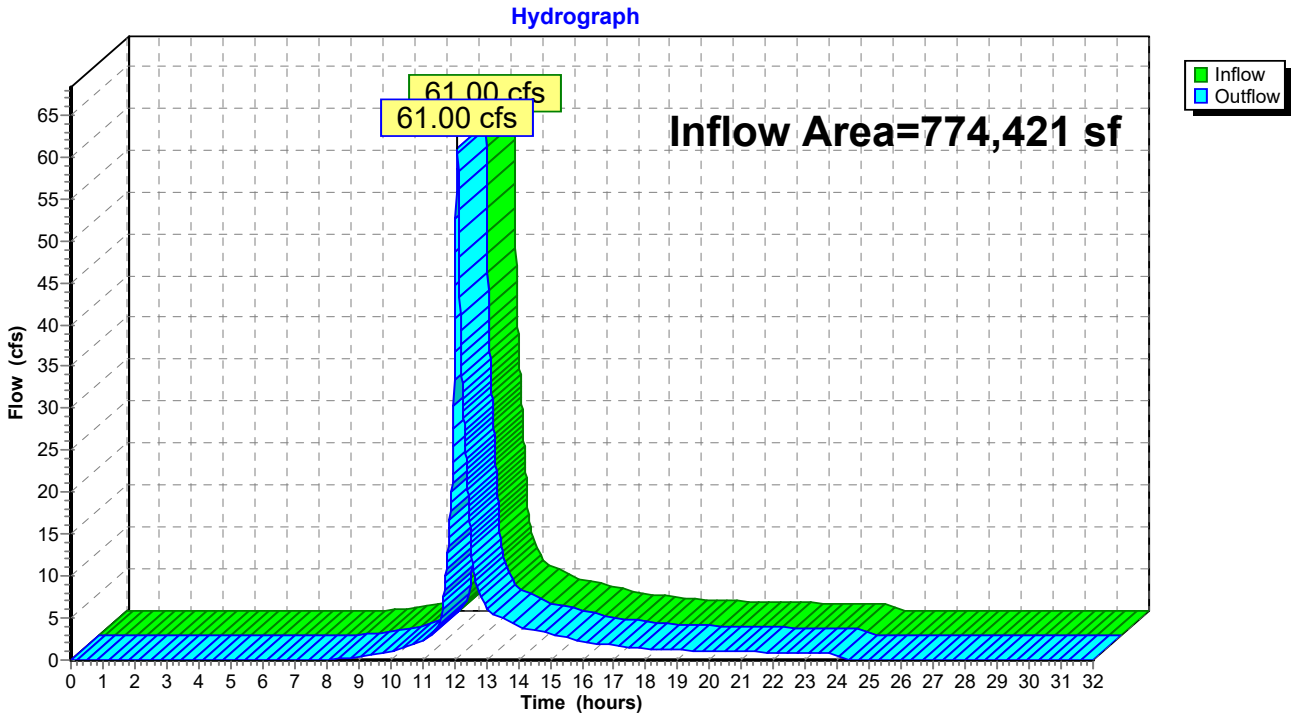
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	5.30	4.49	0.00
0.50	0.03	0.00	0.00	26.50	5.30	4.49	0.00
1.00	0.05	0.00	0.00	27.00	5.30	4.49	0.00
1.50	0.08	0.00	0.00	27.50	5.30	4.49	0.00
2.00	0.11	0.00	0.00	28.00	5.30	4.49	0.00
2.50	0.13	0.00	0.00	28.50	5.30	4.49	0.00
3.00	0.16	0.00	0.00	29.00	5.30	4.49	0.00
3.50	0.19	0.00	0.00	29.50	5.30	4.49	0.00
4.00	0.23	0.01	0.00	30.00	5.30	4.49	0.00
4.50	0.26	0.01	0.00	30.50	5.30	4.49	0.00
5.00	0.30	0.02	0.01	31.00	5.30	4.49	0.00
5.50	0.34	0.04	0.01	31.50	5.30	4.49	0.00
6.00	0.38	0.05	0.01	32.00	5.30	4.49	0.00
6.50	0.43	0.07	0.01				
7.00	0.48	0.10	0.01				
7.50	0.54	0.13	0.02				
8.00	0.60	0.17	0.02				
8.50	0.68	0.22	0.03				
9.00	0.77	0.28	0.03				
9.50	0.88	0.36	0.04				
10.00	1.00	0.45	0.05				
10.50	1.15	0.57	0.06				
11.00	1.33	0.72	0.08				
11.50	1.58	0.94	0.13				
12.00	2.65	1.92	**0.76**				
12.50	3.72	2.95	**0.26**				
13.00	3.97	3.20	0.11				
13.50	4.15	3.37	0.08				
14.00	4.30	3.51	0.07				
14.50	4.42	3.63	0.06				
15.00	4.53	3.73	0.05				
15.50	4.62	3.82	0.04				
16.00	4.70	3.90	0.04				
16.50	4.76	3.96	0.03				
17.00	4.82	4.02	0.03				
17.50	4.87	4.07	0.02				
18.00	4.92	4.12	0.02				
18.50	4.96	4.16	0.02				
19.00	5.00	4.20	0.02				
19.50	5.04	4.23	0.02				
20.00	5.07	4.27	0.02				
20.50	5.11	4.30	0.02				
21.00	5.14	4.33	0.02				
21.50	5.17	4.36	0.01				
22.00	5.20	4.39	0.01				
22.50	5.23	4.42	0.01				
23.00	5.25	4.45	0.01				
23.50	5.28	4.47	0.01				
24.00	**5.30**	**4.49**	0.01				
24.50	5.30	4.49	0.00				
25.00	5.30	4.49	0.00				
25.50	5.30	4.49	0.00				

Summary for Reach POA-1:

Inflow Area = 774,421 sf, 5.85% Impervious, Inflow Depth = 2.99" for 25-Yr 24 Hr event
Inflow = 61.00 cfs @ 12.09 hrs, Volume= 192,688 cf
Outflow = 61.00 cfs @ 12.09 hrs, Volume= 192,688 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs

Reach POA-1:



Hydrograph for Reach POA-1:

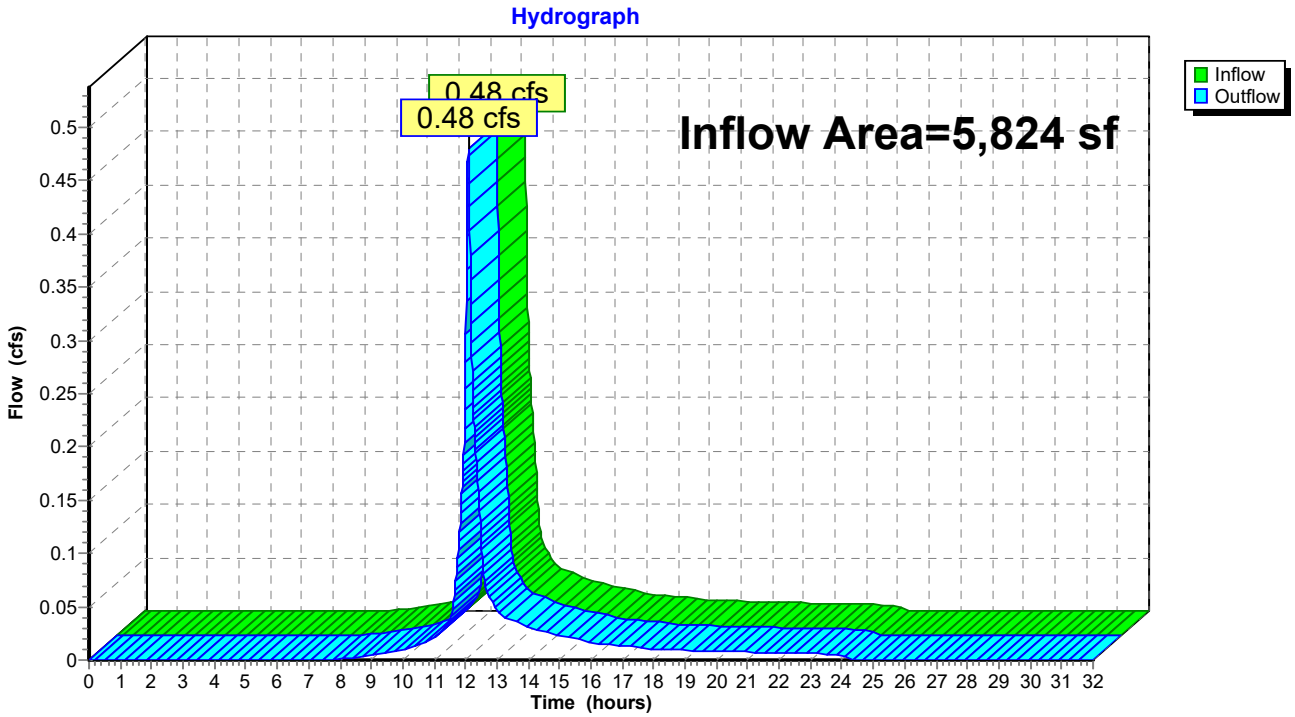
Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	26.00	0.00		0.00
0.50	0.00		0.00	26.50	0.00		0.00
1.00	0.00		0.00	27.00	0.00		0.00
1.50	0.00		0.00	27.50	0.00		0.00
2.00	0.00		0.00	28.00	0.00		0.00
2.50	0.00		0.00	28.50	0.00		0.00
3.00	0.00		0.00	29.00	0.00		0.00
3.50	0.00		0.00	29.50	0.00		0.00
4.00	0.00		0.00	30.00	0.00		0.00
4.50	0.00		0.00	30.50	0.00		0.00
5.00	0.01		0.01	31.00	0.00		0.00
5.50	0.01		0.01	31.50	0.00		0.00
6.00	0.01		0.01	32.00	0.00		0.00
6.50	0.01		0.01				
7.00	0.01		0.01				
7.50	0.02		0.02				
8.00	0.06		0.06				
8.50	0.20		0.20				
9.00	0.40		0.40				
9.50	0.67		0.67				
10.00	1.00		1.00				
10.50	1.53		1.53				
11.00	2.24		2.24				
11.50	4.19		4.19				
12.00	**33.39**		**33.39**				
12.50	**15.84**		**15.84**				
13.00	6.43		6.43				
13.50	4.98		4.98				
14.00	4.08		4.08				
14.50	3.54		3.54				
15.00	3.10		3.10				
15.50	2.66		2.66				
16.00	2.21		2.21				
16.50	1.95		1.95				
17.00	1.75		1.75				
17.50	1.55		1.55				
18.00	1.36		1.36				
18.50	1.27		1.27				
19.00	1.20		1.20				
19.50	1.14		1.14				
20.00	1.08		1.08				
20.50	1.04		1.04				
21.00	0.99		0.99				
21.50	0.95		0.95				
22.00	0.90		0.90				
22.50	0.85		0.85				
23.00	0.81		0.81				
23.50	0.76		0.76				
24.00	0.72		0.72				
24.50	0.03		0.03				
25.00	0.01		0.01				
25.50	0.01		0.01				

Summary for Reach POA-2:

Inflow Area = 5,824 sf, 0.00% Impervious, Inflow Depth = 3.06" for 25-Yr 24 Hr event
Inflow = 0.48 cfs @ 12.09 hrs, Volume= 1,486 cf
Outflow = 0.48 cfs @ 12.09 hrs, Volume= 1,486 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs

Reach POA-2:



Hydrograph for Reach POA-2:

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	26.00	0.00		0.00
0.50	0.00		0.00	26.50	0.00		0.00
1.00	0.00		0.00	27.00	0.00		0.00
1.50	0.00		0.00	27.50	0.00		0.00
2.00	0.00		0.00	28.00	0.00		0.00
2.50	0.00		0.00	28.50	0.00		0.00
3.00	0.00		0.00	29.00	0.00		0.00
3.50	0.00		0.00	29.50	0.00		0.00
4.00	0.00		0.00	30.00	0.00		0.00
4.50	0.00		0.00	30.50	0.00		0.00
5.00	0.00		0.00	31.00	0.00		0.00
5.50	0.00		0.00	31.50	0.00		0.00
6.00	0.00		0.00	32.00	0.00		0.00
6.50	0.00		0.00				
7.00	0.00		0.00				
7.50	0.00		0.00				
8.00	0.00		0.00				
8.50	0.00		0.00				
9.00	0.00		0.00				
9.50	0.01		0.01				
10.00	0.01		0.01				
10.50	0.01		0.01				
11.00	0.02		0.02				
11.50	0.04		0.04				
12.00	**0.28**		**0.28**				
12.50	**0.11**		**0.11**				
13.00	0.05		0.05				
13.50	0.04		0.04				
14.00	0.03		0.03				
14.50	0.03		0.03				
15.00	0.02		0.02				
15.50	0.02		0.02				
16.00	0.02		0.02				
16.50	0.01		0.01				
17.00	0.01		0.01				
17.50	0.01		0.01				
18.00	0.01		0.01				
18.50	0.01		0.01				
19.00	0.01		0.01				
19.50	0.01		0.01				
20.00	0.01		0.01				
20.50	0.01		0.01				
21.00	0.01		0.01				
21.50	0.01		0.01				
22.00	0.01		0.01				
22.50	0.01		0.01				
23.00	0.01		0.01				
23.50	0.01		0.01				
24.00	0.01		0.01				
24.50	0.00		0.00				
25.00	0.00		0.00				
25.50	0.00		0.00				

Summary for Pond Swale-1: Wet Swale-1

Inflow Area = 87,495 sf, 42.57% Impervious, Inflow Depth = 3.95" for 25-Yr 24 Hr event
Inflow = 9.07 cfs @ 12.09 hrs, Volume= 28,834 cf
Outflow = 7.09 cfs @ 12.15 hrs, Volume= 21,401 cf, Atten= 22%, Lag= 3.8 min
Primary = 7.09 cfs @ 12.15 hrs, Volume= 21,401 cf

Routing by Stor-Ind method, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Peak Elev= 73.43' @ 12.15 hrs Surf.Area= 6,174 sf Storage= 10,129 cf

Plug-Flow detention time= 152.4 min calculated for 21,395 cf (74% of inflow)
Center-of-Mass det. time= 66.4 min (862.2 - 795.8)

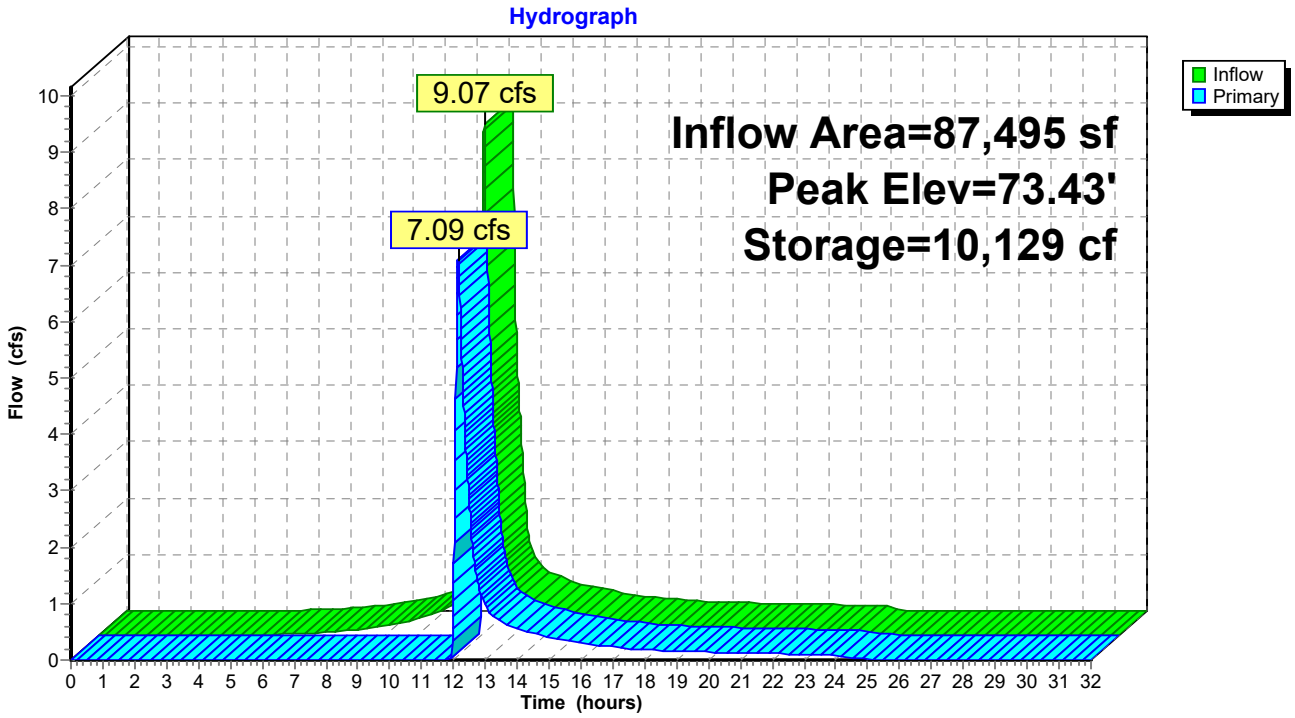
Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	13,739 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	2,093	0	0
72.00	3,688	2,891	2,891
73.00	5,396	4,542	7,433
74.00	7,216	6,306	13,739

Device	Routing	Invert	Outlet Devices
#1	Primary	73.00'	**10.0' long x 5.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86

Primary OutFlow Max=7.09 cfs @ 12.15 hrs HW=73.43' (Free Discharge)
└1=**Broad-Crested Rectangular Weir** (Weir Controls 7.09 cfs @ 1.66 fps)

Pond Swale-1: Wet Swale-1



Hydrograph for Pond Swale-1: Wet Swale-1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	71.00	0.00
1.00	0.00	0	71.00	0.00
2.00	0.00	0	71.00	0.00
3.00	0.00	0	71.00	0.00
4.00	0.00	0	71.00	0.00
5.00	0.00	2	71.00	0.00
6.00	0.02	51	71.02	0.00
7.00	0.05	181	71.06	0.00
8.00	0.09	441	71.15	0.00
9.00	0.18	917	71.32	0.00
10.00	0.29	1,753	71.61	0.00
11.00	0.51	3,168	72.06	0.00
12.00	**5.52**	**8,373**	**73.15**	**1.36**
13.00	**0.81**	**8,183**	**73.12**	**0.97**
14.00	0.51	7,948	73.08	0.56
15.00	0.39	7,856	73.07	0.41
16.00	0.27	7,770	73.05	0.30
17.00	0.22	7,716	73.04	0.23
18.00	0.17	7,676	73.04	0.18
19.00	0.15	7,646	73.03	0.15
20.00	0.13	7,628	73.03	0.14
21.00	0.12	7,614	73.03	0.13
22.00	0.11	7,600	73.03	0.11
23.00	0.10	7,587	73.02	0.10
24.00	0.09	7,574	73.02	0.09
25.00	0.00	7,466	73.01	0.01
26.00	0.00	7,441	73.00	0.00
27.00	0.00	7,435	73.00	0.00
28.00	0.00	7,433	73.00	0.00
29.00	0.00	7,433	73.00	0.00
30.00	0.00	7,433	73.00	0.00
31.00	0.00	7,433	73.00	0.00
32.00	0.00	7,433	73.00	0.00

Time span=0.00-32.00 hrs, dt=0.01 hrs, 3201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Runoff Area=87,495 sf 42.57% Impervious Runoff Depth=5.11"
Tc=6.0 min CN=88 Runoff=11.56 cfs 37,248 cf

Subcatchment PR-2: Runoff Area=676,086 sf 0.00% Impervious Runoff Depth=4.02"
Tc=6.0 min CN=78 Runoff=73.03 cfs 226,708 cf

Subcatchment PR-3: Runoff Area=5,824 sf 0.00% Impervious Runoff Depth=4.13"
Tc=6.0 min CN=79 Runoff=0.64 cfs 2,004 cf

Subcatchment PR-4: Runoff Area=10,840 sf 74.46% Impervious Runoff Depth=5.68"
Tc=6.0 min CN=93 Runoff=1.53 cfs 5,128 cf

Reach POA-1: Inflow=83.57 cfs 261,652 cf
Outflow=83.57 cfs 261,652 cf

Reach POA-2: Inflow=0.64 cfs 2,004 cf
Outflow=0.64 cfs 2,004 cf

Pond Swale-1: Wet Swale-1 Peak Elev=73.52' Storage=10,738 cf Inflow=11.56 cfs 37,248 cf
Outflow=9.98 cfs 29,816 cf

Total Runoff Area = 780,245 sf Runoff Volume = 271,088 cf Average Runoff Depth = 4.17"
94.19% Pervious = 734,923 sf 5.81% Impervious = 45,322 sf

Summary for Subcatchment PR-1:

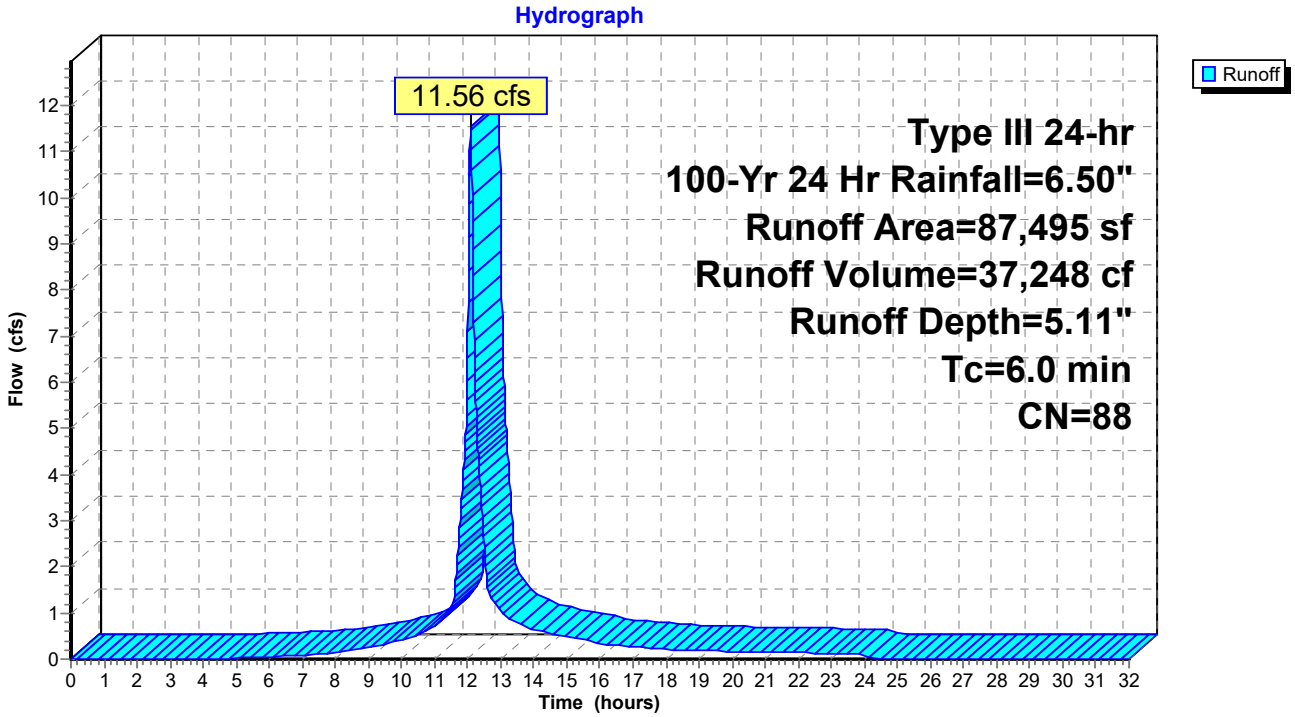
Runoff = 11.56 cfs @ 12.08 hrs, Volume= 37,248 cf, Depth= 5.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr 24 Hr Rainfall=6.50"

	Area (sf)	CN	Description
	50,245	80	>75% Grass cover, Good, HSG D
*	7,585	98	Sidewalk, HSG D
*	29,665	98	Paved Road, HSG D
	87,495	88	Weighted Average
	50,245		57.43% Pervious Area
	37,250		42.57% Impervious Area

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

Subcatchment PR-1:



Hydrograph for Subcatchment PR-1:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	6.50	5.11	0.00
0.50	0.03	0.00	0.00	26.50	6.50	5.11	0.00
1.00	0.07	0.00	0.00	27.00	6.50	5.11	0.00
1.50	0.10	0.00	0.00	27.50	6.50	5.11	0.00
2.00	0.13	0.00	0.00	28.00	6.50	5.11	0.00
2.50	0.16	0.00	0.00	28.50	6.50	5.11	0.00
3.00	0.20	0.00	0.00	29.00	6.50	5.11	0.00
3.50	0.24	0.00	0.00	29.50	6.50	5.11	0.00
4.00	0.28	0.00	0.00	30.00	6.50	5.11	0.00
4.50	0.32	0.00	0.01	30.50	6.50	5.11	0.00
5.00	0.37	0.01	0.02	31.00	6.50	5.11	0.00
5.50	0.42	0.01	0.03	31.50	6.50	5.11	0.00
6.00	0.47	0.02	0.05	32.00	6.50	5.11	0.00
6.50	0.52	0.04	0.07				
7.00	0.59	0.06	0.09				
7.50	0.66	0.09	0.12				
8.00	0.74	0.12	0.15				
8.50	0.83	0.16	0.20				
9.00	0.95	0.22	0.26				
9.50	1.08	0.30	0.33				
10.00	1.23	0.39	0.41				
10.50	1.41	0.52	0.54				
11.00	1.63	0.67	0.69				
11.50	1.94	0.91	1.15				
12.00	3.25	2.04	**7.10**				
12.50	4.56	3.26	**2.48**				
13.00	4.87	3.55	1.02				
13.50	5.09	3.76	0.79				
14.00	5.27	3.93	0.64				
14.50	5.42	4.07	0.56				
15.00	5.55	4.20	0.49				
15.50	5.67	4.30	0.41				
16.00	5.76	4.39	0.34				
16.50	5.84	4.47	0.30				
17.00	5.91	4.54	0.27				
17.50	5.98	4.60	0.24				
18.00	6.03	4.66	0.21				
18.50	6.08	4.71	0.20				
19.00	6.13	4.75	0.19				
19.50	6.18	4.80	0.18				
20.00	6.22	4.84	0.17				
20.50	6.26	4.88	0.16				
21.00	6.30	4.92	0.15				
21.50	6.34	4.95	0.15				
22.00	6.37	4.99	0.14				
22.50	6.41	5.02	0.13				
23.00	6.44	5.05	0.12				
23.50	6.47	5.08	0.12				
24.00	**6.50**	**5.11**	0.11				
24.50	6.50	5.11	0.00				
25.00	6.50	5.11	0.00				
25.50	6.50	5.11	0.00				

Summary for Subcatchment PR-2:

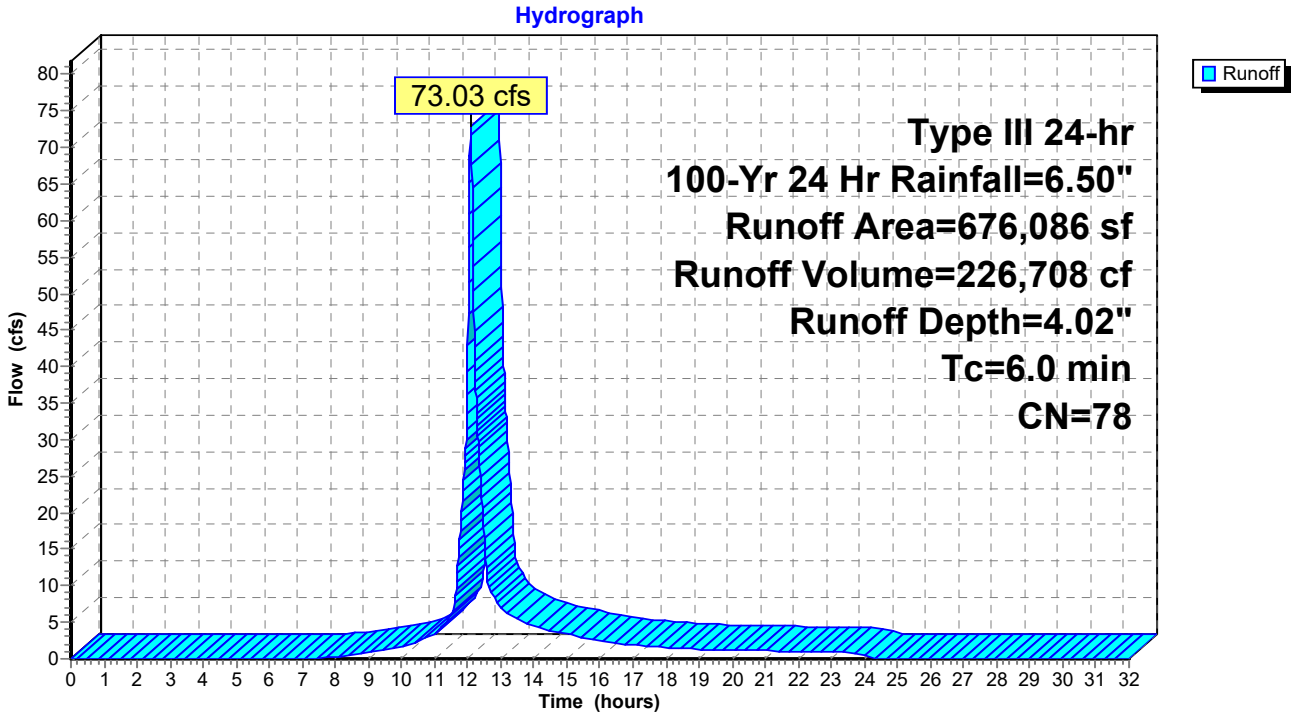
Runoff = 73.03 cfs @ 12.09 hrs, Volume= 226,708 cf, Depth= 4.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr 24 Hr Rainfall=6.50"

	Area (sf)	CN	Description
	161,199	80	>75% Grass cover, Good, HSG D
	492,335	77	Woods, Good, HSG D
*	22,552	77	Wetlands, HSG D
	676,086	78	Weighted Average
	676,086		100.00% Pervious Area

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

Subcatchment PR-2:



Hydrograph for Subcatchment PR-2:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	6.50	4.02	0.00
0.50	0.03	0.00	0.00	26.50	6.50	4.02	0.00
1.00	0.07	0.00	0.00	27.00	6.50	4.02	0.00
1.50	0.10	0.00	0.00	27.50	6.50	4.02	0.00
2.00	0.13	0.00	0.00	28.00	6.50	4.02	0.00
2.50	0.16	0.00	0.00	28.50	6.50	4.02	0.00
3.00	0.20	0.00	0.00	29.00	6.50	4.02	0.00
3.50	0.24	0.00	0.00	29.50	6.50	4.02	0.00
4.00	0.28	0.00	0.00	30.00	6.50	4.02	0.00
4.50	0.32	0.00	0.00	30.50	6.50	4.02	0.00
5.00	0.37	0.00	0.00	31.00	6.50	4.02	0.00
5.50	0.42	0.00	0.00	31.50	6.50	4.02	0.00
6.00	0.47	0.00	0.00	32.00	6.50	4.02	0.00
6.50	0.52	0.00	0.00				
7.00	0.59	0.00	0.02				
7.50	0.66	0.00	0.13				
8.00	0.74	0.01	0.27				
8.50	0.83	0.02	0.49				
9.00	0.95	0.05	0.79				
9.50	1.08	0.08	1.17				
10.00	1.23	0.13	1.63				
10.50	1.41	0.19	2.37				
11.00	1.63	0.29	3.31				
11.50	1.94	0.45	5.99				
12.00	3.25	1.31	**43.04**				
12.50	4.56	2.34	**16.80**				
13.00	4.87	2.61	6.98				
13.50	5.09	2.79	5.48				
14.00	5.27	2.94	4.47				
14.50	5.42	3.07	3.90				
15.00	5.55	3.19	3.41				
15.50	5.67	3.28	2.91				
16.00	5.76	3.37	2.41				
16.50	5.84	3.44	2.14				
17.00	5.91	3.50	1.92				
17.50	5.98	3.56	1.70				
18.00	6.03	3.61	1.48				
18.50	6.08	3.65	1.39				
19.00	6.13	3.69	1.32				
19.50	6.18	3.74	1.25				
20.00	6.22	3.77	1.19				
20.50	6.26	3.81	1.14				
21.00	6.30	3.85	1.09				
21.50	6.34	3.88	1.04				
22.00	6.37	3.91	0.99				
22.50	6.41	3.94	0.94				
23.00	6.44	3.97	0.89				
23.50	6.47	4.00	0.84				
24.00	**6.50**	**4.02**	0.78				
24.50	6.50	4.02	0.00				
25.00	6.50	4.02	0.00				
25.50	6.50	4.02	0.00				

Summary for Subcatchment PR-3:

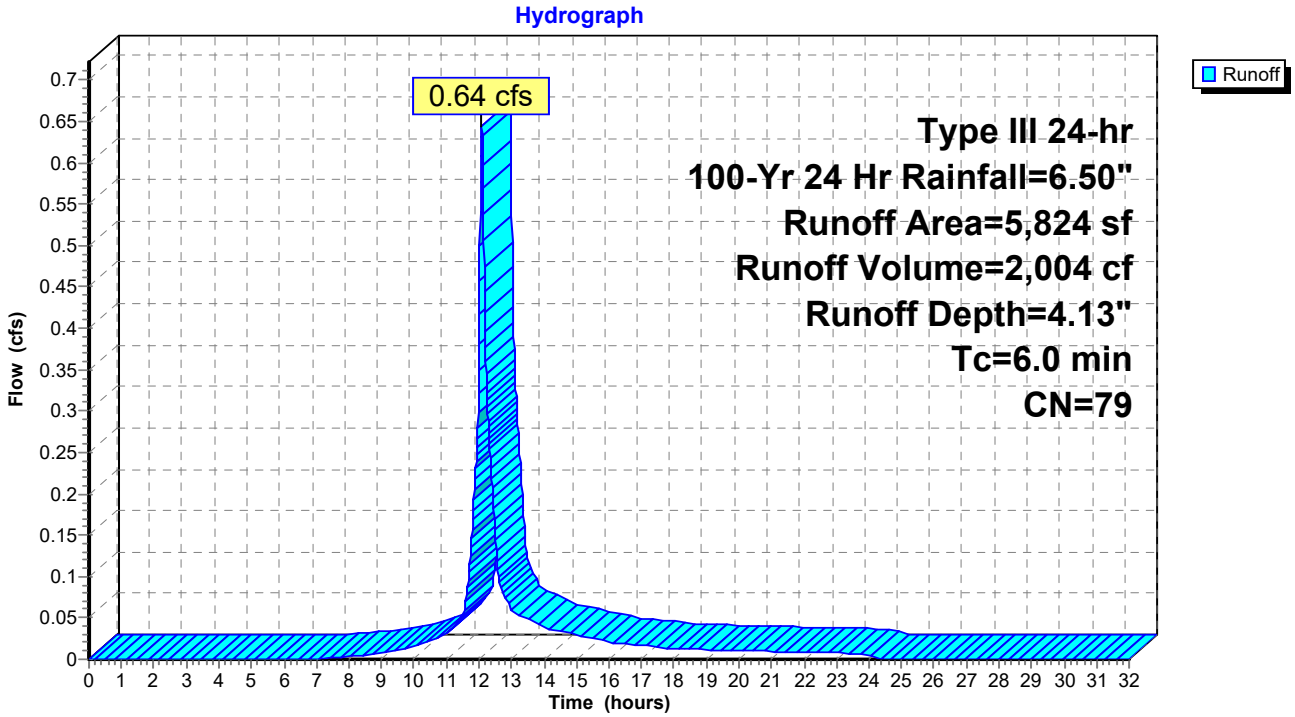
Runoff = 0.64 cfs @ 12.09 hrs, Volume= 2,004 cf, Depth= 4.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr 24 Hr Rainfall=6.50"

Area (sf)	CN	Description
3,883	80	>75% Grass cover, Good, HSG D
1,941	77	Woods, Good, HSG D
5,824	79	Weighted Average
5,824		100.00% Pervious Area

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

Subcatchment PR-3:



Hydrograph for Subcatchment PR-3:

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	6.50	4.13	0.00
0.50	0.03	0.00	0.00	26.50	6.50	4.13	0.00
1.00	0.07	0.00	0.00	27.00	6.50	4.13	0.00
1.50	0.10	0.00	0.00	27.50	6.50	4.13	0.00
2.00	0.13	0.00	0.00	28.00	6.50	4.13	0.00
2.50	0.16	0.00	0.00	28.50	6.50	4.13	0.00
3.00	0.20	0.00	0.00	29.00	6.50	4.13	0.00
3.50	0.24	0.00	0.00	29.50	6.50	4.13	0.00
4.00	0.28	0.00	0.00	30.00	6.50	4.13	0.00
4.50	0.32	0.00	0.00	30.50	6.50	4.13	0.00
5.00	0.37	0.00	0.00	31.00	6.50	4.13	0.00
5.50	0.42	0.00	0.00	31.50	6.50	4.13	0.00
6.00	0.47	0.00	0.00	32.00	6.50	4.13	0.00
6.50	0.52	0.00	0.00				
7.00	0.59	0.00	0.00				
7.50	0.66	0.01	0.00				
8.00	0.74	0.02	0.00				
8.50	0.83	0.03	0.00				
9.00	0.95	0.06	0.01				
9.50	1.08	0.09	0.01				
10.00	1.23	0.14	0.02				
10.50	1.41	0.22	0.02				
11.00	1.63	0.32	0.03				
11.50	1.94	0.49	0.05				
12.00	3.25	1.37	**0.38**				
12.50	4.56	2.43	**0.15**				
13.00	4.87	2.69	0.06				
13.50	5.09	2.88	0.05				
14.00	5.27	3.04	0.04				
14.50	5.42	3.17	0.03				
15.00	5.55	3.28	0.03				
15.50	5.67	3.38	0.03				
16.00	5.76	3.47	0.02				
16.50	5.84	3.54	0.02				
17.00	5.91	3.60	0.02				
17.50	5.98	3.66	0.01				
18.00	6.03	3.71	0.01				
18.50	6.08	3.75	0.01				
19.00	6.13	3.80	0.01				
19.50	6.18	3.84	0.01				
20.00	6.22	3.88	0.01				
20.50	6.26	3.91	0.01				
21.00	6.30	3.95	0.01				
21.50	6.34	3.98	0.01				
22.00	6.37	4.02	0.01				
22.50	6.41	4.05	0.01				
23.00	6.44	4.08	0.01				
23.50	6.47	4.10	0.01				
24.00	**6.50**	**4.13**	0.01				
24.50	6.50	4.13	0.00				
25.00	6.50	4.13	0.00				
25.50	6.50	4.13	0.00				

Summary for Subcatchment PR-4:

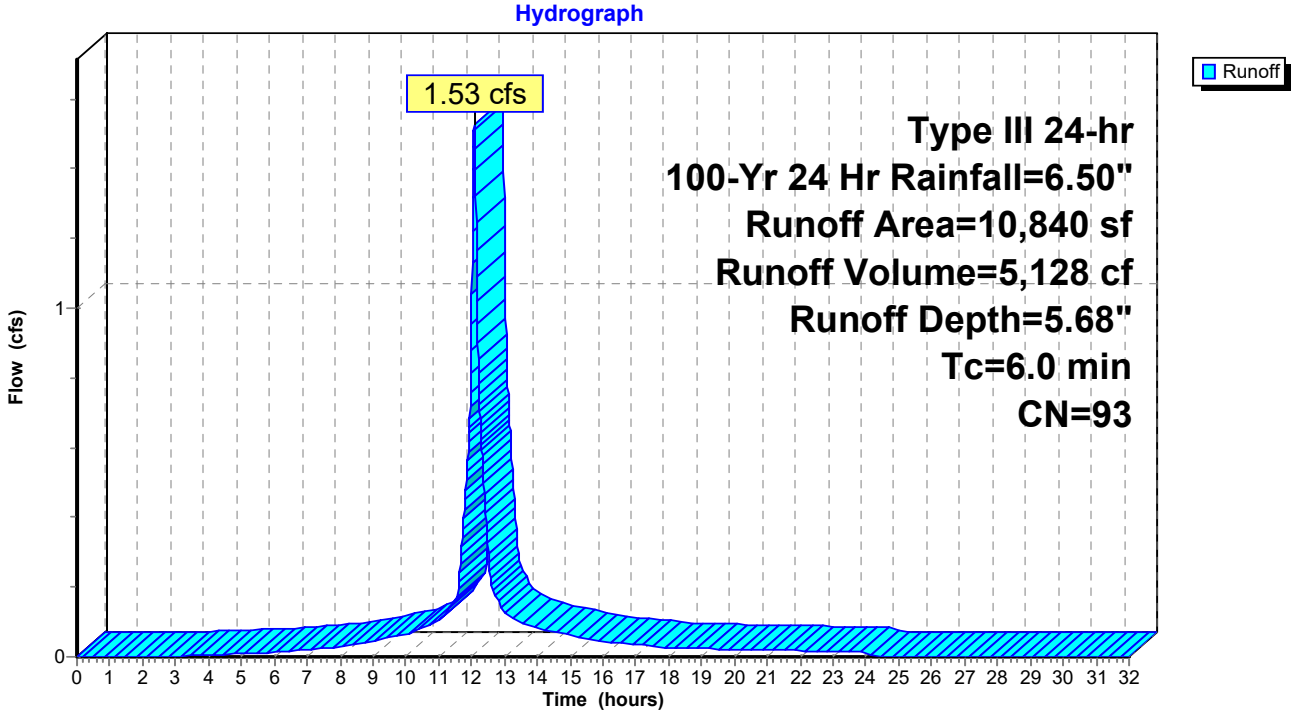
Runoff = 1.53 cfs @ 12.08 hrs, Volume= 5,128 cf, Depth= 5.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr 24 Hr Rainfall=6.50"

Area (sf)	CN	Description
8,072	98	Paved parking, HSG D
2,768	80	>75% Grass cover, Good, HSG D
10,840	93	Weighted Average
2,768		25.54% Pervious Area
8,072		74.46% Impervious Area

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

Subcatchment PR-4:



Hydrograph for Subcatchment PR-4:

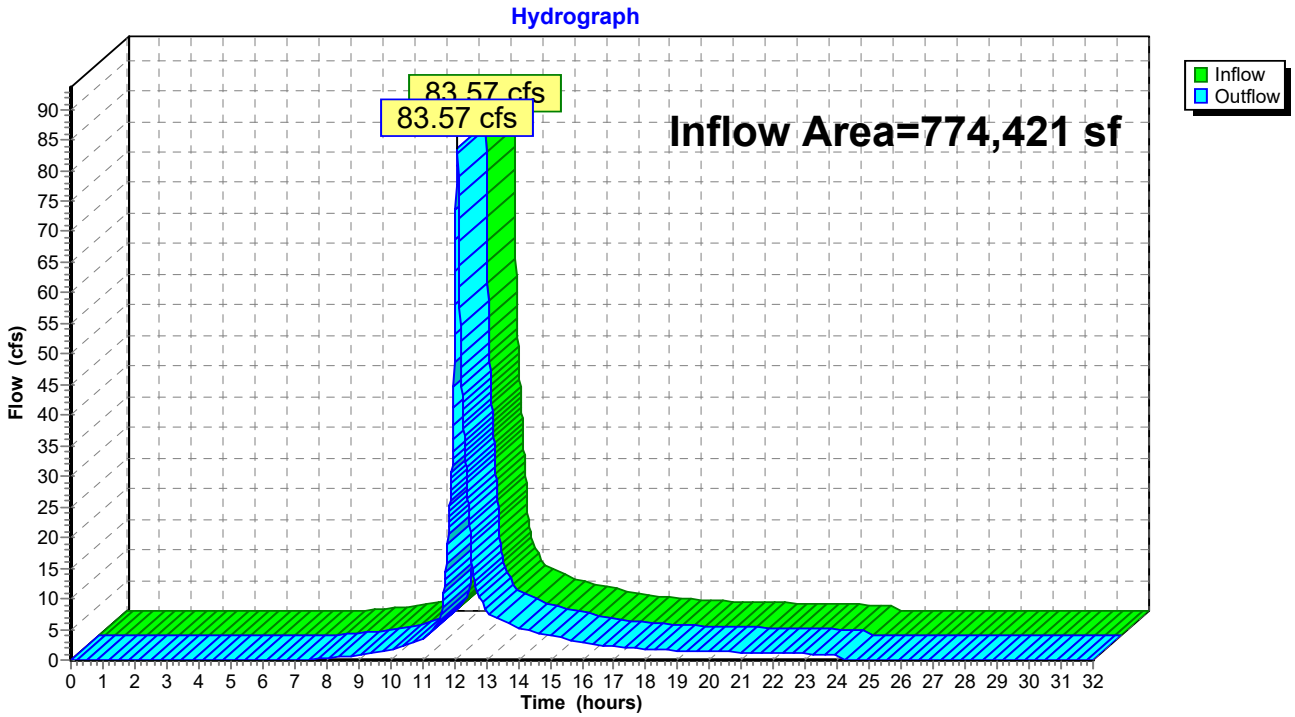
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	6.50	5.68	0.00
0.50	0.03	0.00	0.00	26.50	6.50	5.68	0.00
1.00	0.07	0.00	0.00	27.00	6.50	5.68	0.00
1.50	0.10	0.00	0.00	27.50	6.50	5.68	0.00
2.00	0.13	0.00	0.00	28.00	6.50	5.68	0.00
2.50	0.16	0.00	0.00	28.50	6.50	5.68	0.00
3.00	0.20	0.00	0.00	29.00	6.50	5.68	0.00
3.50	0.24	0.01	0.00	29.50	6.50	5.68	0.00
4.00	0.28	0.02	0.01	30.00	6.50	5.68	0.00
4.50	0.32	0.03	0.01	30.50	6.50	5.68	0.00
5.00	0.37	0.05	0.01	31.00	6.50	5.68	0.00
5.50	0.42	0.07	0.01	31.50	6.50	5.68	0.00
6.00	0.47	0.09	0.01	32.00	6.50	5.68	0.00
6.50	0.52	0.12	0.02				
7.00	0.59	0.16	0.02				
7.50	0.66	0.21	0.02				
8.00	0.74	0.26	0.03				
8.50	0.83	0.33	0.04				
9.00	0.95	0.41	0.04				
9.50	1.08	0.51	0.05				
10.00	1.23	0.63	0.06				
10.50	1.41	0.79	0.08				
11.00	1.63	0.98	0.10				
11.50	1.94	1.26	0.16				
12.00	3.25	2.49	**0.95**				
12.50	4.56	3.77	**0.32**				
13.00	4.87	4.08	0.13				
13.50	5.09	4.29	0.10				
14.00	5.27	4.46	0.08				
14.50	5.42	4.61	0.07				
15.00	5.55	4.74	0.06				
15.50	5.67	4.85	0.05				
16.00	5.76	4.94	0.04				
16.50	5.84	5.02	0.04				
17.00	5.91	5.10	0.03				
17.50	5.98	5.16	0.03				
18.00	6.03	5.21	0.03				
18.50	6.08	5.26	0.02				
19.00	6.13	5.31	0.02				
19.50	6.18	5.36	0.02				
20.00	6.22	5.40	0.02				
20.50	6.26	5.44	0.02				
21.00	6.30	5.48	0.02				
21.50	6.34	5.52	0.02				
22.00	6.37	5.55	0.02				
22.50	6.41	5.59	0.02				
23.00	6.44	5.62	0.02				
23.50	6.47	5.65	0.01				
24.00	**6.50**	**5.68**	0.01				
24.50	6.50	5.68	0.00				
25.00	6.50	5.68	0.00				
25.50	6.50	5.68	0.00				

Summary for Reach POA-1:

Inflow Area = 774,421 sf, 5.85% Impervious, Inflow Depth = 4.05" for 100-Yr 24 Hr event
Inflow = 83.57 cfs @ 12.09 hrs, Volume= 261,652 cf
Outflow = 83.57 cfs @ 12.09 hrs, Volume= 261,652 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs

Reach POA-1:



Hydrograph for Reach POA-1:

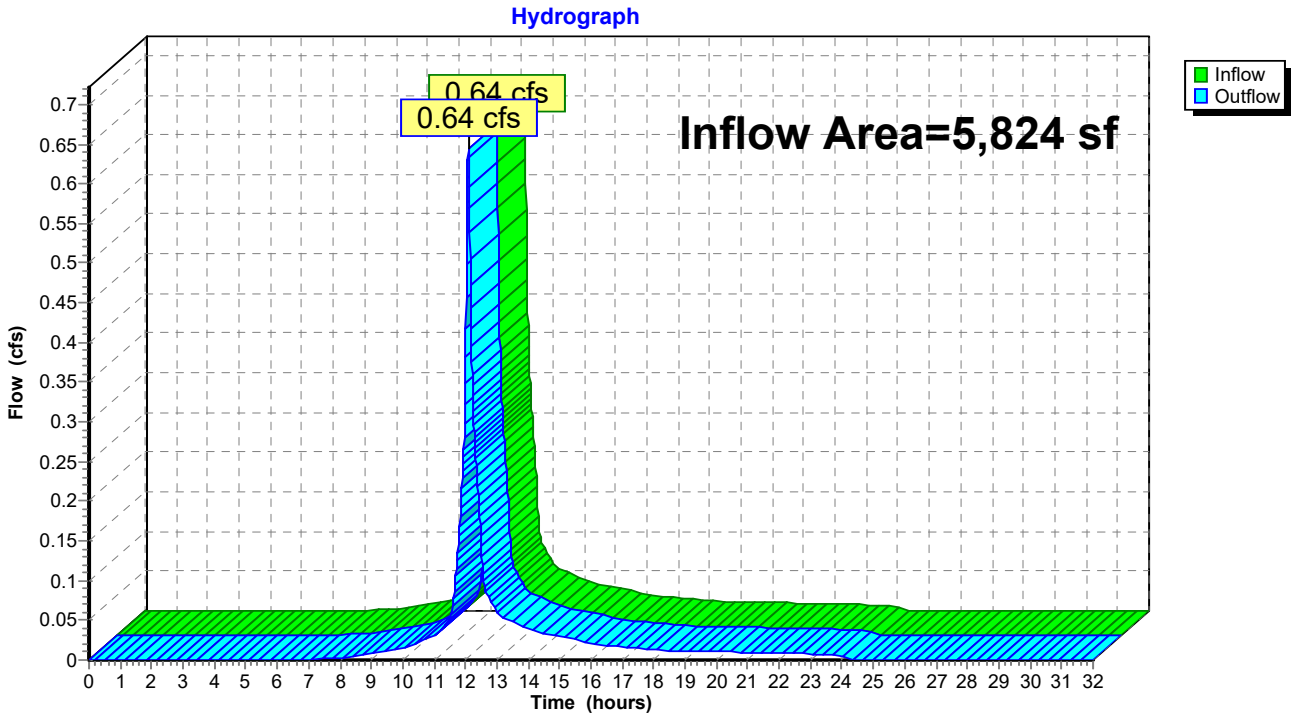
Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
0.50	0.00		0.00
1.00	0.00		0.00
1.50	0.00		0.00
2.00	0.00		0.00
2.50	0.00		0.00
3.00	0.00		0.00
3.50	0.00		0.00
4.00	0.01		0.01
4.50	0.01		0.01
5.00	0.01		0.01
5.50	0.01		0.01
6.00	0.01		0.01
6.50	0.02		0.02
7.00	0.04		0.04
7.50	0.16		0.16
8.00	0.30		0.30
8.50	0.53		0.53
9.00	0.84		0.84
9.50	1.23		1.23
10.00	1.69		1.69
10.50	2.45		2.45
11.00	3.41		3.41
11.50	6.15		6.15
12.00	**48.70**		**48.70**
12.50	**20.51**		**20.51**
13.00	8.30		8.30
13.50	6.42		6.42
14.00	5.25		5.25
14.50	4.55		4.55
15.00	3.98		3.98
15.50	3.41		3.41
16.00	2.83		2.83
16.50	2.50		2.50
17.00	2.24		2.24
17.50	1.99		1.99
18.00	1.73		1.73
18.50	1.61		1.61
19.00	1.53		1.53
19.50	1.46		1.46
20.00	1.38		1.38
20.50	1.32		1.32
21.00	1.26		1.26
21.50	1.20		1.20
22.00	1.15		1.15
22.50	1.09		1.09
23.00	1.03		1.03
23.50	0.97		0.97
24.00	0.91		0.91
24.50	0.03		0.03
25.00	0.01		0.01
25.50	0.01		0.01
26.00	0.00		0.00
26.50	0.00		0.00
27.00	0.00		0.00
27.50	0.00		0.00
28.00	0.00		0.00
28.50	0.00		0.00
29.00	0.00		0.00
29.50	0.00		0.00
30.00	0.00		0.00
30.50	0.00		0.00
31.00	0.00		0.00
31.50	0.00		0.00
32.00	0.00		0.00

Summary for Reach POA-2:

Inflow Area = 5,824 sf, 0.00% Impervious, Inflow Depth = 4.13" for 100-Yr 24 Hr event
Inflow = 0.64 cfs @ 12.09 hrs, Volume= 2,004 cf
Outflow = 0.64 cfs @ 12.09 hrs, Volume= 2,004 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs

Reach POA-2:



Hydrograph for Reach POA-2:

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	26.00	0.00		0.00
0.50	0.00		0.00	26.50	0.00		0.00
1.00	0.00		0.00	27.00	0.00		0.00
1.50	0.00		0.00	27.50	0.00		0.00
2.00	0.00		0.00	28.00	0.00		0.00
2.50	0.00		0.00	28.50	0.00		0.00
3.00	0.00		0.00	29.00	0.00		0.00
3.50	0.00		0.00	29.50	0.00		0.00
4.00	0.00		0.00	30.00	0.00		0.00
4.50	0.00		0.00	30.50	0.00		0.00
5.00	0.00		0.00	31.00	0.00		0.00
5.50	0.00		0.00	31.50	0.00		0.00
6.00	0.00		0.00	32.00	0.00		0.00
6.50	0.00		0.00				
7.00	0.00		0.00				
7.50	0.00		0.00				
8.00	0.00		0.00				
8.50	0.00		0.00				
9.00	0.01		0.01				
9.50	0.01		0.01				
10.00	0.02		0.02				
10.50	0.02		0.02				
11.00	0.03		0.03				
11.50	0.05		0.05				
12.00	**0.38**		**0.38**				
12.50	**0.15**		**0.15**				
13.00	0.06		0.06				
13.50	0.05		0.05				
14.00	0.04		0.04				
14.50	0.03		0.03				
15.00	0.03		0.03				
15.50	0.03		0.03				
16.00	0.02		0.02				
16.50	0.02		0.02				
17.00	0.02		0.02				
17.50	0.01		0.01				
18.00	0.01		0.01				
18.50	0.01		0.01				
19.00	0.01		0.01				
19.50	0.01		0.01				
20.00	0.01		0.01				
20.50	0.01		0.01				
21.00	0.01		0.01				
21.50	0.01		0.01				
22.00	0.01		0.01				
22.50	0.01		0.01				
23.00	0.01		0.01				
23.50	0.01		0.01				
24.00	0.01		0.01				
24.50	0.00		0.00				
25.00	0.00		0.00				
25.50	0.00		0.00				

Summary for Pond Swale-1: Wet Swale-1

Inflow Area = 87,495 sf, 42.57% Impervious, Inflow Depth = 5.11" for 100-Yr 24 Hr event
Inflow = 11.56 cfs @ 12.08 hrs, Volume= 37,248 cf
Outflow = 9.98 cfs @ 12.13 hrs, Volume= 29,816 cf, Atten= 14%, Lag= 2.8 min
Primary = 9.98 cfs @ 12.13 hrs, Volume= 29,816 cf

Routing by Stor-Ind method, Time Span= 0.00-32.00 hrs, dt= 0.01 hrs
Peak Elev= 73.52' @ 12.13 hrs Surf.Area= 6,350 sf Storage= 10,738 cf

Plug-Flow detention time= 132.7 min calculated for 29,816 cf (80% of inflow)
Center-of-Mass det. time= 57.5 min (846.3 - 788.8)

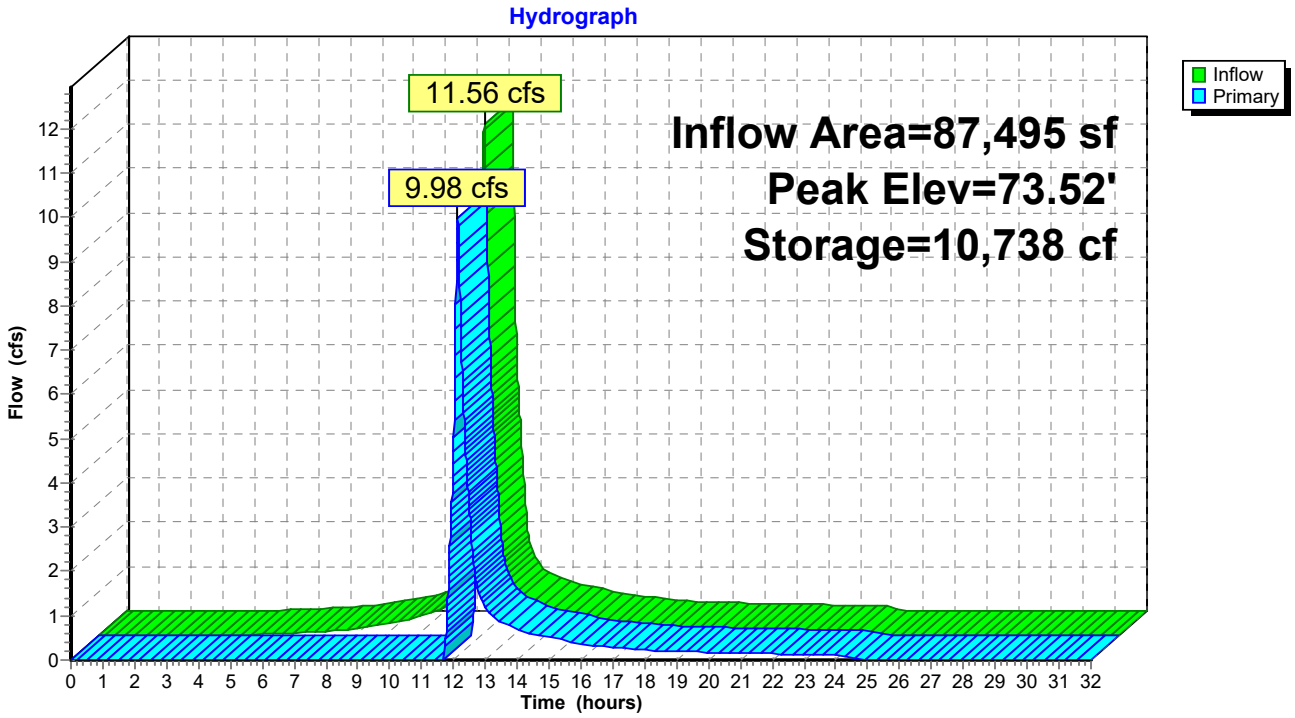
Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	13,739 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	2,093	0	0
72.00	3,688	2,891	2,891
73.00	5,396	4,542	7,433
74.00	7,216	6,306	13,739

Device	Routing	Invert	Outlet Devices
#1	Primary	73.00'	**10.0' long x 5.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86

Primary OutFlow Max=9.97 cfs @ 12.13 hrs HW=73.52' (Free Discharge)
└1=**Broad-Crested Rectangular Weir** (Weir Controls 9.97 cfs @ 1.90 fps)

Pond Swale-1: Wet Swale-1



Hydrograph for Pond Swale-1: Wet Swale-1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	71.00	0.00
1.00	0.00	0	71.00	0.00
2.00	0.00	0	71.00	0.00
3.00	0.00	0	71.00	0.00
4.00	0.00	0	71.00	0.00
5.00	0.02	39	71.01	0.00
6.00	0.05	162	71.06	0.00
7.00	0.09	402	71.14	0.00
8.00	0.15	823	71.28	0.00
9.00	0.26	1,540	71.53	0.00
10.00	0.41	2,734	71.95	0.00
11.00	0.69	4,675	72.39	0.00
12.00	**7.10**	**9,527**	**73.33**	**4.71**
13.00	**1.02**	**8,296**	**73.14**	**1.19**
14.00	0.64	8,032	73.09	0.69
15.00	0.49	7,920	73.08	0.51
16.00	0.34	7,826	73.06	0.37
17.00	0.27	7,759	73.05	0.29
18.00	0.21	7,711	73.04	0.22
19.00	0.19	7,686	73.04	0.19
20.00	0.17	7,667	73.04	0.17
21.00	0.15	7,649	73.03	0.16
22.00	0.14	7,633	73.03	0.14
23.00	0.12	7,616	73.03	0.13
24.00	0.11	7,600	73.03	0.11
25.00	0.00	7,469	73.01	0.01
26.00	0.00	7,442	73.00	0.00
27.00	0.00	7,435	73.00	0.00
28.00	0.00	7,433	73.00	0.00
29.00	0.00	7,433	73.00	0.00
30.00	0.00	7,433	73.00	0.00
31.00	0.00	7,433	73.00	0.00
32.00	0.00	7,433	73.00	0.00

TSS Removal Calculations

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

Version 1, Automated: Mar. 4, 2008

Location: 316 New Boston Street Woburn, MA

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 10%	**0.10**	**1.00**	**0.10**	**0.90**
Deep Sump and Hooded Catch Basin	**0.25**	**0.90**	**0.23**	**0.68**
Oil Grit Separator	**0.25**	**0.68**	**0.17**	**0.51**
Sediment Forebay	**0.25**	**0.51**	**0.13**	**0.38**
Water Quality Swale - Wet	**0.70**	**0.38**	**0.27**	**0.11**

Total TSS Removal = **89%**

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

Project: 19078
Prepared By: TRG
Date: 4/1/2020

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

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

Mass. Dept. of Environmental Protection

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25-Year Storm Event Pipe Sizing Calculations

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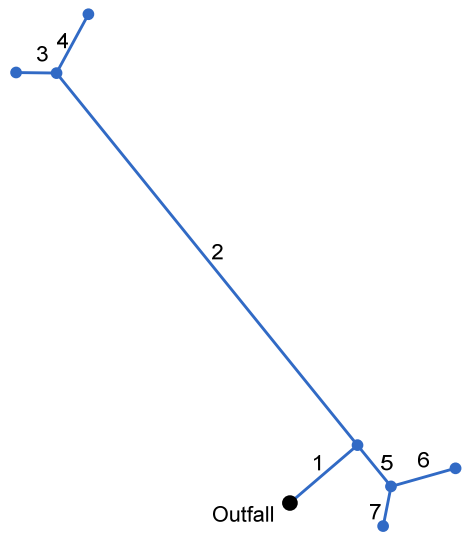
Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: 19078 - Woburn, MA - Pipe Sizing.stm	Number of lines: 7	Date: 4/3/2020

Storm Sewers v2020.00

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	40.227	-40.534	MH	0.00	0.00	0.00	0.0	72.80	0.50	73.00	15	Cir	0.012	1.00	77.19	DMH-3 TO FES-1
2	1	216.957	-88.332	MH	0.00	0.00	0.00	0.0	73.10	0.60	74.40	12	Cir	0.012	0.94	79.22	DMH-2 TO DMH-3
3	2	18.320	-49.843	Grate	0.65	0.12	0.90	0.0	74.50	0.55	74.60	12	Cir	0.012	1.00	78.90	B-4 TO DMH-2
4	2	30.390	67.126	Grate	0.65	0.12	0.90	0.0	74.50	0.99	74.80	12	Cir	0.012	1.00	78.90	B-3 TO DMH-2
5	1	24.184	91.668	MH	0.00	0.00	0.00	0.0	73.10	0.41	73.20	12	Cir	0.012	0.94	77.00	DMH-1 TO DMH-3
6	5	30.404	-67.198	Grate	1.70	0.33	0.90	0.0	73.30	0.66	73.50	12	Cir	0.012	1.00	76.54	B-1 TO DMH-1
7	5	18.301	49.916	Grate	1.70	0.33	0.90	0.0	73.30	0.55	73.40	12	Cir	0.012	1.00	77.34	B-2 TO DMH-1

Project File: 19078 - Woburn, MA - Pipe Sizing.stm | Number of lines: 7 | Date: 4/3/2020

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	DMH-3	Manhole	77.19	Cir	4.00	4.00	15	Cir	73.00	12 12	Cir Cir	73.10 73.10
2	DMH-2	Manhole	79.22	Cir	4.00	4.00	12	Cir	74.40	12 12	Cir Cir	74.50 74.50
3	CB-4	Grate	78.90	Cir	4.00	4.00	12	Cir	74.60			
4	CB-3	Grate	78.90	Cir	4.00	4.00	12	Cir	74.80			
5	DMH-1	Manhole	77.00	Cir	4.00	4.00	12	Cir	73.20	12 12	Cir Cir	73.30 73.30
6	CB-1	Grate	76.54	Cir	4.00	4.00	12	Cir	73.50			
7	CB-2	Grate	77.34	Cir	4.00	4.00	12	Cir	73.40			

Project File: 19078 - Woburn, MA - Pipe Sizing.stm | Number of Structures: 7 | Run Date: 4/3/2020

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	DMH-3 TO FES-1	4.93	15	Cir	40.227	72.80	73.00	0.497	73.70	74.03	0.32	74.35	End	Manhole
2	DMH-2 TO DMH-3	2.99	12	Cir	216.957	73.10	74.40	0.599	74.35*	75.65*	0.21	75.87	1	Manhole
3	B-4 TO DMH-2	2.85	12	Cir	18.320	74.50	74.60	0.546	75.87*	75.97*	0.20	76.17	2	Grate
4	B-3 TO DMH-2	3.83	12	Cir	30.390	74.50	74.80	0.987	75.87*	76.17*	0.37	76.54	2	Grate
5	DMH-1 TO DMH-3	2.48	12	Cir	24.184	73.10	73.20	0.413	74.35*	74.45*	0.15	74.60	1	Manhole
6	B-1 TO DMH-1	3.13	12	Cir	30.404	73.30	73.50	0.658	74.60*	74.80*	0.25	75.05	5	Grate
7	B-2 TO DMH-1	2.85	12	Cir	18.301	73.30	73.40	0.546	74.60*	74.70*	0.20	74.91	5	Grate

Project File: 19078 - Woburn, MA - Pipe Sizing.stm | Number of lines: 7 | Run Date: 4/3/2020

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown).

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	DMH-3	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	DMH-2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	CB-4	0.00*	0.00	0.00	0.00	Grate	0.0	0.00	0.00	2.00	2.00	1.000	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off
4	CB-3	0.00*	0.00	0.00	0.00	Grate	0.0	0.00	0.00	2.00	2.00	1.000	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off
5	DMH-1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
6	CB-1	0.00*	0.00	0.00	0.00	Grate	0.0	0.00	0.00	2.00	2.00	1.000	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off
7	CB-2	0.00*	0.00	0.00	0.00	Grate	0.0	0.00	0.00	2.00	2.00	1.000	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off

Project File: 19078 - Woburn, MA - Pipe Sizing.stm | Number of lines: 7 | Run Date: 4/3/2020

NOTES: Inlet N-Values = 0.016; Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

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APPENDIX C
Stormwater Pollution Prevention Plan (SWPPP)
(To be Submitted Prior to Land Disturbance)

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APPENDIX D
Operation and Maintenance Plan (O & M)

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Operation and Maintenance Plan

Long Term Pollution Prevention Plan (LTPPP)
& Illicit Discharge Statement

Definitive Subdivision
316 New Boston Street
Woburn, Massachusetts

Prepared for:
DM Five, Inc.
c/o The O'Connor Law Firm
16 South Main Street
Topsfield, MA 01983

Prepared by:
R.J. O'Connell & Associates, Inc.
80 Montvale Ave, Suite 201
Stoneham, MA 02180

Date:
April 3, 2020

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TABLE OF CONTENTS

Introduction

Section 1 – Stormwater Management System - Operations and Maintenance

Section 2 – Long Term Pollution Prevention Plan (LTPPP)
- A. Materials Covered
- B. Materials Management Practices
- C. Spill Prevention and Response Procedures

Section 3 – Illicit Discharge Statement

Section 4 – Snow Management

Section 5 – Public Safety Features

Appendices

Appendix A – Maintenance and Inspection Forms

Activity Guide

Comprehensive Annual Evaluation and Inspection Report

Annual Training Signoff Sheet

Weekly Inspection Checklist

Monthly Inspection Checklist

Quarterly Inspection Checklist

Semi-Annual Inspection Checklist

Spill and Leak History

Appendix B – C-2A – Definitive Grading and Drainage Plan

Operations and Maintenance Plan

INTRODUCTION

This Operations and Maintenance Plan has been prepared to ensure that the stormwater management system implemented at 316 New Boston Street located in Woburn, MA functions as designed, and to develop and carry out suitable practices for source control and pollution prevention. It describes the various components of the stormwater management system, identifies the inspection and maintenance tasks to be undertaken after construction is complete, and establishes a schedule for implementing these tasks to ensure the proper, long-term operation of the system.

SECTION 1 - STORMWATER MANAGEMENT SYSTEM- OPERATION AND MAINTENANCE

The objectives of the stormwater management system are to effectively control and treat stormwater runoff from the site in accordance with the Massachusetts Stormwater Management Standards. To accomplish this objective, the following Best Management Practices (BMP's) are included in the stormwater management system:

<u>Pre-Treatment BMPs</u>

- Sweeping of paved surface areas to remove solids and reduce suspended solids in surface runoff.
- Installation and maintenance of the catch basins with deep sumps and hoods to reduce the discharge of sediment and pollutants.
- Installation of hydrodynamic particle separator unit for removal of oil, grease and suspended solids.
- Installation of sediment forebay to reduce suspended solids prior to discharging to the wet water quality swale.

In consideration of the foregoing, it is the ongoing responsibility of the landowner, their successors and assignees to adequately maintain the on-site stormwater management BMPs. Adequate maintenance is herein defined as good working condition so that these BMPs are performing their design functions.

Based on this, the landowner, his successors and assignees are required to create a Pollution Prevention Team (PPT) that will be responsible for implementing this Operations and Maintenance Plan.

Property Information

Address: 316 New Boston Street
Woburn, MA 01801

Landowner and Pollution Prevention Team Leader

Owners Name: DM Five, Inc. c/o The O'Connor Law Firm
Title: Owner and Operator
Office Phone: (978) 887-5580

Responsibilities: Coordinate all aspects of the Operations and Maintenance Plan, coordinate and hire the other Pollution Prevention team members in order to conduct inspections, keep all records, and coordinate with contractors for maintenance and repair of the stormwater management system.

Spill Prevention & Control Contractor
The following contacts shall be notified only in those instances identified within 310 CMR 40.00: Massachusetts Contingency Plan-Subpart C (see the Long-Term Pollution Prevention Plan, Section 2).:

Primary Contact: TBD
Office Phone: TBD

Emergency Contact: TBD
Company Name: TBD
Contact Name: TBD
Emergency Phone: TBD

Consultant Contact: TBD
Company Name: TBD
Contact Name: TBD
Phone: TBD

Department of Environmental Protection (DEP)
Hazardous Waste Incident Response Group
Contact Name: TBD
Phone: TBD

Municipal Contacts

Woburn Fire Department
Contact Name: Stephen Adgate, Chief
Phone: (781) 897-1380

Woburn Engineering Department
Contact Name: John E. Corey Jr., PE, City Engineer
Phone: (781) 897-5880

Other Pollution Prevention Team Members

Member: Qualified Engineering and/or Environmental Consulting Firm(s).

Responsibilities: Conduct scheduled inspections, maintain records, advise the Team Leader of maintenance needs, ensure inspection maintenance and repairs are completed and keep and maintain all records and inspection reports.

Company Name(s): TBD
Address: TBD
Office Phone: TBD

Team Member Training

The Pollution Prevention Team Leader will coordinate an annual in-house training session with the qualified Engineering and/or Environmental Consulting Firm to discuss the Operations and Maintenance Plan, ongoing inspection and maintenance and preventative maintenance procedures.

Annual training session will generally include the following:

- Discuss the Operations and Maintenance Plan
    - What it is- identify potential sources of stormwater pollution and methods of reducing or eliminating that pollution
    - What it contains- emphasize good housekeeping measures and location of potential pollution sources.
    - Pollution Prevention Team- introduce the team and explain their responsibilities, explain the operations and continuous monitoring of the stormwater management system and encourage input and assistance from all.
- Review and explain the storm drainage system, how it works and its components, note the receiving resource area in which the storm drainage system discharges into and the role each component plays.
- Emphasize the importance of maintaining current and up-to-date inspection reports and maintenance records of BMPs. Documentation shall include any changes to the O&M Plan's procedures to accommodate changes and revisions to BMPs.

The components of the stormwater management system must be inspected, monitored and maintained in accordance with the following in order to ensure that the on-site stormwater management BMPs are functioning as designed. Routine inspection and proper maintenance of these individual components is essential to providing the long-term enhancement of both the quality and quantity of the runoff from the properties.

Sweeping and Site Clean-Up:

Routine sweeping of paved areas is an effective method to provide important nonpoint source pollution control and will be performed by mechanical sweepers. Most stormwater pollutants travel with the suspended solids contained in the stormwater runoff and regular sweeping will help reduce a portion of this load. Sweeping, especially during the period immediately following winter snowmelt (March/April) when road sand and other debris has accumulated on the pavement, will capture a peak sediment load before spring rains wash residual sand from winter applications into nearby resource areas.

Inspection: Paved areas will be inspected for litter on a weekly basis and picked up and disposed of immediately.

Maintenance: All parking areas, sidewalks, driveways and other impervious surfaces (except roofs) will be swept clean of sand, litter, trash, etc. on a monthly basis. A log of land/lot sweeping and cleanup will be kept. Housekeeping concerns noted by store leadership, PPT members, guests and others will be noted and acted upon. Separate cleanup services will be conducted at least twice a year, once between November 14 and December 15 (after leaf fall) and once during the month of April (after snow melt). Additional cleanup services will be conducted as necessary.

Deep Sump Catch Basins:

Stormwater runoff from pavement areas is directed to catch basins via site grading and curbing. Catch basins are equipped with a deep (4ft) sump and a hood. The sumps are designed to capture sediment and coarse particles and the hoods prevent hydrocarbons and other floatable debris from entering the drainage system. To ensure proper functioning of catch basins, each will be inspected and maintained as follows:

Inspection: Beginning of March, June, September and December and after major storm events. Structural damage and other malfunctions are to be noted and reported. Basins shall also be inspected during every major rain event (3.1 inches or greater in 24 hours) to ensure the grates are not clogged and are functioning properly.

Maintenance: Catch basins to be pumped and cleaned at a minimum once a year in the springtime, or when sump is half full. Cleaning shall be performed by a licensed contractor. Sediment and hydrocarbons will be properly handled and legally disposed of off-site in accordance with local, state, and federal guidelines and regulations. Any structural damage to catch basins and/or castings will be repaired upon discovery.

Hydrodynamic Oil/Particle Separators:

The particle separators are precast concrete structures designed to treat incoming stormwater runoff, removing suspended solids, thereby preventing the transfer of pollutants downstream. The particle separators on the site are designed to collect and treat water runoff from activities performed within the building via trench drains. As water will be used to wash vehicles and equipment, the oil/particle separators are proposed to be connected to the sanitary sewer system. Particle separators will be inspected and maintained as follows:

> Inspection: Inspect in accordance with manufacturer's recommendations and requirements. At a minimum, hydrodynamic particle separators shall be inspected once per year
>
> Maintenance: Jet vacuum and power wash by a licensed contractor at least once per year or as recommended by the manufacturer. Accumulated sediment and hydrocarbons will be disposed of in accordance with applicable local, state and federal guidelines and regulations. Particle separators will also be cleaned when the level of sediment depth is within 12 inches of the outlet invert or as recommended by the manufacturer.

Sediment Forebay

One (1) sediment forebay is proposed on the western side of the proposed cul-de-sac preceding the wet water quality swale. Sediment forebays are impoundments, basins or other storage structures designed to dissipate the energy of incoming runoff and allow settling of coarse sediments. The forebay is used to pre-treat runoff prior to discharge to the wet water quality swale.

> Inspection: Inspect once per year for significant sedimentation, if sediment depth exceeds one (1) foot, maintenance is required. Install and maintain a staff gauge or other measuring device to indicate depth of sediment accumulation and level at which cleanout is required.
>
> Maintenance: The forebay shall be maintained once per year and when sediment depth exceeds one (1) foot.

Wet Water Quality Swale

A wet water quality swale is located in the western side of the midpoint of the cul-de-sac. The wet swale is designed to treat stormwater runoff prior to discharge to the offsite wetlands to the south.

Inspection: Inspect the swale monthly for the first 3 months to ensure that vegetation is adequately established. Thereafter, inspections of the swale shall occur bi-annually for:

- Inspect for and remove debris.
- Inspect soil and sloped areas and repair eroded areas as necessary.
- Verify vegetation is adequately established.
- Re-vegetate poorly established areas as necessary.
- Treat diseased vegetation as necessary.
- Check overflow spillways for blockage, structural integrity, and evidence of erosion.

Annual Maintenance:

- Repair and inspected damage to slopes or evidence of erosion.
- Re-vegetate and remove debris as necessary per routine inspections.
- Mow swales to a minimum grass height of 4 inches.
- Remove and repair all blockages and structural integrity of overflow spillway.
- Remove sediment from the swale when accumulation is observed greater than six (6) inches and reseed as necessary.

Please refer to Appendix A for the Inspection Forms, which are to be used by the Pollution Prevention Team member responsible for conducting the scheduled inspections.

SECTION 2 - LONG TERM POLLUTION PREVENTION PLAN (LTPPP)

A. MATERIALS COVERED

The following materials or substances are expected to be present onsite after construction:

Cleaning solvents	Petroleum based products
Detergents	Pesticides/Insecticides
Paints/Solvents	Fertilizers/Herbicides
Acids	
Solid Waste	

B. MATERIALS MANAGEMENT PRACTICES

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff. The Pollution Prevention Team Leader will be responsible for ensuring that these procedures are followed:

Good Housekeeping

The following good housekeeping practices will be followed onsite after construction:

a) An effort will be made to store only enough products required to do the job.
b) All materials stored onsite will be stored in a neat, orderly manner and, if possible, under a roof or in a containment area. At a minimum, all containers will be stored with their lids on when not in use. Drip pans shall be provided under all dispensers.
c) Products will be kept in their original containers with the original manufacturer's label in legible condition.
d) Substances will not be mixed with one another unless recommended by the manufacturer.
e) Whenever possible, all of a product will be used up before disposing of the container.
f) Manufacturer's recommendations for proper use and disposal will be followed.
g) A Pollution Prevention Team Member will be responsible for daily inspections to ensure proper use and disposal of materials.
h) The storage of all deicing materials on the site shall be covered and not be exposed to precipitation.

1. Hazardous Substances

These practices will be used to reduce the risks associated with hazardous substances. Material Safety Data Sheets (MSDS's) for each product with hazardous characteristics that are used on the property will be obtained and used for the proper management of potential wastes that may result from these products. An MSDS will be posted in the

immediate area where such product is stored and/or used and another copy of each MSDS will be maintained on-site, in the management office. Each employee who must handle a hazardous substance will be instructed on the use of MSDS sheets and the specific information in the applicable MSDS for the product he/she is using, particularly regarding spill control techniques.

a) Products will be kept in original containers with the original labels in legible condition.
b) Original labels and MSDS's will be procured and used for each product.
c) If surplus product must be disposed of, the manufacturer's and local/state/federal required methods for proper disposal must be followed.

2. Hazardous Waste

It is imperative that all hazardous waste be properly identified and handled in accordance with all applicable hazardous waste standards, including the storage, transport and disposal of the hazardous wastes. There are significant penalties for the improper handling of hazardous wastes. It is important that the Pollution Prevention Team Leader seeks appropriate assistance in making the determination of whether a substance or material is a hazardous waste. For example, hazardous waste may include certain hazardous substances, as well as pesticides, paints, paint solvents, cleaning solvents, contaminated soils, and other materials, substances or chemicals that have been discarded (or are to be discarded) as being out-of-date, contaminated, or otherwise unusable. The Pollution Prevention Team Leader is responsible for ensuring that all Pollution Prevention Team Members are instructed as to these hazardous waste requirements as well as that the requirements for handling and disposal are being followed.

3. Product Specific Practices

The following product specific practices will be followed on the job site:

a) Petroleum Products

Petroleum products will be stored in tightly sealed containers which are clearly labeled. Petroleum storage tanks shall be located a minimum of 100 linear feet from wetland resource areas, drainage ways, inlets and surface waters unless stored within a building. Any petroleum storage tanks stored onsite will be located within a containment area that is designed with an impervious surface between the tank and the ground. The secondary containment must be designed to provide a containment volume that is equal to 110% of the volume of the largest tank. Drip pans shall be provided for all dispensers. Any asphalt substances used onsite will be applied according to the manufacturer's recommendations. The location of any fuel tanks and/or equipment storage areas must be identified on the Erosion Control Plan by the Contractor once the locations have been determined.

b) Fertilizers, Herbicides, Pesticides, and Insecticides

Fertilizers, herbicides, pesticides, and insecticides will be applied only in the minimum amounts recommended by the manufacturer. Once applied, they will be utilized so as to limit exposure to stormwater. Storage will be in a covered shed. The contents of any partially used bags or containers will be transferred to a sealable plastic bin to avoid spills.

Fertilizers shall not be applied within wetland buffer zones or other resource areas. Refer to Drawing C-2, Grading and Drainage Plan, for location of resource areas and buffer zones.

c) Paints, Paint Solvents, and Cleaning Solvents

All containers will be tightly sealed and stored when not in use. Excess paint and solvents will not be discharged to the storm sewer system but will be properly disposed of according to manufacturer's instructions or state and federal regulations.

4. Solid Waste

All waste materials will be collected and stored in an appropriately covered container and/or securely contained metal dumpster rented from a local waste management company which must be a licensed solid waste management company. The dumpster will comply with all local and state solid waste management regulations.

All trash and debris from the site will be deposited in dumpsters. The dumpsters will be emptied a minimum of once per week or more often if necessary. All personnel will be instructed regarding the correct procedures for waste disposal.

All waste dumpsters and roll-off containers shall be located in an area where the likelihood of the containers contributing to stormwater discharges is negligible.

5. Contaminated Soils

Any contaminated soils resulting from spills of hazardous substances or oil shall be contained and cleaned up immediately in accordance with the procedures given in the Materials Management Plan and in accordance with applicable state and federal regulations. If there is a release, it should be reported as a spill, if it otherwise meets the requirements for a reportable spill.

C. SPILL PREVENTION AND RESPONSE PROCEDURES

The Pollution Prevention Team Leader will train all personnel in the proper handling and cleanup of spilled hazardous substances or oil. No spilled hazardous substances or oil will be allowed to come in contact with stormwater discharges. If such contact occurs, the storm water discharge will be contained on site until appropriate measures in compliance with state and federal regulations are taken to dispose of such contaminated storm water. It shall be the responsibility of the Pollution Prevention Team Leader to be properly trained, and to train all personnel in spill prevention and clean up procedures.

1. In order to prevent or minimize the potential for a spill of hazardous substances or oil to come into contact with stormwater, the following steps shall be implemented:

    a) All hazardous substances or oil (such as pesticides, petroleum products, fertilizers, detergents, acids, paints, paint solvents, cleaning solvents, etc.) shall be stored in a secure location, with their lids on, preferably under cover, when not in use.
    b) The minimum practical quantity of all such materials shall be kept on site.
    c) A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) shall be provided on site.
    d) Manufacturer's recommended methods for spill cleanup shall be clearly posted and site personnel shall be trained regarding these procedures and the location of the information and cleanup supplies.
    e) It is the Pollution Prevention Team Leader's responsibility to ensure that all hazardous waste on site is disposed of properly by a licensed hazardous material disposal company. The Pollution Prevention Team Leader is responsible for not exceeding hazardous waste storage requirements mandated by the EPA or state and local authority.

2. In the event of a spill of hazardous substances or oil, the following procedures must be followed:

    a) All measures must be taken to contain and abate the spill and to prevent the discharge of the hazardous substance or oil to stormwater or off-site. (The spill area must be kept well ventilated and personnel must wear appropriate protective clothing to prevent injury from contact with the hazardous substances.)
    b) For spills of less than five (5) gallons of material, proceed with source control and containment, clean-up with absorbent materials or other applicable means unless an imminent hazard or other circumstances dictate that the spill should be treated by a professional emergency response contractor.
    c) For spills greater than five (5) gallons of material immediately contact the MA DEP Emergency Response at (888) 304-1133, and an approved emergency response contractor. Provide information on the type of material spilled, the location of the spill, the quantity spilled, and the time of the spill to the emergency response contractor or coordinator, and proceed with prevention, containment and/or clean-up as safely deemed necessary.

d) If there is a Reportable Quantity (RQ) release, then the National Response Center shall be notified immediately at (800) 424-8802; within 14 days a report will be submitted to the EPA regional office describing the release, the date and circumstances of the release and the steps taken to prevent another release. This Pollution Prevention Plan must be updated to reflect any such steps or actions taken and measures to prevent the same from reoccurring.

3. The Pollution Prevention Team Leader shall be the spill prevention and response coordinator. He/she will designate the individuals who will receive spill prevention and response training. These individuals will each become responsible for a particular phase of prevention and response. The names of these personnel will be posted in the material storage area and in the management office.

SECTION 3 - ILLICIT DISCHARGE STATEMENT

Certain types of discharges are allowable under the U.S. Environmental Protection Agency Construction General Permit, and it is the intent of this Long Term Pollution Prevention Plan (LTPPP) to allow such discharges. These types of discharges will be allowed under the conditions that no pollutants will be allowed to come in contact with the water prior to, or after its discharge. The control measures which have been outlined previously in this LTPPP will be strictly followed to ensure that no contamination of these non-storm water discharges takes place. Illicit discharges, if they exist currently, shall be contained and eliminated in the manner specified by local, state and federal regulations, and will be prohibited in the proposed development.

Specifically, the following discharges are not considered illicit discharges per Standard 10 of the Massachusetts Stormwater Management Handbook:

- Firefighting
- Water line flushing
- Landscape irrigation
- Uncontaminated groundwater
- Potable water sources
- Foundation drains
- Air conditioning condensation
- Footing drains
- Individual resident car washing
- Flows from riparian habitats and wetlands
- Dechlorinated water from swimming pools
- Water used for street washing
- Water used to clean residential buildings without detergents

_____

Owner/Responsible Party

SECTION 4 – SNOW MANAGEMENT

Snow management will be overseen by the Property Manager who will implement this plan and be authorized to utilize additional resources should unusual events occur. The Snow Management Contractor (SMC) shall be responsible for maintaining all roads, driveways, parking lots, sidewalks and pedestrian access areas for clear and safe travel. The SMC shall report directly to the Property Manager and maintain communication via cell phones 24 hours per day, 7 days per week. During extreme events, the first priority will be to clear and maintain proper access for employees and public safety vehicles. The next priority is parking areas, sidewalks, and delivery areas. Snow shall not be piled around light bases and handicap parking areas shall be cleared frequently.

The anti-icing operations typically precede snow plowing and will be provided when conditions warrant. Within 12 months of concrete walks, pads, or other features being poured, no salt shall be placed on those surfaces. After the materials have cured for 12 months, a combination of calcium chloride de-icers and sand ("washed", fine to medium grade) shall be utilized. Parking areas shall receive spot treatment only when and where needed in a similar manner.

Snow plowing shall commence under the property manager's direction. Under no circumstances shall snow be dumped in wetland areas or the wet water quality swale. During extreme events, excess snow shall be removed off-site if necessary. The property manager SMC shall keep existing catch basins open for drainage or water resulting from melting.

SECTION 5 – PUBLIC SAFETY FEATURES

The following measures have been incorporated into the stormwater management system to insure the safety of the public:

- Storm drain manholes and catch basins provided with heavy duty covers and/or grates and designed to withstand H20 loading.
- Control and collection of stormwater runoff through positive drainage and curbing directing it toward drainage inlet structures.
- Treatment of stormwater runoff from paved surfaces to remove % of the average post-construction load of Total Suspended Solids (TSS).
- Reduction in peak rates of runoff and volume from the site under post-redevelopment conditions as compared to pre-development conditions.
- Development and implementation of an Operations and Maintenance Plan to insure the proper function of the stormwater management system and a Long Term Pollution Prevention Plan identifying potential pollution sources and suitable practices to control and prevent them from impacting the environment and/or the public's health and safety

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Appendix A

Maintenance and Inspection Forms

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316 New Boston Street – Woburn, MA
Operation and Maintenance Plan
Task Guide

The table below is a list of the minimum inspection and maintenance activities the Pollution Prevention Team needs to conduct for the Stormwater Operations and Management Plan and who is responsible for the activity. The task Guide is provided to assist the Pollution Prevention Team Leader and ensure that the activities are being conducted as scheduled.

Timing	**Task**	**Responsible Party**
Weekly	Inspect Lot/Land	PPT
Monthly	Parking Lot Sweeping Inspect Sediment Forebay	PPT/Contractor PPT/Contractor
Quarterly (March, June, September, December)	Inspect Catch Basins Clean Sediment Forebay	PPT/Contractor PPT/Contractor
Semi-Annually (March and September)	Inspect Oil/Particle Separators Inspect Wet Swale Overflow Inspect Wet Swale soils and slopes Inspect vegetative cover of Wet Swale	PPT/Contractor PPT/Contractor PPT/Contractor PPT/Contractor PPT/Contractor
Annually	Pollution Prevention Team training Comprehensive Annual Stormwater Evaluation and Inspection Report Clean Oil/Particle Separator Unit Clean Catch Basins Clean, Re-vegetate, and Mow Wet Swale as Necessary	PPT Leader PPT Leader PPT/Contractor PPT/Contractor PPT/Contractor
April	Spring clean-up	PPT/Contractor
Between November 14 and December 15	Fall clean-up	PPT/Contractor

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316 New Boston Street – Woburn, MA
Operations and Maintenance Plan
Comprehensive Annual Evaluation and Inspection Report

Once a year, the Pollution Prevention Team Leader must inspect and evaluate all aspects and provisions of the Operations and Maintenance Plan, complete the following report and keep a copy on file at the site.

Inspector/Reviewers:_____

Date of Inspection/Review: _____

Note any changes to the Plan in the space below and in the appropriate section of the Plan.

1. Review the Pollution Prevention Team list and update if necessary. Does the Pollution Prevention Team list need updating?

   (circle one) Yes No

2. Review the Operations and Maintenance Plan (O&M Plan). Are there sections of the O&M Plan that need updating?

   (circle one) Yes No

3. Review Monthly and Weekly Checklists, update these as necessary. Are there any updates needed to Spill and Leak History and/or the checklists?

   (circle one) Yes No

4. Review site drawings and update if necessary. Are there updates needed to any of the drawings?

   (circle one) Yes No

Requested Changes (attach revisions)

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316 New Boston Street – Woburn, MA
Operations and Maintenance Plan
Annual Training Sign-off Sheet

For each Operations and Maintenance Plan training session, the Team Leader should keep records of all attending Team Members using the signoff sheet below, as well as the training agenda, notes, etc.

Training Date: _____	**Topic**:
Trainer: _____	
Team Member Name	**Team Member Signature**

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316 New Boston Street – Woburn, MA
Operations & Maintenance Plan
Weekly Task Checklist

The site will be checked each week for trash and debris by a member of the Pollution Prevention Team. If any trash or debris is observed in the specified area, write "yes" in the 2nd column and note the problem and corrective measures taken in the appropriate space. Make a new copy of this checklist each week.

Date: _____ **Checklist completed by**: _____

GROUNDS AREA TO CHECK	TASK	DESCRIPTION OF PROBLEM	CORRECTIVE MEASURES TAKEN
Parking Lot & Roadways	Pickup and Dispose of Litter		
Landscaped Areas	Pickup and Dispose of Litter		
Compactor/Dumpster & Loading Dock Areas	Check for Leaking Liquid Pickup and Dispose of Litter		
Perimeter of Property	Pickup and Dispose of Litter		

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316 New Boston Street – Woburn, MA
Operations & Maintenance Plan
Monthly Task Checklist

The following will be checked each month for sources of pollutants by a member of the Pollution Prevention Team. If the condition in the "check for" column is observed, note the problem and corrective measures taken in the appropriate space. Make a new copy of the checklist each month.

Date: _____ **Checklist completed by**: _____

BMP	TASK	DESCRIPTION OF PROBLEM (IF PRESENT)	CORRECTIVE MEASURES TAKEN
Sweeping	Sweep Parking Lot and Paved Areas Spillage and Trash		
Sediment Forebay	Inspect for trash, excessive sediment build-up, erosion and scouring		

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316 New Boston Street – Woburn, MA
Operations & Maintenance Plan
Quarterly Task Checklist (March, June, September, December)

The following will be checked each month for sources of pollutants by a member of the Pollution Prevention Team. If the condition in the "check for" column is observed, note the problem and corrective measures taken in the appropriate space. Make a new copy of the checklist each month.

Date: _____ **Checklist completed by**: _____

BMP	TASK	DESCRIPTION OF PROBLEM (IF PRESENT)	CORRECTIVE MEASURES TAKEN
Catch Basins	Inspect for Sediment, Trash, and Oil.		
Sediment Forebay	Remove trash, excessive sediment build-up, repair erosion and scouring		

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316 New Boston Street – Woburn, MA
Operations & Maintenance Plan
Semi-Annual Task Checklist (March, September)

The site will be checked semi-annually four sources of pollutants by a member of the Pollution Prevention Team. If the condition in the "check for" column is observed, note the problem and corrective measures taken in the appropriate space. Make a new copy of the checklist each month.

Date: _____ **Checklist completed by**: _____

BMP	TASK	DESCRIPTION OF PROBLEM (IF PRESENT)	CORRECTIVE MEASURES TAKEN
Oil/Particle Separators	Inspect for Sediment, Trash, and Oil		
Wet Water Quality Swale	Inspect for slope integrity, soil moisture, vegetative health, soil stability, soil compaction, soil erosion, ponding and sedimentation		

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316 New Boston Street – Woburn, MA
Operations & Maintenance Plan
Annual Task Checklist

The following will be check each year for sources of pollutant by a member of the Pollution Prevention Team. If a problem is observed, note the problem and corrective measures take in the appropriate space. Make a new copy of the checklist each year.

Date: _____ **Checklist completed by**: _____

BMP	TASK	DESCRIPTION OF PROBLEM (IF PRESENT)	CORRECTIVE MEASURES TAKEN
Pollution Prevention Team Training	Pollution Prevention Team Training		
Oil/Particle Separators	Vacuum clean and Power wash		
Catch Basins	Remove sediment and debris from sump and power wash		
Wet Water Quality Swale	Clean Wet Swale and revegetate and repair erosion as necessary. Mow grass to no shorter than 4 inches.		
Comprehensive Annual Stormwater Evaluation and Inspection Report	Compile the comprehensive annual stormwater evaluation and inspection report and file for future reference.		

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316 New Boston Street – Woburn, MA

Long Term Pollution Prevention Plan

Spill and Leak History

(____ to _____)

Date	Spill	Leak	Location	Description				Response Procedures	Measures to Prevent Reoccurrence	Reporting Pollution Prevention Team Member
(MM/DD/YY)	*(check one)*		*(as indicated on Site Map)*	*Type of Material*	*Quantity*	*Source, if known*	*Reason*			

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Appendix B

C-2A Definitive Grading and Drainage Plan

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