Section 13. Stormwater Management Plan

SEBAGO TECHNICS

CIVIL ENGINEERING ▪ SURVEYING ▪ LANDSCAPE ARCHITECTURE

STORMWATER MANAGEMENT PLAN

For

Valet Parking Lot
Portland, Maine

Prepared for

Toye Realty Holdings III, LLC
P.O. Box 6285
Cape Elizabeth, ME 04107

April 2017

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Executive Summary

Toye Realty Holdings III, LLC has submitted plans to develop within a 1.97 acre property of undeveloped land off Jetport Boulevard; the project will be utilized as an extension of the parking for an existing valet service at the Portland Jetport. The property is shown as Lot A006 on City of Portland Tax Map 210A.

The development will create 1.06 acres of new non-vegetated surface and 1.84 acres of new developed area as defined by the Maine Department of Environmental Protection (MDEP).

The site is tributary to the Fore River and Casco Bay via culverts and drainage ways of the Portland Jetport. As the proposed development is classified by the City of Portland as a Level III development as well as a Site Law of Development Act (SLODA) project, the site is required to comply with Maine DEP Chapter 500 Standards, per Chapter 5 of City of Portland Technical Manual.

The project has been designed to provide treatment for 95.8% of the new non-vegetated area and 93.3% of the new developed area, which exceeds the required treatment level of Table 1 contained in Maine DEP Chapter 500, Section 4.C.(2)(a)(iii) amended date August 12, 2015. Treatment is achieved utilizing a grassed underdrained soil filter. Best Management Practices (BMPs) have been designed and sized in accordance with criteria published in Chapter 500 BMP's Technical Design Manual.

88125

STORMWATER MANAGEMENT PLAN

Valet Parking Lot
Jetport Boulevard
Portland, Maine

I. Introduction

This Stormwater Management Plan has been prepared to address the potential impacts associated with this project due to the proposed modification in stormwater runoff characteristics. The stormwater management controls that are outlined in this plan have been designed to best suit the proposed development and to comply with applicable regulatory requirements.

II. Existing Conditions

The project site is currently undeveloped land with woods land cover comprising of 2.0 acres in Portland.

Land Cover: The site is undeveloped land consisting of wooded land cover. The development site abuts Jetport Boulevard to the north, Embassy Suites and Westbrook Street to the east, gravel parking area to the south, and undeveloped land to the west.

Site Topography: The majority of the site drains in a southwesterly direction towards existing drainage structure DH-86 in the internal loop road for the Jetport. Topography varies from 5.0% - 10.0 % from the northwest corner towards the southeast with a turn to the southwest and slopes flattening out to approximately 2.0%.

Surface Water Features: There are no surface water features on the site. Runoff drains to the conveyance systems of the adjacent properties/rights-of-way and continues on to discharge to the Fore River and Casco Bay.

Soils: Soil characteristics were obtained from the Soil Conservation Service (SCS) Medium Intensity Soil Survey of Cumberland County. Soils identified on the site (or within close proximity) are identified below in Table 1. These soil boundaries are identified on the attached watershed maps.

Table 1 – Proximity Soil Types and Characteristics

Soil Type	Symbol	HSG	K Factor
Lamoine Silt Loam, 3-8% Slopes	BuB	C/D	0.37
Paxton Fine Sandy Loam, 3-8% Slopes	PbB	C	0.28
Scantic Silt Loam, 0-3% Slopes	Sn	D	0.28

The K factor is an erodibility index that relates each soil family based on a slight erosion potential of 0.20 to a high erosion potential of 0.69. An index number, greater than 0.32, indicates that a high level of erosion control measures must be taken in order to control erosion of this soil. The Hydrologic Soil Group (HSG) designation is based on a rating of the relative permeability of a soil, with Group "A" being extremely permeable such as coarse sand, to Group "D" having low permeability such as clay.

Historic Flooding: The Federal Emergency Management Agency (FEMA) lists the project site as Zone X, "Areas of 500 year flood based on the published Flood Insurance Rate Map (FEMA Community Panel Number 230051 0012C, dated December 8, 1998).

III. Proposed Development

The Applicant is proposing a milled parking lot, consisting of 134 parking spaces.

Alterations to Land Cover: Completion of the proposed project will result in the creation of 1.06 acres of impervious, non-vegetated area and 1.84 acres of developed area.

IV. Downstream Ponds and Waterbodies

The project site is tributary to Fore River and Casco Bay, which are not listed by the Maine Department of Environmental Protection as impaired or threatened.

V. Regulatory Requirements

A. City of Portland, Maine

The proposed development is classified as a Level III development due to the addition of a permanent parking lot of more than seventy-five (75) vehicles. Level III development must comply with Section 5 of the City of Portland's Technical Manual stating that this development "shall be required to submit a Stormwater Management Plan pursuant to the regulations of the MDEP Chapter 500 Stormwater Management Rules, including Basic, General and Flooding Standards. The MDEP Chapter 500 rules describe stormwater management requirements for new development projects.

The following sections describe how this project will address these stormwater management performance standards.

Basic Standards: These standards include various erosion and sedimentation controls, inspection and maintenance procedures, and general housekeeping requirements. These performance standards are addressed on the Erosion and Sedimentation Control Plan Sheet and in the Inspection, Maintenance, and Housekeeping Plan attached in Attachment 3. Please refer to these documents for more detailed information.

General Standards: This standard presents minimum treatment thresholds for new non-vegetated areas and new developed areas to be treated by stormwater Best Management Practices (BMPs). General Standard BMPs have been defined by the MDEP and are described thoroughly in their publication "Stormwater Management for Maine: Best Management Practices Manual". Volume III of this manual contains additional information and sizing requirements for the treatment measures proposed for the proposed development.

Flooding Standards: The MDEP requires that projects creating impervious areas greater than three (3) acres, or developed areas greater than twenty (20) acres address various flooding standards. The proposed project will not exceed the MDEP thresholds, but is required to meet the flooding standards for the City of Portland. The development will be designed to "detain, retain or result in the infiltration of stormwater from 24-hour storms of the 2-year, 10-year, and 25-year frequencies such that the peak flows of stormwater from the project site do not exceed the peak flows of stormwater prior to undertaking the project." A detailed stormwater model has been provided to demonstrate compliance with these standards.

VI. Stormwater Management BMPs

In order to meet the applicable regulations, the project will utilize a grassed underdrained soil filter located adjacent to proposed valet parking lot. The location is indicated on the attached plans.

A. Grassed Underdrained Soil Filter

A grassed underdrained soil filter must detail a runoff volume equal to 1" times the tributary impervious area and 0.4" times the tributary landscaped areas. The surface area of the system must be at least equal to 5% the impervious area and 2% of the landscaped area. Pre-treatment of the runoff must be provided by a sediment forebay, adequately sized to retain the anticipated winter sanding load. The runoff volume shall be discharged over a period of time not less than 24 hours and not greater than 48 hours.

The areas treated by this BMP are summarized in the stormwater treatment calculations attached in Attachment 1: *Stormwater Quality Calculations*.

VII. Peak Flow Analysis

This section has been prepared to discuss the proposed modifications to peak flow rates as a result of the development.

A. Modeling Technique

In order to evaluate drainage characteristics in pre and post-development conditions, a quantitative analysis was performed to determine peak rates of runoff for the 2, 10, and 25-year storm events. Runoff calculations were performed following the methodology outlined in the USDA Soil Conservation Service's "Urban Hydrology for Small Watersheds, Technical Release #55" and HydroCAD Stormwater Modeling System Software. A 24-hour, SCS Type III storm distribution for the 2, 10, and 25-year storm frequencies were used for analysis.

The 24-hour rainfall values utilized in the hydrologic model for Southeast Cumberland County are as follows:

Table 2 - Storm Frequency Precipitation (in./24hr)	
2-year	3.1
10-year	4.6
25-year	5.8

*Appendix H, MDEP Chapter 500, amended date Aug 12, 2015

B. Drainage Characteristics (Pre and Post-Development Watershed Delineation)

A majority of the runoff from the site discharges to the southwest corner of the site and into the stormwater system of the adjacent internal loop road of the Jetport, Study Point 1 (SP1). A second subcatchment includes a small area of the project site that drains easterly onto the adjacent hotel property. This area discharges to a detention pond to the north along Westbrook Street (SP2).

C. Pre-Development

SP1: The drainage system of the internal loop road of the Jetport. This analysis point includes stormwater from Watersheds 1S and 3S, as they enter the same drainage system.

Subcatchment Area 1S consists of 1.54 acres of the project site. Runoff starts in sheet flow in the northwest corner of the site flowing to the southeast. The runoff transitions to shallow concentrated flow and turns towards the southwest and eventually discharges from the site in the southwest corner via existing closed drainage system of the internal loop road.

Subcatchment Area 3S consists of 0.31 acres of the project site. Runoff starts in a sheet flow in the southeast portion of the site, flowing westerly. The runoff transitions to shallow concentrated flow as it continues westerly, and ultimately enters the drainage system of the internal loop road.

It should be noted that a portion of Subcatchment Area 3S also includes area previously conveyed to the City of Portland per deed, book 16971, page 190.

SP2: The detention pond along Westbrook Street.

Subcatchment Area 2S consists of 0.15 acres of the project site that discharges easterly onto the adjacent hotel property. Runoff starts in sheet flow in the southeast corner of the site flowing easterly. The runoff transitions to shallow concentrated flow and exits the site, ultimately discharging to the detention pond along Westbrook Street.

For the purpose of this analysis, the site is considered to be woodland with exception to a small paved entrance to the site; the conditions that existed prior to the clearing activities from two years ago. The three subcatchments and their respective flow paths are depicted on a pre-development watershed plan.

D. Post-Development

SP1: The drainage system of the internal loop road of the Jetport.

This analysis point includes stormwater from Watersheds 1S and 3S, as they enter the same drainage system. Watershed 1S is treated and outlets to existing catch basin DH86, and Watershed 3S enters at the system at the next downstream catch basin. It should be noted that a portion of Subcatchment Area 3S also includes area previously conveyed to the City of Portland per deed, book 16971, page 190.

The post condition will compare to the pre-development runoff rates for these watersheds. The site primarily consists of Watershed 1S which consists of proposed parking area designed to sheet flow to a stormwater treatment area where it will enter a pre-treatment swale. Runoff will then discharge to the

grassed underdrained soil filter. The post development model depicts the site as a mixture of pavement and grass.

SP2: The detention pond along Westbrook Street.

Subcatchment Area 2S is a small portion of the site that drains easterly onto the adjacent hotel property. Runoff is sheet flow in the southeast corner of the site flowing easterly, ultimately discharging to the detention pond along Westbrook Street. The site was regraded to minimize the amount of runoff discharging to SP2.

E. Comparison

The watershed areas and times of concentration of the post-development watersheds vary from the existing conditions based on the proposed site development and grading. Table 3 summarizes the results of the hydrologic analysis of the project under pre-development and post-development conditions.

Table 3 – Stormwater Runoff Summary Table
Pre-Development vs. Post-Development

Study Point	Total Watershed Area (Ac)		Percent Impervious		Peak Rates of Runoff (cfs)					
					2-year		10-year		25-year	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
SP1	1.54	1.91	1%	53%	1.44	0.65	3.06	1.63	4.47	2.90
SP2	0.15	0.09	0%	5%	0.17	0.16	0.37	0.32	0.54	0.45

As depicted in the above table, post-development peak runoff rates at the study point will be below pre-development levels for the 2-year, 10-year and 25-year storm events.

VIII. Water Quality Analysis

To achieve the required water quality treatment, a grassed underdrained soil filter was utilized to provide treatment for the proposed project site. This treatment measure has been designed and sized in accordance with the current Maine DEP Stormwater Best Management Practices handbook.

The development has been designed to provide water quality treatment through implementation of approved BMP's which provide for an impervious area treatment percentage of 95.8% and a developed area treatment percentage of 93.3%, which

exceeds the required treatment levels of 95% and 80%, respectively, in accordance with MaineDEP Chapter 500, Section 4.C.(2)(a)(i) amended date August 12, 2015.

Water Quality Volumes, BMP sizing volume calculations, and other supporting calculations are attached to this report.

IX. Urban Impaired Stream Standard

The project is not tributary to an Urban Impaired Stream.

X. Conclusions

The proposed development has been designed to meet the requirements of the City of Portland's Stormwater Technical Standards. The stormwater management system will treat 95.8 % of the created impervious surface and 93.3% of the total developed area. The peak flow rates have been controlled to the greatest extent practical to be below pre-development levels. Additionally, erosion and sedimentation controls have been outlined to prevent unreasonable impacts on the site and to the surrounding environment.

Prepared by,

SEBAGO TECHNICS, INC.

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April 26, 2017

Date: 4/26/17

STATE OF MAINE
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No. 8126
LICENSED PROFESSIONAL ENGINEER

Robert A. McSorley
Senior Project Manager
2017.05.02 19:27:38 -04'00'

Attachment A

Stormwater Quality Calculations

Table 1: MDEP GENERAL STANDARD CALCULATIONS

Job # **88125** *

AREA ID	WATERSHED SIZE (S.F.)	EXISTING ONSITE IMPERVIOUS AREA (S.F.)	NEW ONSITE IMPERVIOUS AREA (S.F.)	EXISTING ONSITE LANDSCAPED AREA (S.F.)	NEW ONSITE LANDSCAPED AREA (S.F.)	NET NEW DEVELOPED AREA (S.F.)	NET EXISTING DEVELOPED AREAS (S.F.)	TREATMENT PROVIDED?	IMPERVIOUS AREA TREATED (S.F.)	LANDSCAPED AREA TREATED* (S.F.)	DEVELOPED AREA TREATED (S.F.)	TREATMENT BMP
1	74,272	0	44,188	4,862	25,222	69,410	4,862	YES	44,188	30,084	74,272	
2	4,045	0	216	2,219	1,610	1,826	2,219	NO	0	0	0	
3	8,806	470	1,703	0	6,633	8,336	0	NO	0	0	0	
4						0		NO	0	0	0	
5						0		NO	0	0	0	
6						0		NO	0	0	0	
7						0		NO	0	0	0	
8						0	0	NO	0	0	0	
9						0	0	NO	0	0	0	
10						0	0	NO	0	0	0	
11						0	0	NO	0	0	0	
12						0	0	NO	0	0	0	
13						0	0	NO	0	0	0	
14						0	0	NO	0	0	0	
15						0	0	NO	0	0	0	
16						0	0	NO	0	0	0	
TOTAL (S.F.)	**87,123**	**470**	**46,107**	**7,081**	**33,465**	**79,572**	**7,081**		**44,188**	**30,084**	**74,272**	

TOTAL NEW IMPERVIOUS AREA (S.F.)	**46,107**	**TOTAL DEVELOPED AREA (S.F.)**	**79,572**
TOTAL IMPERVIOUS AREA RECEIVING TREATMENT (S.F.)	**44,188**	**TOTAL DEV. AREA RECEIVING TREATMENT (S.F.)**	**74,272**
% OF IMPERVIOUS AREA RECEIVING TREATMENT	**95.84%**	**% OF DEV. AREA RECEIVING TREATMENT**	**93.34%**

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JOB	Valet Parking Lot		
SHEET NO.	1	OF	1
CALCULATED BY	SAH	DATE	4/19/2017
FILE NAME	88125	PRNT DATE	4/26/2017

UNDERDRAINED SOIL FILTER

Task: Calculate water quality volume per MDEP chapter 500 regulations

1. Maine DEP Chapter 500, Section 4.C.(3)(b)

References

a. "must detain a runoff volume equal to 1.0 inch times the subcatchment's impervious area plus 0.4 inch times the subcatchment's landscaped area"

2. Maine DEP Best Management Practices Stormwater Manual, Section 7.1

a. "surface should represent 5% of impervious area and 2% of landscaped area"

Tributary to Underdrained Filter

Landscaped Area	30,084.00	SF	
Impervious Area	44,188.00	SF	

Minimum Surface Area

Required (2% X Landscaped + 5%" X Impervious)

Total Landscaped Area	30,084.00	SF	Area	601.7	SF	
Total Impervious Area	44,188.00	SF	Area	2,209.4	SF	
Required Minimum Surface Area				2,811.1	SF	
Provided Surface Area				3,000.0	SF	

Treatment Volume

Required (0.4" X Landscaped + 1.0" X Impervious)

Landscaped Area	30,084.00	SF	Volume	1,002.8				
Impervious Area	44,188.00	SF	Volume	3,682.3				
Treatment Volume Required				4,685.1	CF	0.108	AF	
Provided Treatment Volume				5,520.0	CF	0.127	AF	

Sediment Pre-Treatment

Per Reference 2, Chapter 7.1 "Pretreatment devices shall be provided to minimize discharge of sediment to the soil filter"

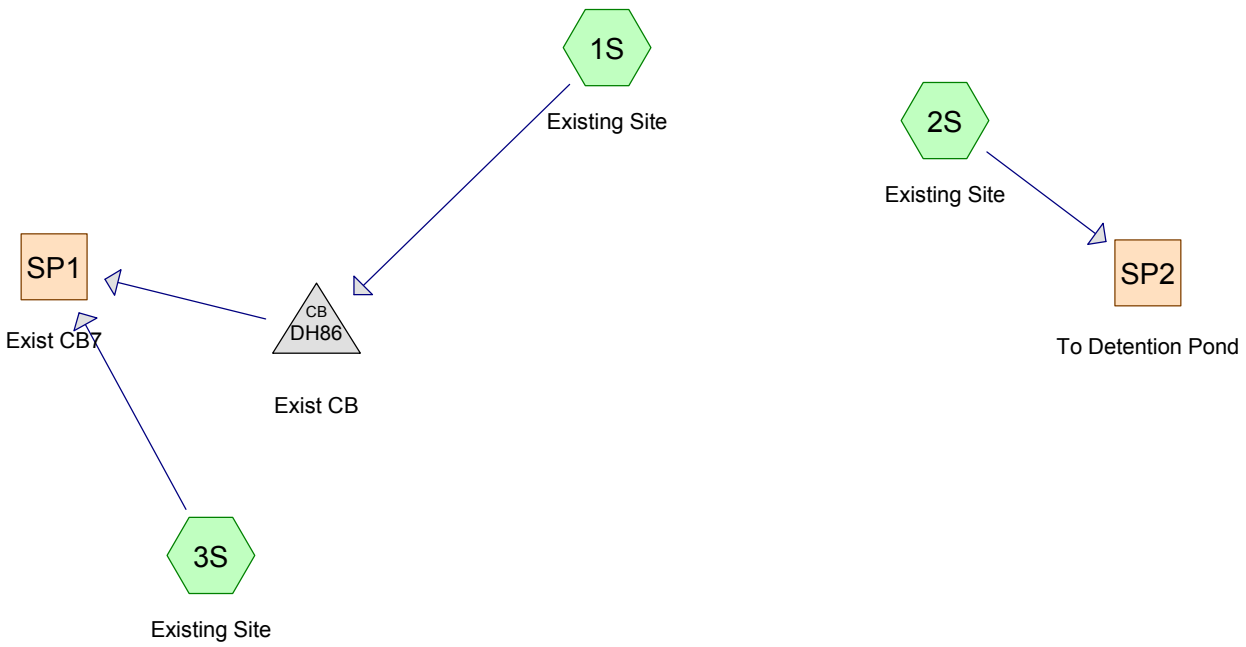
Annual Sediment Load: 55 cubic feet per acre per year of sanded area

Area to be sanded:	44,188.00	SF
Sediment Volume	56	CF

Provided	581	CF	0.75	Inch Deep Forebay	with area of	775	sf

Attachment B

HydroCAD Output- Pre-Development/Post Development TR-2- Model



Subcat Reach Pond Link

Routing Diagram for 88125-Pre April 2017
Prepared by {enter your company name here}, Printed 4/26/2017

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.011	98	Paved parking, HSG C (1S, 3S)
1.989	76	Woods/grass comb., Fair, HSG C (1S, 2S, 3S)
2.000	**76**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
2.000	HSG C	1S, 2S, 3S
0.000	HSG D	
0.000	Other	
2.000		**TOTAL AREA**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: Existing Site Runoff Area=66,921 sf 0.67% Impervious Runoff Depth>0.98"
Flow Length=590' Tc=22.4 min CN=76 Runoff=1.19 cfs 0.126 af

Subcatchment 2S: Existing Site Runoff Area=6,728 sf 0.00% Impervious Runoff Depth>0.99"
Flow Length=55' Tc=7.7 min CN=76 Runoff=0.17 cfs 0.013 af

Subcatchment 3S: Existing Site Runoff Area=13,474 sf 0.16% Impervious Runoff Depth>0.99"
Flow Length=175' Tc=15.5 min CN=76 Runoff=0.28 cfs 0.025 af

Reach SP1: Exist CB7 Inflow=1.44 cfs 0.151 af
Outflow=1.44 cfs 0.151 af

Reach SP2: To Detention Pond Inflow=0.17 cfs 0.013 af
Outflow=0.17 cfs 0.013 af

Pond DH86: Exist CB Peak Elev=64.68' Inflow=1.19 cfs 0.126 af
12.0" Round Culvert n=0.011 L=62.0' S=0.0150 '/' Outflow=1.19 cfs 0.126 af

Total Runoff Area = 2.000 ac Runoff Volume = 0.164 af Average Runoff Depth = 0.98"
99.46% Pervious = 1.989 ac 0.54% Impervious = 0.011 ac

Summary for Subcatchment 1S: Existing Site

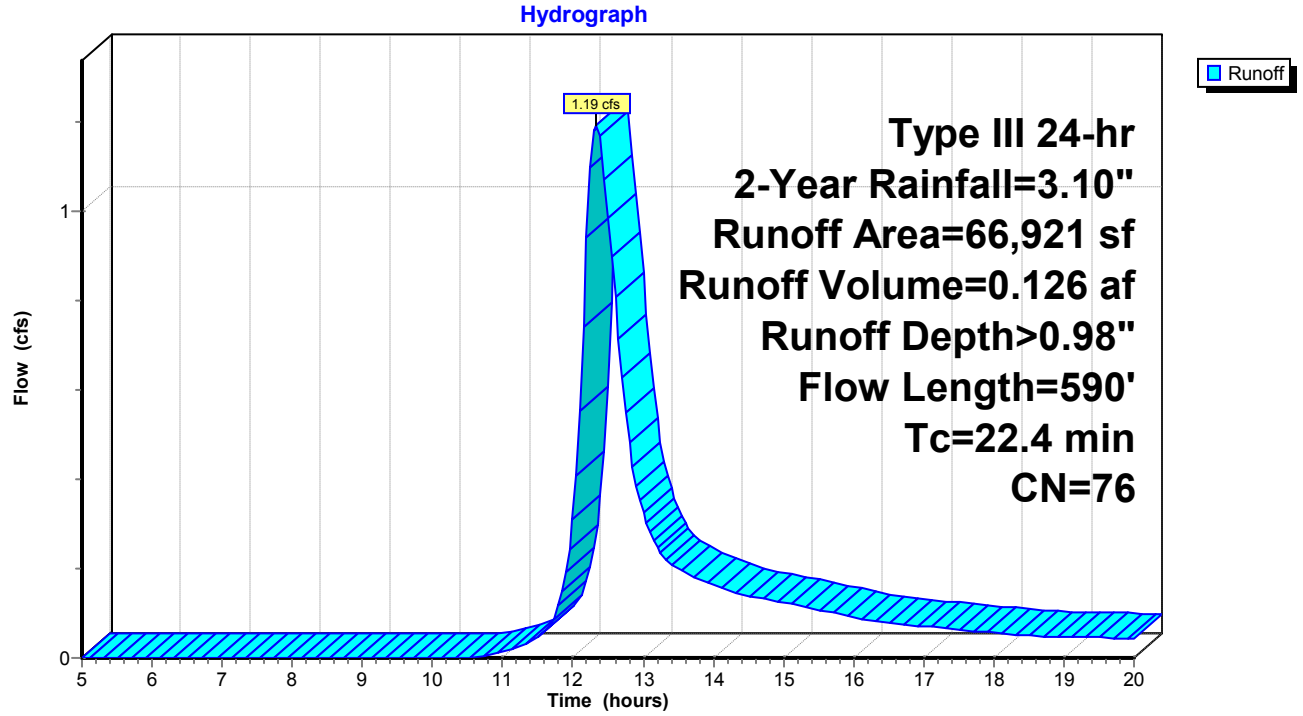
Runoff = 1.19 cfs @ 12.33 hrs, Volume= 0.126 af, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
66,473	76	Woods/grass comb., Fair, HSG C
448	98	Paved parking, HSG C
66,921	76	Weighted Average
66,473		99.33% Pervious Area
448		0.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0300	0.08		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
3.3	185	0.0350	0.94		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
8.4	355	0.0200	0.71		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
22.4	590	Total			

Subcatchment 1S: Existing Site



Summary for Subcatchment 2S: Existing Site

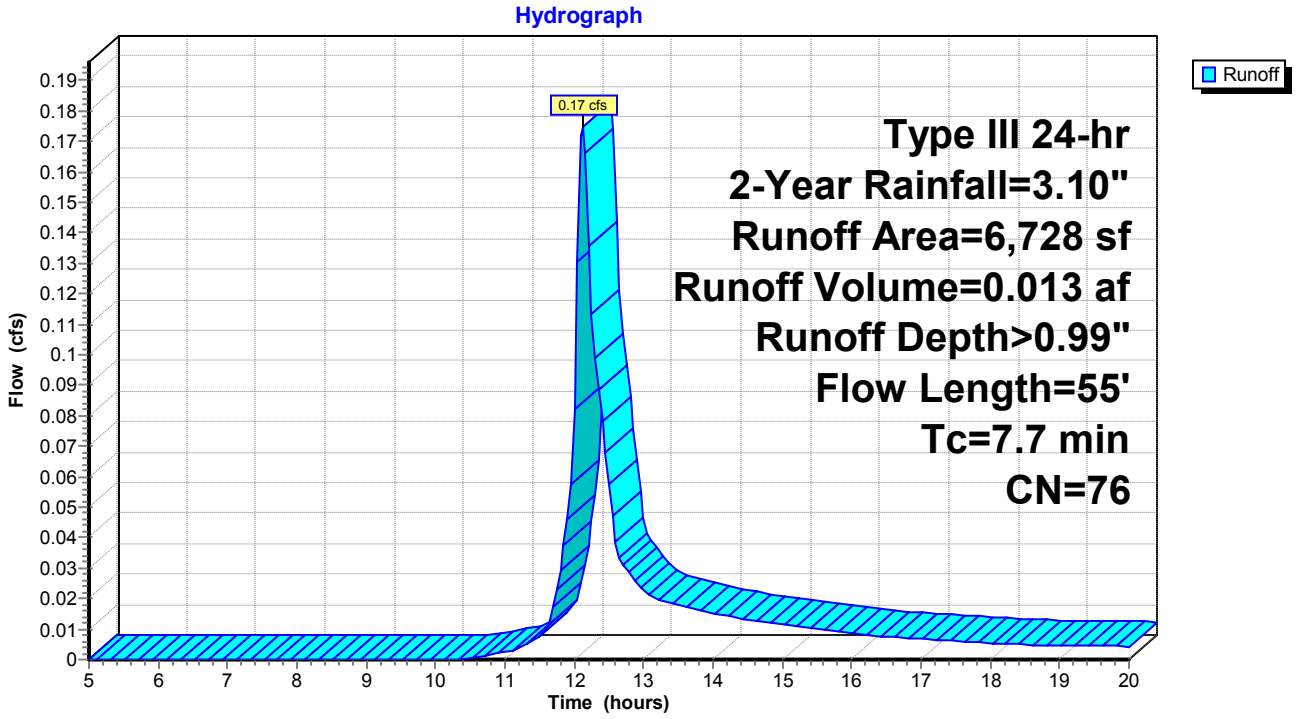
Runoff = 0.17 cfs @ 12.12 hrs, Volume= 0.013 af, Depth> 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
6,728	76	Woods/grass comb., Fair, HSG C
6,728		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	50	0.0700	0.11		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.1	5	0.0350	0.94		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
7.7	55	Total			

Subcatchment 2S: Existing Site



Summary for Subcatchment 3S: Existing Site

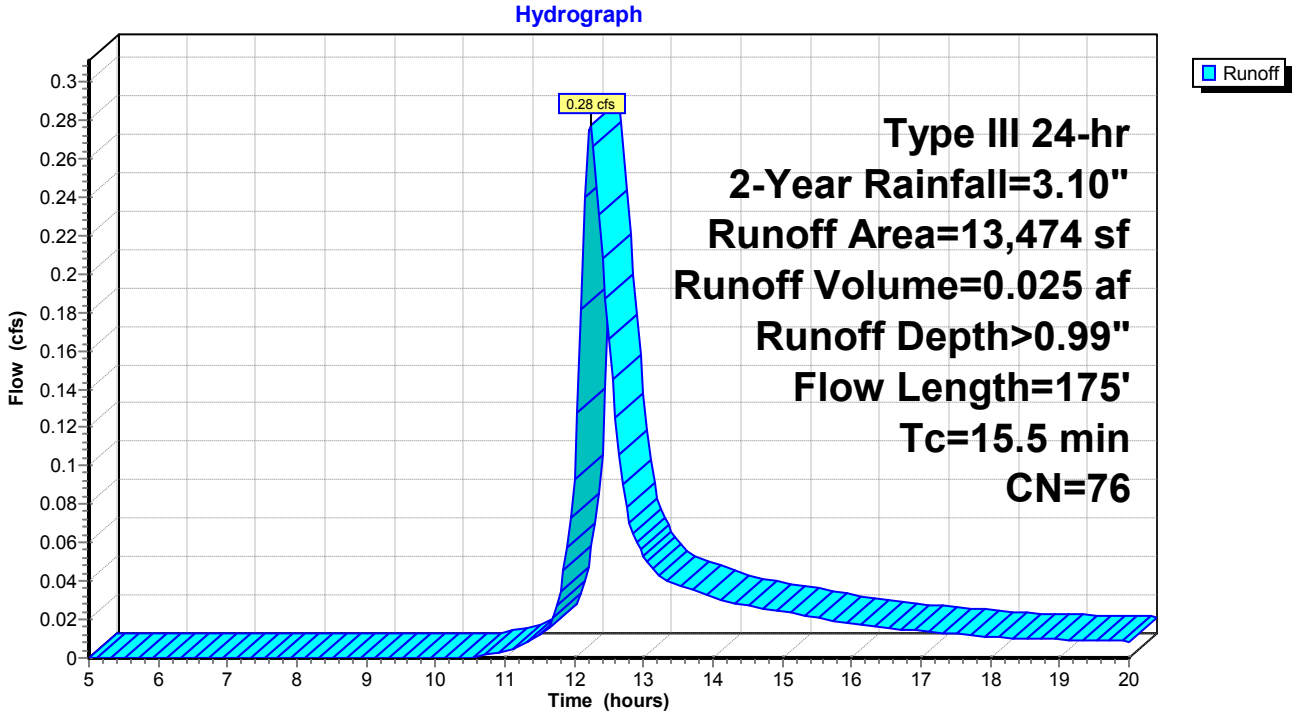
Runoff = 0.28 cfs @ 12.23 hrs, Volume= 0.025 af, Depth> 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
13,452	76	Woods/grass comb., Fair, HSG C
22	98	Paved parking, HSG C
13,474	76	Weighted Average
13,452		99.84% Pervious Area
22		0.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
2.9	115	0.0180	0.67		**Shallow Concentrated Flow, B To C** Woodland Kv= 5.0 fps
0.1	10	0.0180	2.72		**Shallow Concentrated Flow, C To D** Paved Kv= 20.3 fps
15.5	175	Total			

Subcatchment 3S: Existing Site

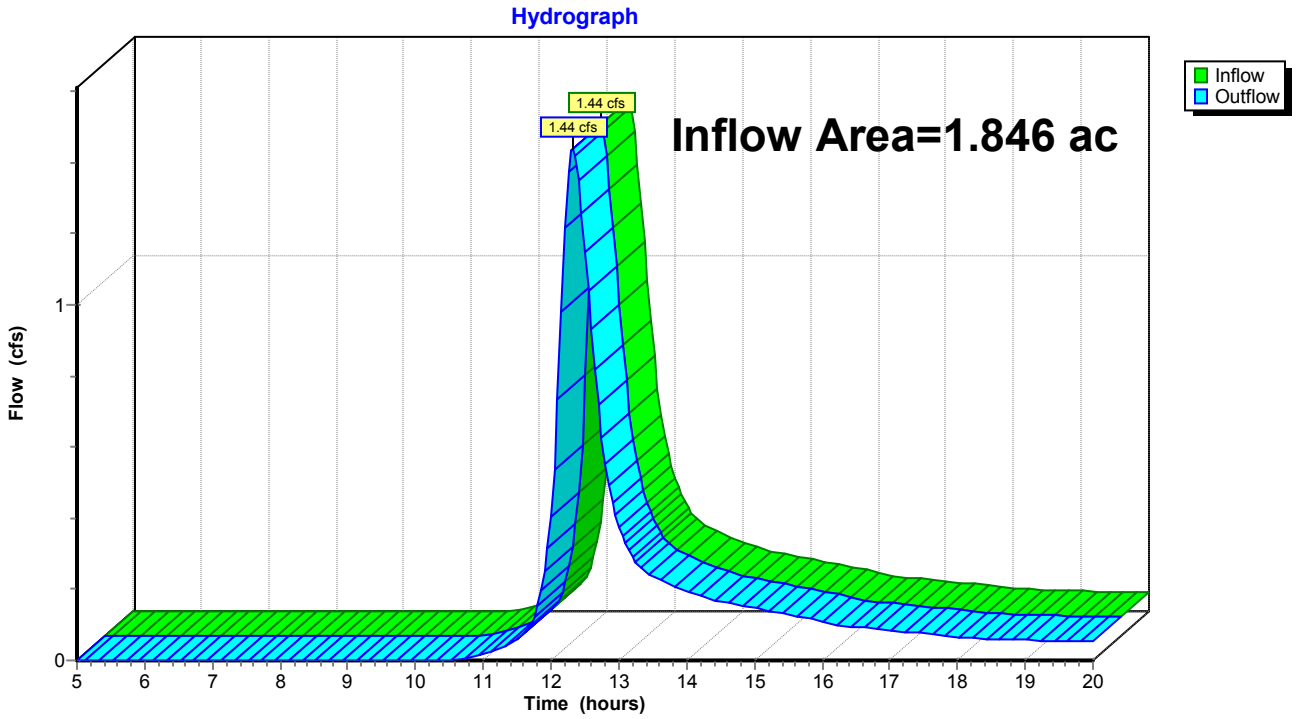


Summary for Reach SP1: Exist CB7

Inflow Area = 1.846 ac, 0.58% Impervious, Inflow Depth > 0.98" for 2-Year event
Inflow = 1.44 cfs @ 12.32 hrs, Volume= 0.151 af
Outflow = 1.44 cfs @ 12.32 hrs, Volume= 0.151 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach SP1: Exist CB7

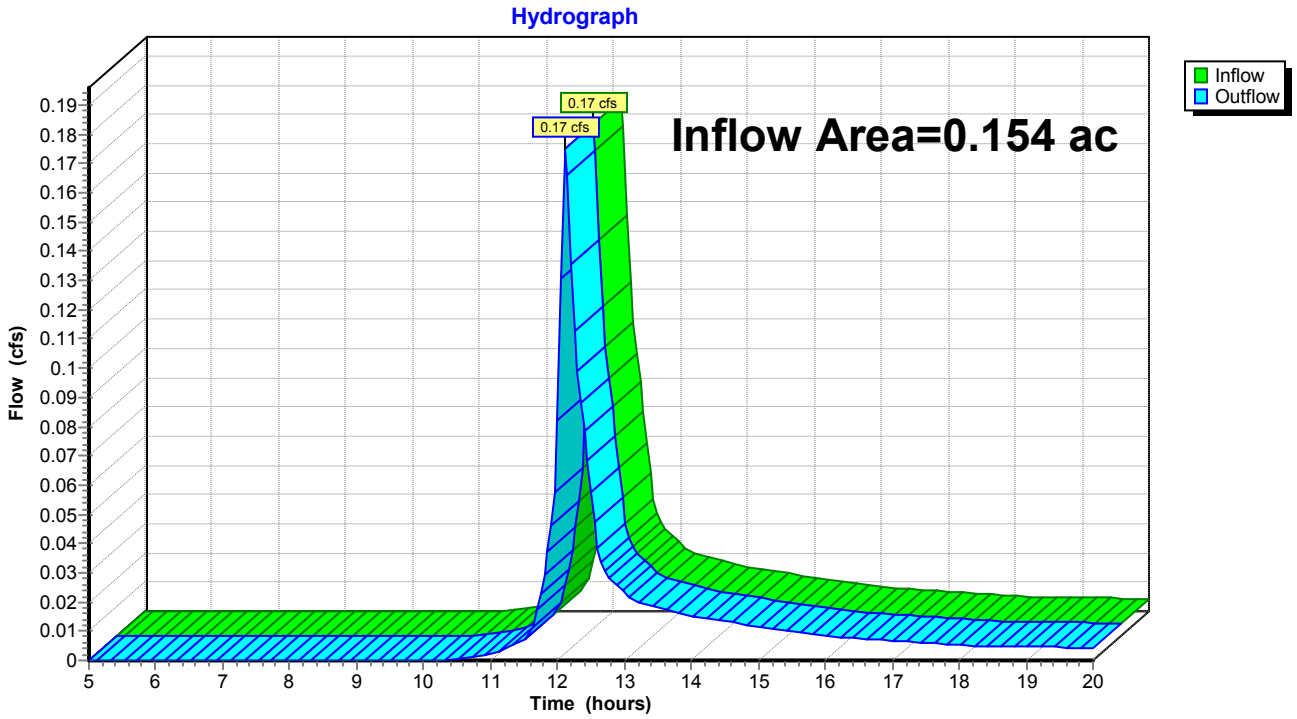


Summary for Reach SP2: To Detention Pond

Inflow Area = 0.154 ac, 0.00% Impervious, Inflow Depth > 0.99" for 2-Year event
Inflow = 0.17 cfs @ 12.12 hrs, Volume= 0.013 af
Outflow = 0.17 cfs @ 12.12 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach SP2: To Detention Pond



Summary for Pond DH86: Exist CB

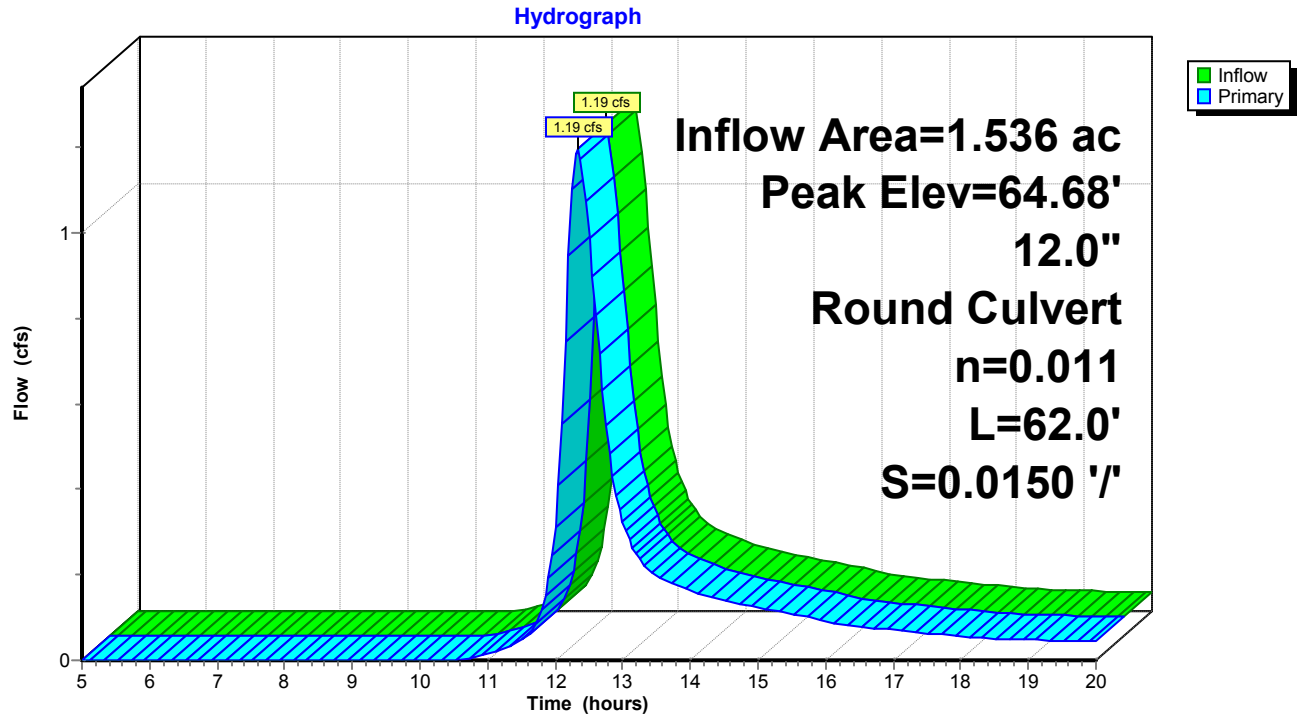
Inflow Area = 1.536 ac, 0.67% Impervious, Inflow Depth > 0.98" for 2-Year event
Inflow = 1.19 cfs @ 12.33 hrs, Volume= 0.126 af
Outflow = 1.19 cfs @ 12.33 hrs, Volume= 0.126 af, Atten= 0%, Lag= 0.0 min
Primary = 1.19 cfs @ 12.33 hrs, Volume= 0.126 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 64.68' @ 12.33 hrs
Flood Elev= 71.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	64.11'	**12.0" Round Culvert** L= 62.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 64.11' / 63.18' S= 0.0150 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.19 cfs @ 12.33 hrs HW=64.68' (Free Discharge)
1=Culvert (Inlet Controls 1.19 cfs @ 2.57 fps)

Pond DH86: Exist CB



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: Existing Site Runoff Area=66,921 sf 0.67% Impervious Runoff Depth>2.04"
Flow Length=590' Tc=22.4 min CN=76 Runoff=2.54 cfs 0.261 af

Subcatchment 2S: Existing Site Runoff Area=6,728 sf 0.00% Impervious Runoff Depth>2.05"
Flow Length=55' Tc=7.7 min CN=76 Runoff=0.37 cfs 0.026 af

Subcatchment 3S: Existing Site Runoff Area=13,474 sf 0.16% Impervious Runoff Depth>2.04"
Flow Length=175' Tc=15.5 min CN=76 Runoff=0.59 cfs 0.053 af

Reach SP1: Exist CB7 Inflow=3.06 cfs 0.313 af
Outflow=3.06 cfs 0.313 af

Reach SP2: To Detention Pond Inflow=0.37 cfs 0.026 af
Outflow=0.37 cfs 0.026 af

Pond DH86: Exist CB Peak Elev=65.06' Inflow=2.54 cfs 0.261 af
12.0" Round Culvert n=0.011 L=62.0' S=0.0150 '/' Outflow=2.54 cfs 0.261 af

Total Runoff Area = 2.000 ac Runoff Volume = 0.340 af Average Runoff Depth = 2.04"
99.46% Pervious = 1.989 ac 0.54% Impervious = 0.011 ac

Summary for Subcatchment 1S: Existing Site

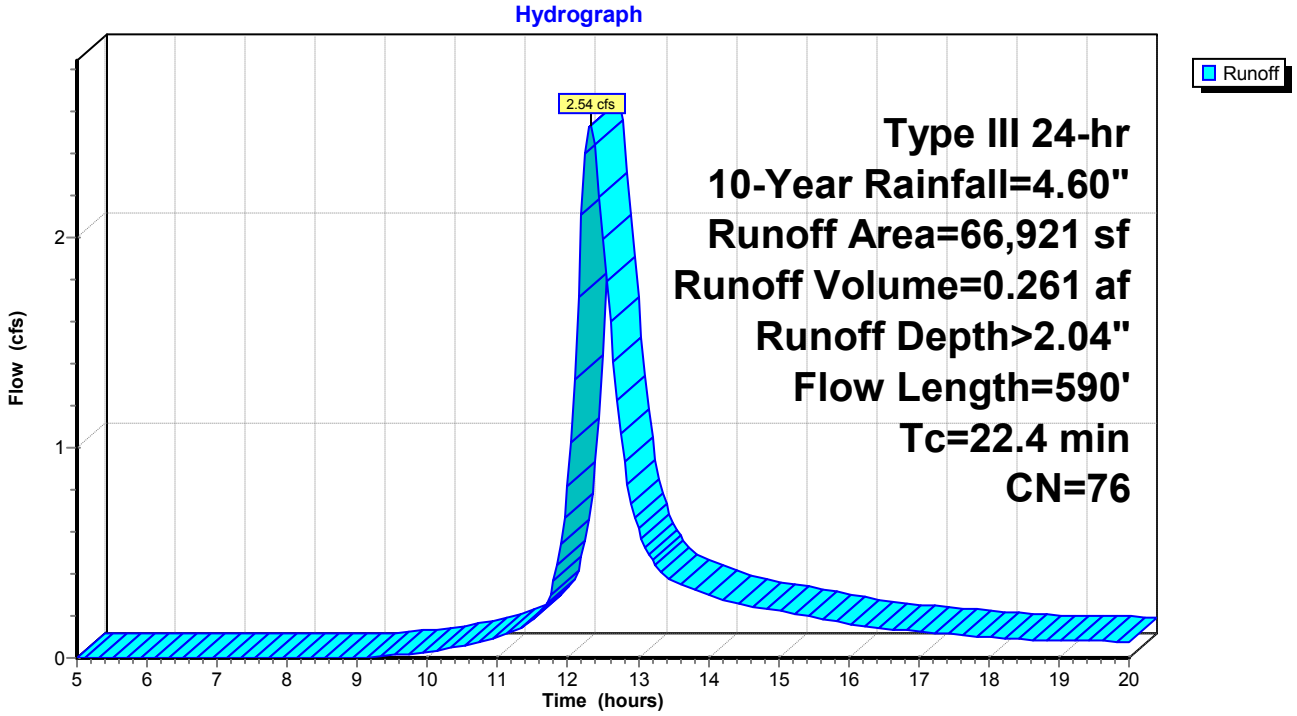
Runoff = 2.54 cfs @ 12.32 hrs, Volume= 0.261 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
66,473	76	Woods/grass comb., Fair, HSG C
448	98	Paved parking, HSG C
66,921	76	Weighted Average
66,473		99.33% Pervious Area
448		0.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0300	0.08		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
3.3	185	0.0350	0.94		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
8.4	355	0.0200	0.71		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
22.4	590	Total			

Subcatchment 1S: Existing Site



Summary for Subcatchment 2S: Existing Site

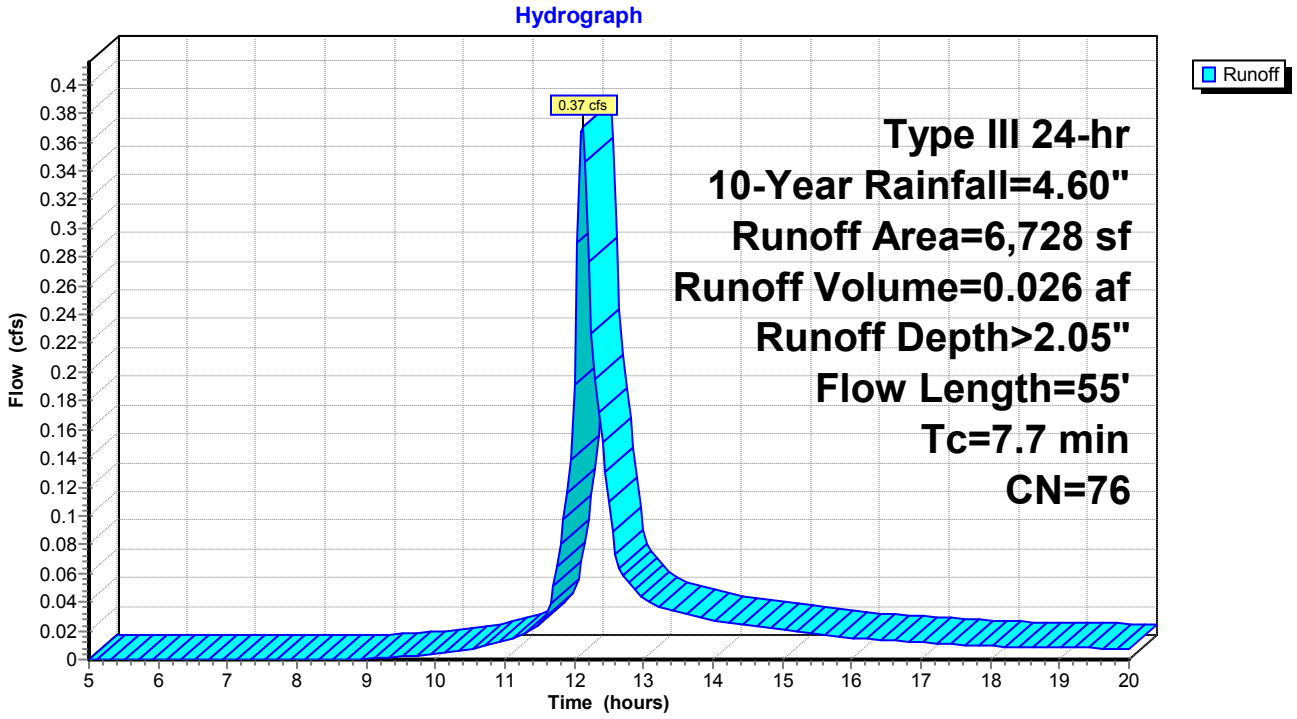
Runoff = 0.37 cfs @ 12.11 hrs, Volume= 0.026 af, Depth> 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
6,728	76	Woods/grass comb., Fair, HSG C
6,728		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	50	0.0700	0.11		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.1	5	0.0350	0.94		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
7.7	55	Total			

Subcatchment 2S: Existing Site



Summary for Subcatchment 3S: Existing Site

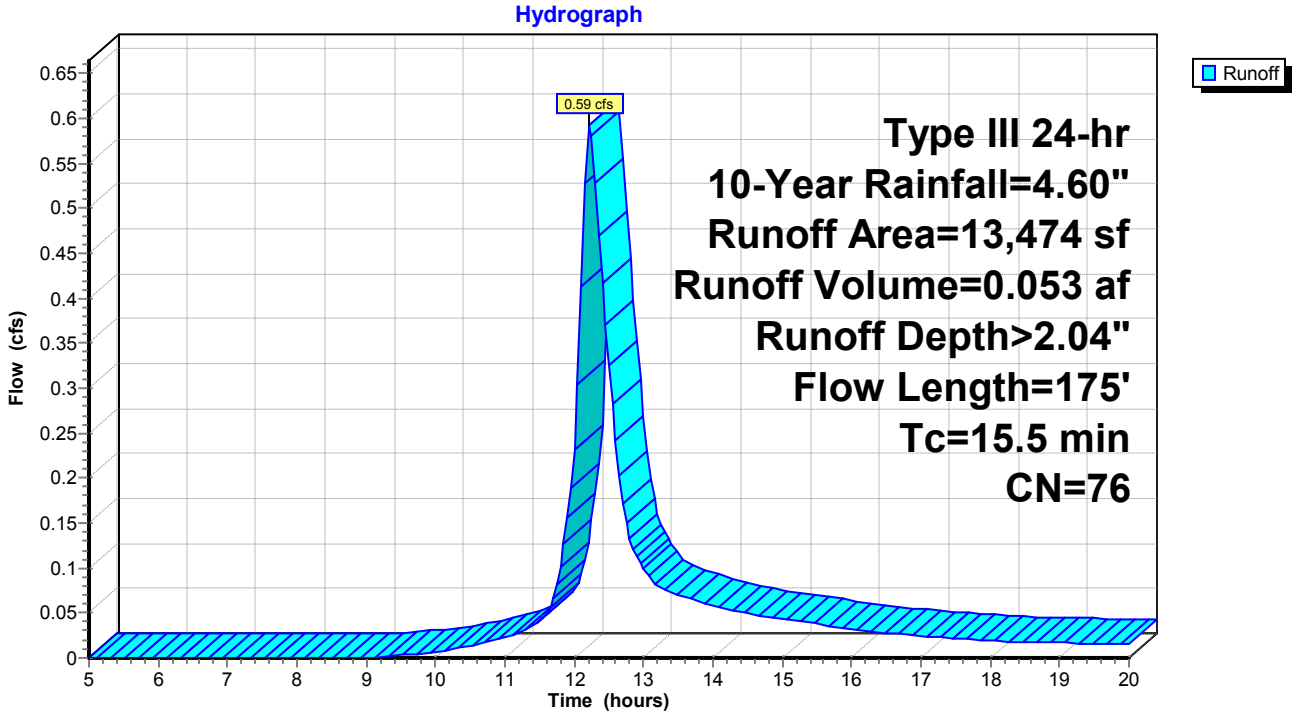
Runoff = 0.59 cfs @ 12.22 hrs, Volume= 0.053 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
13,452	76	Woods/grass comb., Fair, HSG C
22	98	Paved parking, HSG C
13,474	76	Weighted Average
13,452		99.84% Pervious Area
22		0.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
2.9	115	0.0180	0.67		**Shallow Concentrated Flow, B To C** Woodland Kv= 5.0 fps
0.1	10	0.0180	2.72		**Shallow Concentrated Flow, C To D** Paved Kv= 20.3 fps
15.5	175	Total			

Subcatchment 3S: Existing Site

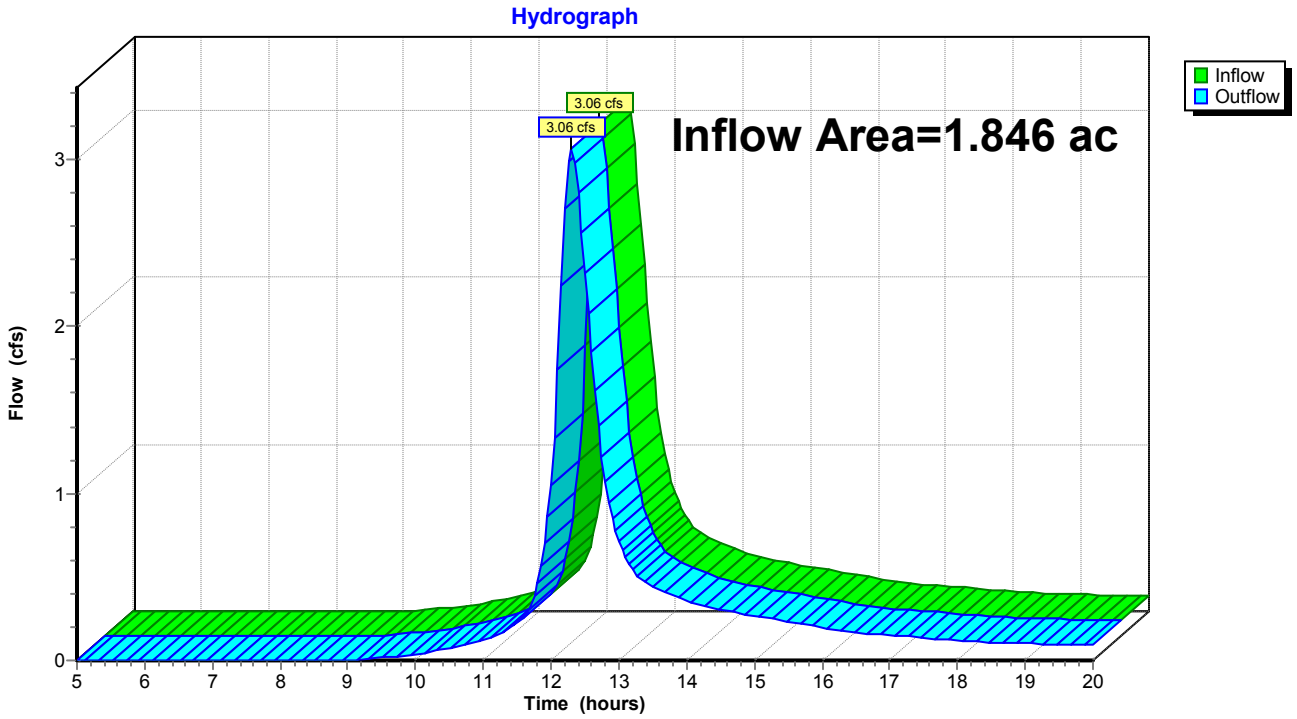


Summary for Reach SP1: Exist CB7

Inflow Area = 1.846 ac, 0.58% Impervious, Inflow Depth > 2.04" for 10-Year event
Inflow = 3.06 cfs @ 12.30 hrs, Volume= 0.313 af
Outflow = 3.06 cfs @ 12.30 hrs, Volume= 0.313 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach SP1: Exist CB7

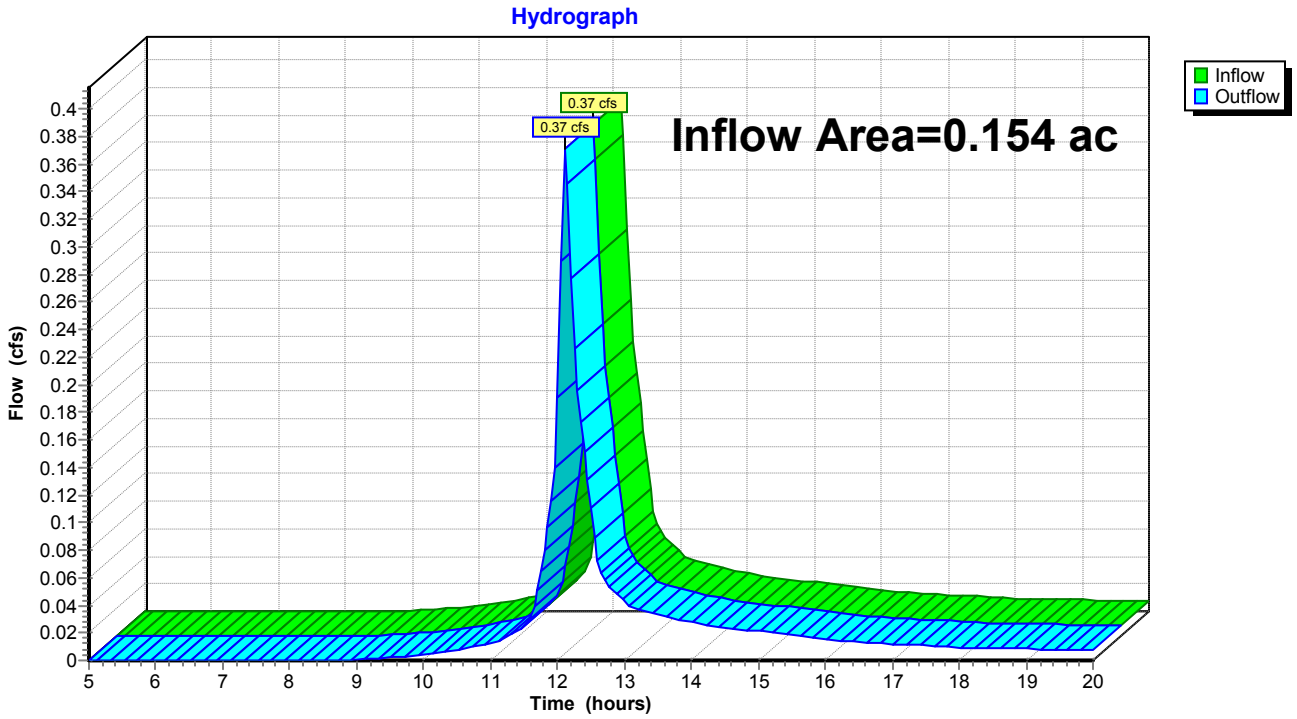


Summary for Reach SP2: To Detention Pond

Inflow Area = 0.154 ac, 0.00% Impervious, Inflow Depth > 2.05" for 10-Year event
Inflow = 0.37 cfs @ 12.11 hrs, Volume= 0.026 af
Outflow = 0.37 cfs @ 12.11 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach SP2: To Detention Pond



Summary for Pond DH86: Exist CB

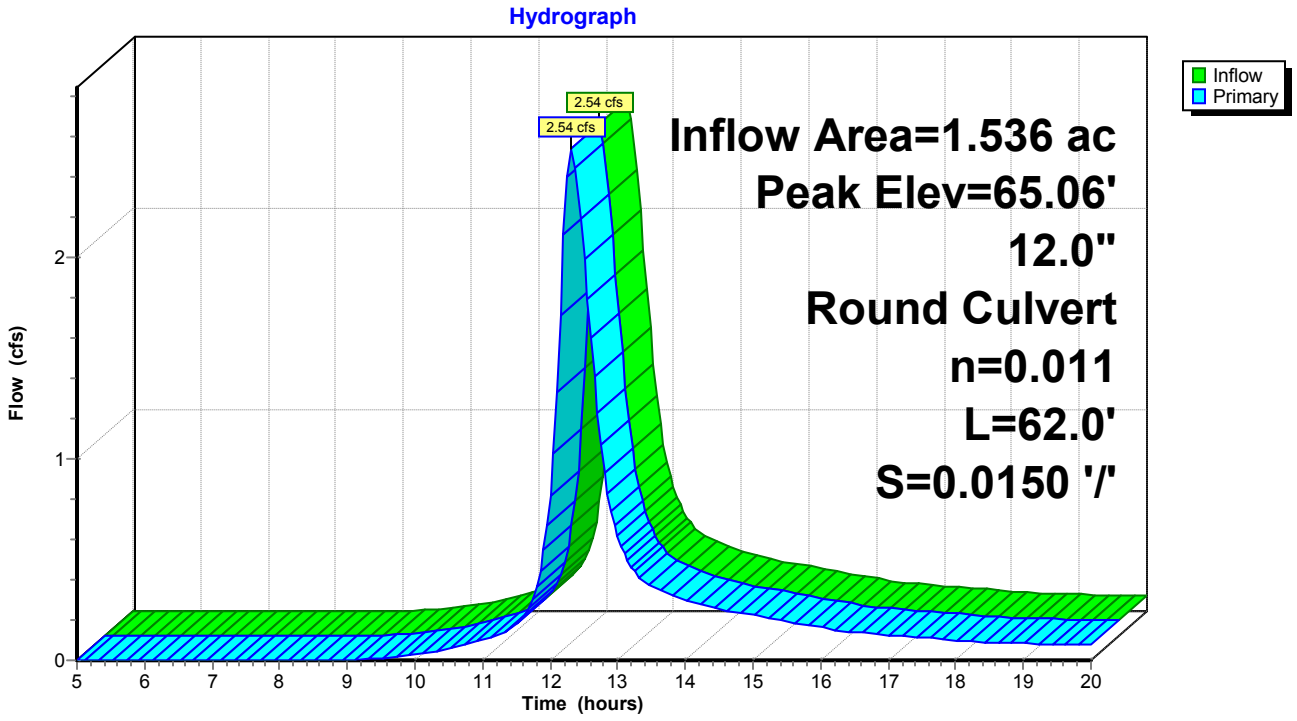
Inflow Area = 1.536 ac, 0.67% Impervious, Inflow Depth > 2.04" for 10-Year event
Inflow = 2.54 cfs @ 12.32 hrs, Volume= 0.261 af
Outflow = 2.54 cfs @ 12.32 hrs, Volume= 0.261 af, Atten= 0%, Lag= 0.0 min
Primary = 2.54 cfs @ 12.32 hrs, Volume= 0.261 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 65.06' @ 12.32 hrs
Flood Elev= 71.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	64.11'	**12.0" Round Culvert** L= 62.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 64.11' / 63.18' S= 0.0150 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.53 cfs @ 12.32 hrs HW=65.05' (Free Discharge)
1=Culvert (Inlet Controls 2.53 cfs @ 3.30 fps)

Pond DH86: Exist CB



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: Existing Site Runoff Area=66,921 sf 0.67% Impervious Runoff Depth>2.97"
Flow Length=590' Tc=22.4 min CN=76 Runoff=3.71 cfs 0.381 af

Subcatchment 2S: Existing Site Runoff Area=6,728 sf 0.00% Impervious Runoff Depth>2.99"
Flow Length=55' Tc=7.7 min CN=76 Runoff=0.54 cfs 0.038 af

Subcatchment 3S: Existing Site Runoff Area=13,474 sf 0.16% Impervious Runoff Depth>2.98"
Flow Length=175' Tc=15.5 min CN=76 Runoff=0.87 cfs 0.077 af

Reach SP1: Exist CB7 Inflow=4.47 cfs 0.458 af
Outflow=4.47 cfs 0.458 af

Reach SP2: To Detention Pond Inflow=0.54 cfs 0.038 af
Outflow=0.54 cfs 0.038 af

Pond DH86: Exist CB Peak Elev=65.57' Inflow=3.71 cfs 0.381 af
12.0" Round Culvert n=0.011 L=62.0' S=0.0150 '/' Outflow=3.71 cfs 0.381 af

Total Runoff Area = 2.000 ac Runoff Volume = 0.496 af Average Runoff Depth = 2.98"
99.46% Pervious = 1.989 ac 0.54% Impervious = 0.011 ac

Summary for Subcatchment 1S: Existing Site

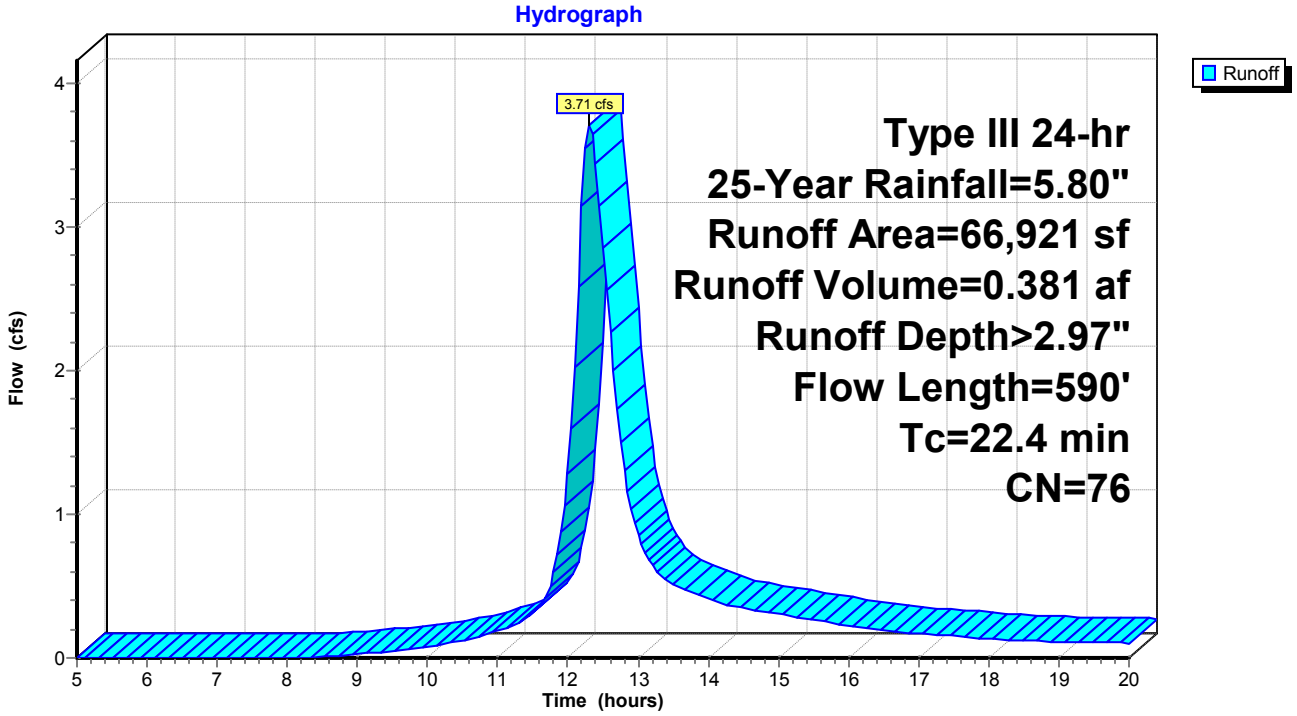
Runoff = 3.71 cfs @ 12.31 hrs, Volume= 0.381 af, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
66,473	76	Woods/grass comb., Fair, HSG C
448	98	Paved parking, HSG C
66,921	76	Weighted Average
66,473		99.33% Pervious Area
448		0.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0300	0.08		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
3.3	185	0.0350	0.94		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
8.4	355	0.0200	0.71		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
22.4	590	Total			

Subcatchment 1S: Existing Site



Summary for Subcatchment 2S: Existing Site

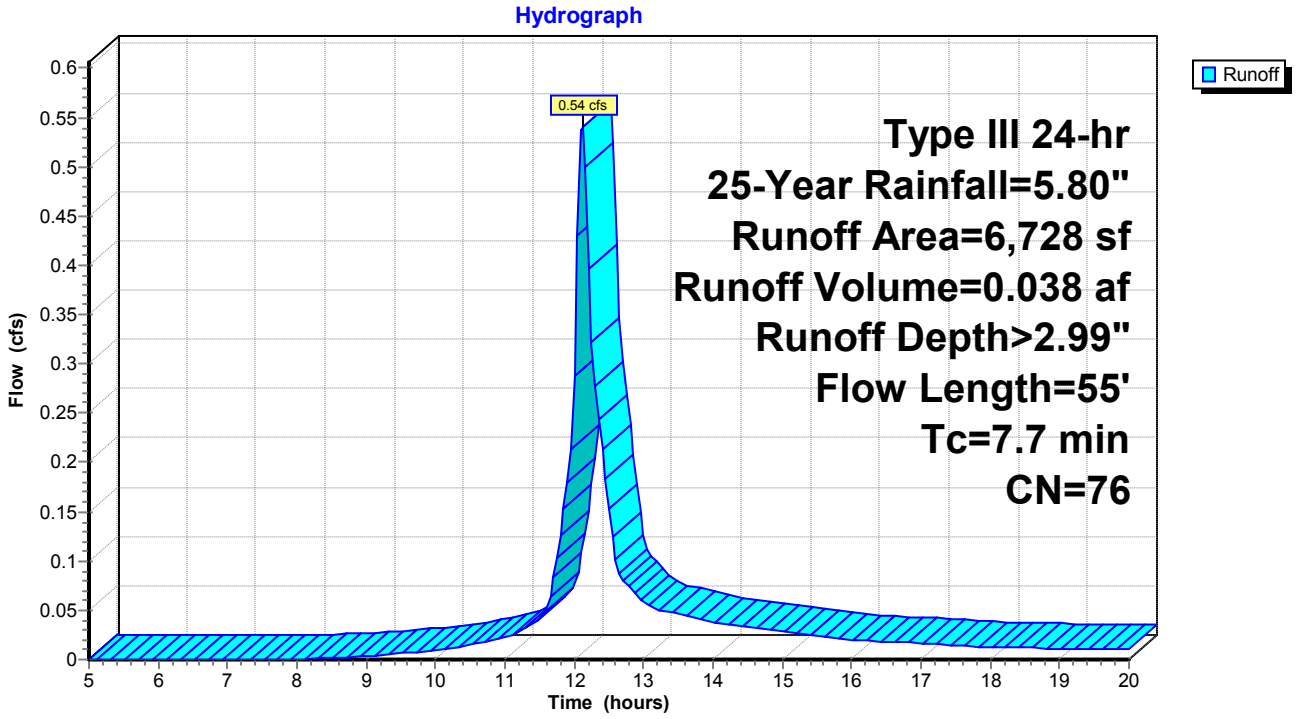
Runoff = 0.54 cfs @ 12.11 hrs, Volume= 0.038 af, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
6,728	76	Woods/grass comb., Fair, HSG C
6,728		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	50	0.0700	0.11		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.1	5	0.0350	0.94		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
7.7	55	Total			

Subcatchment 2S: Existing Site



Summary for Subcatchment 3S: Existing Site

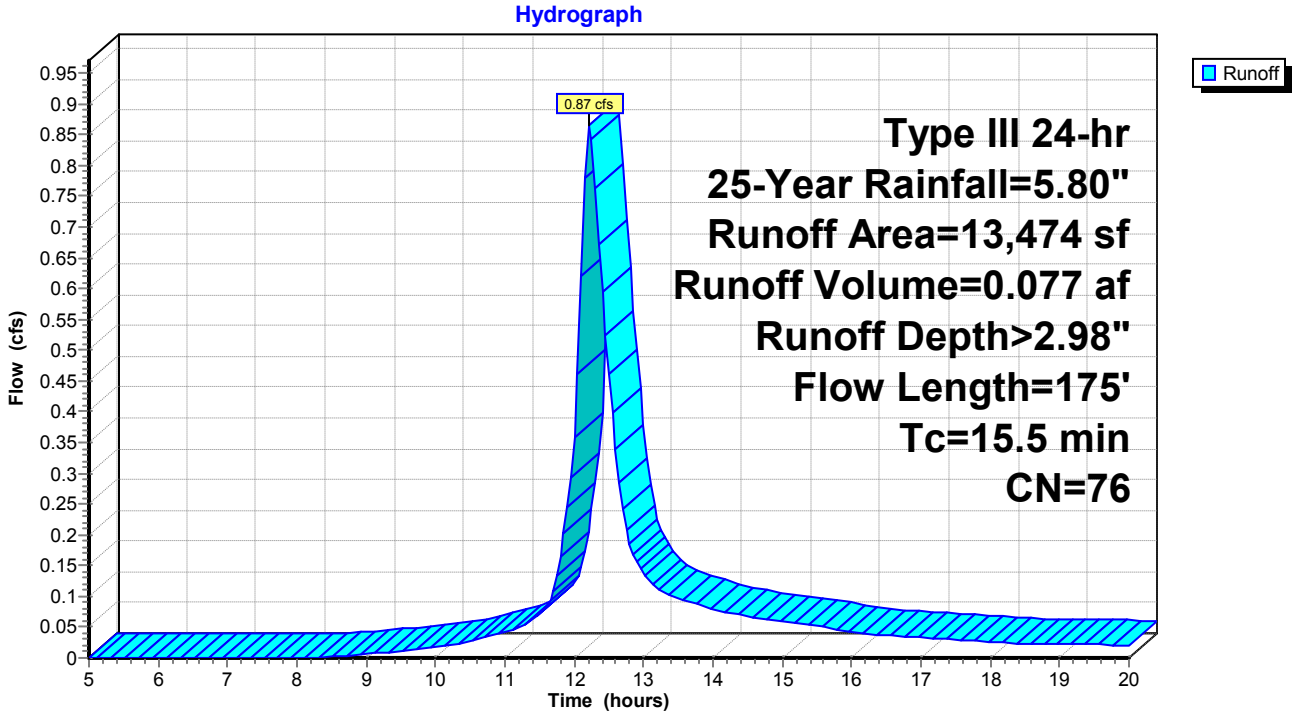
Runoff = 0.87 cfs @ 12.22 hrs, Volume= 0.077 af, Depth> 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
13,452	76	Woods/grass comb., Fair, HSG C
22	98	Paved parking, HSG C
13,474	76	Weighted Average
13,452		99.84% Pervious Area
22		0.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
2.9	115	0.0180	0.67		**Shallow Concentrated Flow, B To C** Woodland Kv= 5.0 fps
0.1	10	0.0180	2.72		**Shallow Concentrated Flow, C To D** Paved Kv= 20.3 fps
15.5	175	Total			

Subcatchment 3S: Existing Site

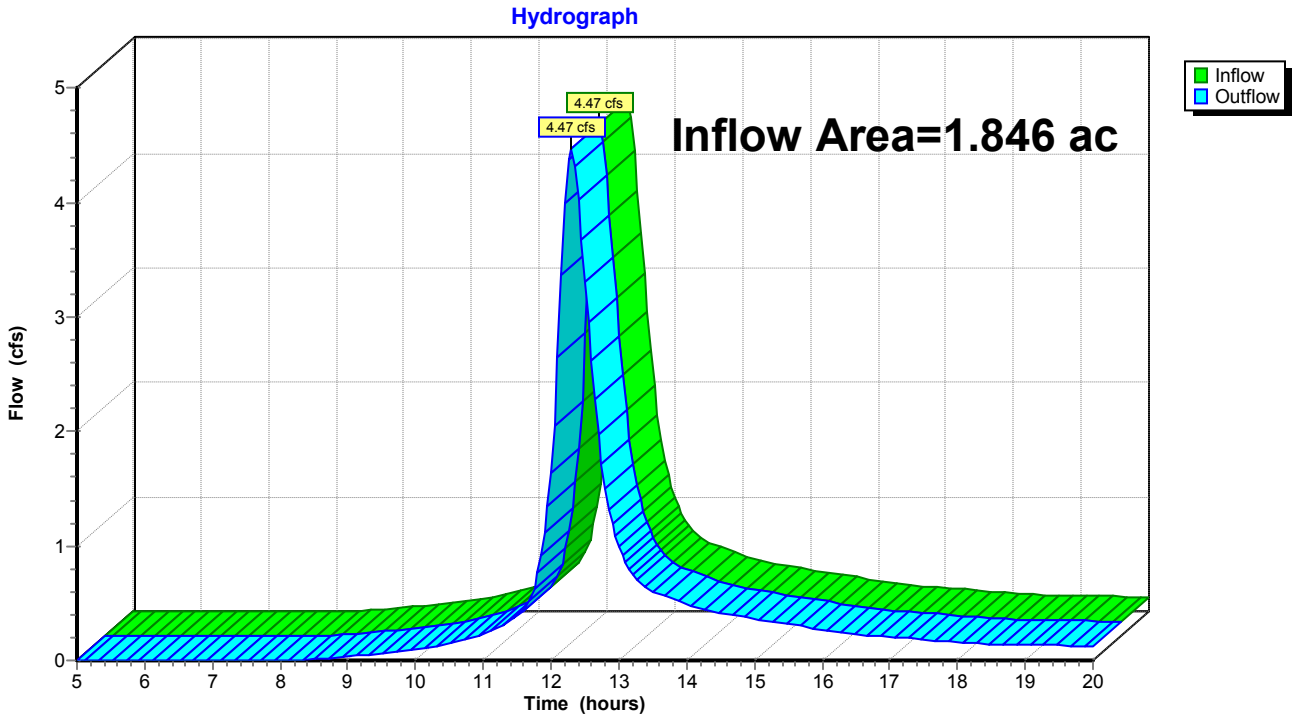


Summary for Reach SP1: Exist CB7

Inflow Area = 1.846 ac, 0.58% Impervious, Inflow Depth > 2.98" for 25-Year event
Inflow = 4.47 cfs @ 12.29 hrs, Volume= 0.458 af
Outflow = 4.47 cfs @ 12.29 hrs, Volume= 0.458 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach SP1: Exist CB7

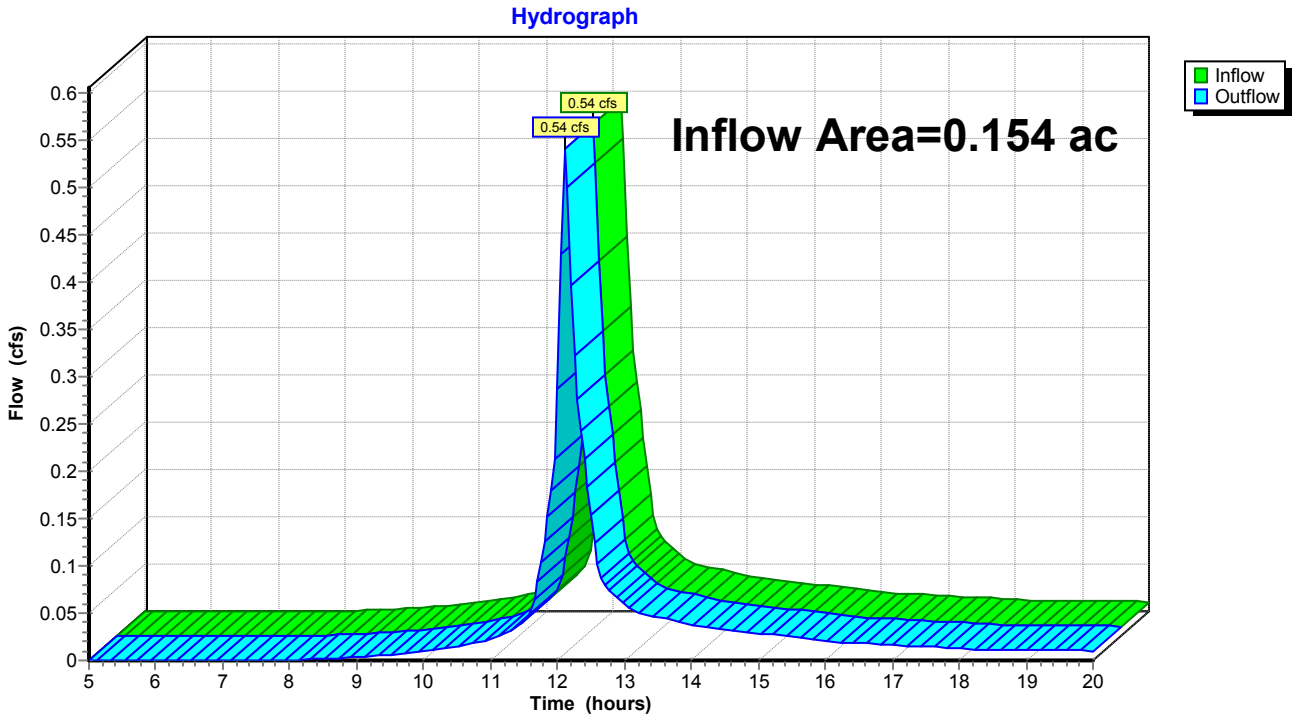


Summary for Reach SP2: To Detention Pond

Inflow Area = 0.154 ac, 0.00% Impervious, Inflow Depth > 2.99" for 25-Year event
Inflow = 0.54 cfs @ 12.11 hrs, Volume= 0.038 af
Outflow = 0.54 cfs @ 12.11 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach SP2: To Detention Pond



Summary for Pond DH86: Exist CB

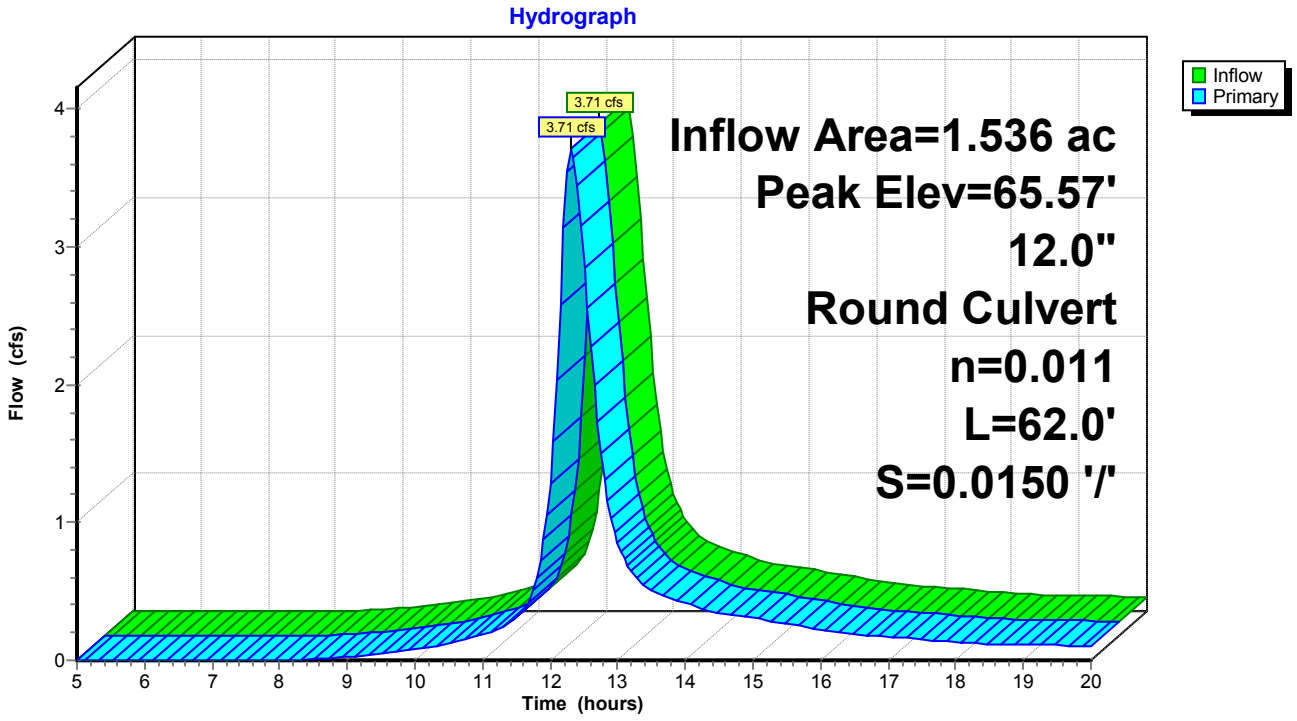
Inflow Area = 1.536 ac, 0.67% Impervious, Inflow Depth > 2.97" for 25-Year event
Inflow = 3.71 cfs @ 12.31 hrs, Volume= 0.381 af
Outflow = 3.71 cfs @ 12.31 hrs, Volume= 0.381 af, Atten= 0%, Lag= 0.0 min
Primary = 3.71 cfs @ 12.31 hrs, Volume= 0.381 af

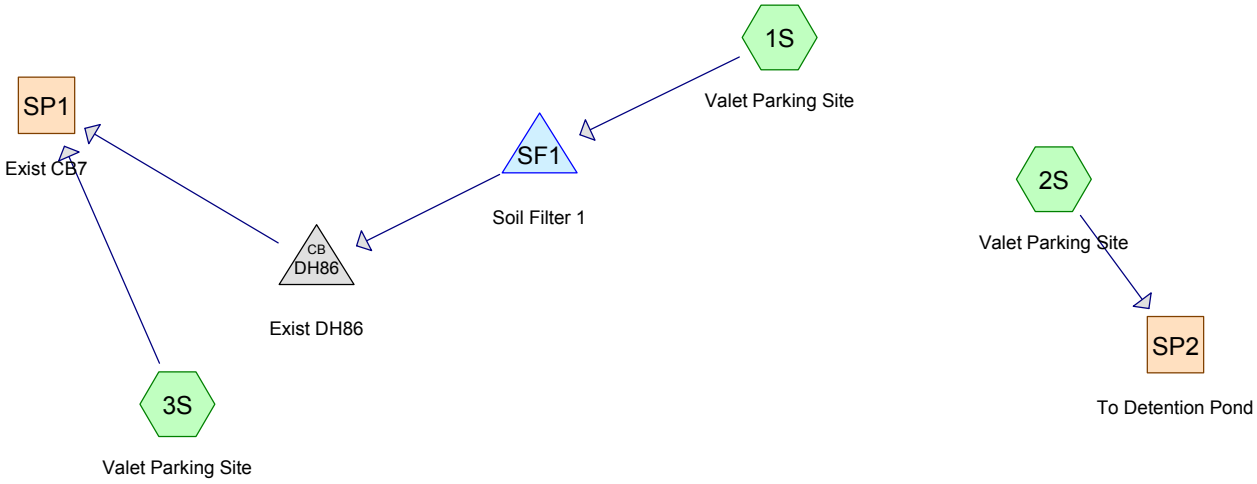
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 65.57' @ 12.31 hrs
Flood Elev= 71.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	64.11'	**12.0" Round Culvert** L= 62.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 64.11' / 63.18' S= 0.0150 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=3.69 cfs @ 12.31 hrs HW=65.56' (Free Discharge)
1=Culvert (Inlet Controls 3.69 cfs @ 4.70 fps)

Pond DH86: Exist CB





Subcat Reach Pond Link

Routing Diagram for 88125-Post April 2017
Prepared by {enter your company name here}, Printed 4/26/2017

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.931	79	50-75% Grass cover, Fair, HSG C (1S, 2S, 3S)
1.069	98	Paved parking, HSG C (1S, 2S, 3S)
2.000	**89**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
2.000	HSG C	1S, 2S, 3S
0.000	HSG D	
0.000	Other	
2.000		**TOTAL AREA**

Time span=5.00-20.00 hrs, dt=0.01 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Valet Parking Site Runoff Area=74,272 sf 59.49% Impervious Runoff Depth>1.95"
Flow Length=488' Tc=9.5 min CN=90 Runoff=3.66 cfs 0.277 af

Subcatchment 2S: Valet Parking Site Runoff Area=4,045 sf 5.34% Impervious Runoff Depth>1.22"
Flow Length=20' Slope=0.1200 '/' Tc=2.0 min CN=80 Runoff=0.16 cfs 0.009 af

Subcatchment 3S: Valet Parking Site Runoff Area=8,806 sf 24.68% Impervious Runoff Depth>1.49"
Flow Length=60' Slope=0.0330 '/' Tc=0.5 min CN=84 Runoff=0.46 cfs 0.025 af

Reach SP1: Exist CB7 Inflow=0.65 cfs 0.225 af
Outflow=0.65 cfs 0.225 af

Reach SP2: To Detention Pond Inflow=0.16 cfs 0.009 af
Outflow=0.16 cfs 0.009 af

Pond DH86: Exist DH86 Peak Elev=64.39' Inflow=0.32 cfs 0.200 af
12.0" Round Culvert n=0.011 L=62.0' S=0.0150 '/' Outflow=0.32 cfs 0.200 af

Pond SF1: Soil Filter 1 Peak Elev=71.61' Storage=5,942 cf Inflow=3.66 cfs 0.277 af
Outflow=0.32 cfs 0.200 af

Total Runoff Area = 2.000 ac Runoff Volume = 0.311 af Average Runoff Depth = 1.87"
46.54% Pervious = 0.931 ac 53.46% Impervious = 1.069 ac

Summary for Subcatchment 1S: Valet Parking Site

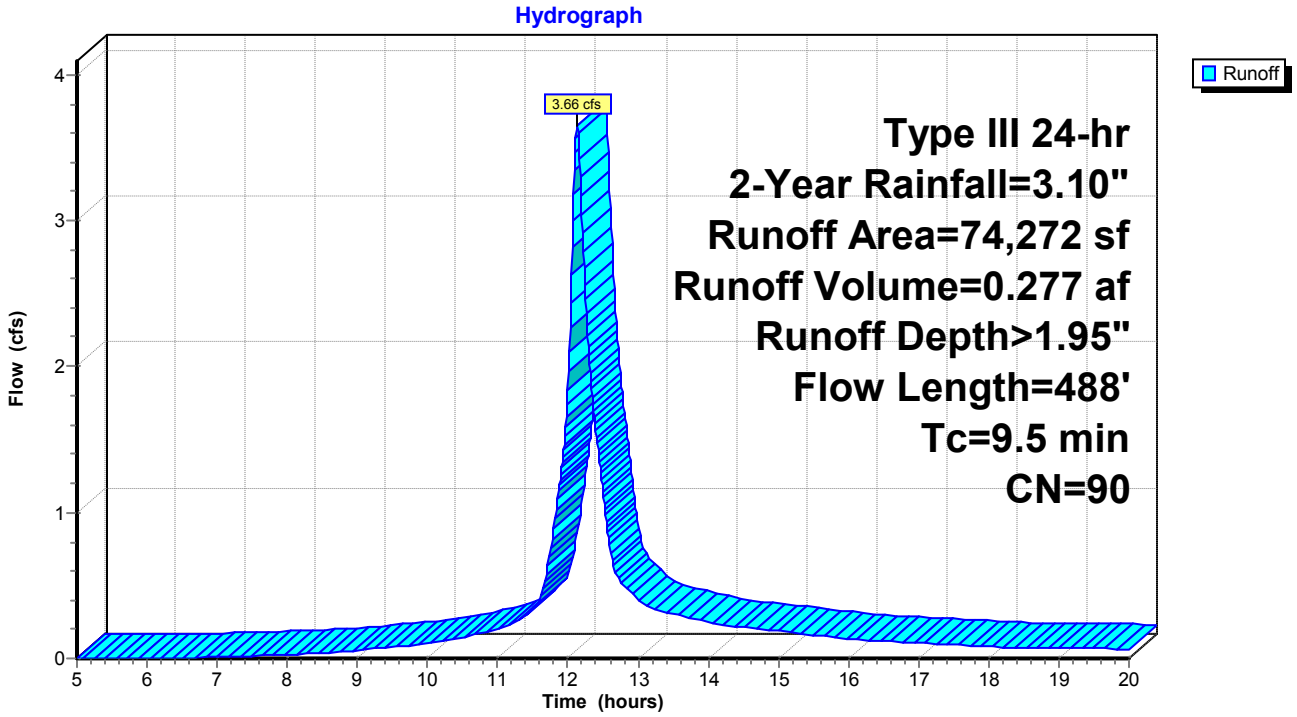
Runoff = 3.66 cfs @ 12.13 hrs, Volume= 0.277 af, Depth> 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
44,188	98	Paved parking, HSG C
30,084	79	50-75% Grass cover, Fair, HSG C
74,272	90	Weighted Average
30,084		40.51% Pervious Area
44,188		59.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0300	0.12		**Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.10"
1.1	185	0.0350	2.81		**Shallow Concentrated Flow, B to C** Grassed Waterway Kv= 15.0 fps
0.1	20	0.0300	2.60		**Shallow Concentrated Flow, C to D** Grassed Waterway Kv= 15.0 fps
1.2	215	0.0220	3.01		**Shallow Concentrated Flow, D to E** Paved Kv= 20.3 fps
0.0	18	0.1900	6.54		**Shallow Concentrated Flow, E to F** Grassed Waterway Kv= 15.0 fps
9.5	488	Total			

Subcatchment 1S: Valet Parking Site



Summary for Subcatchment 2S: Valet Parking Site

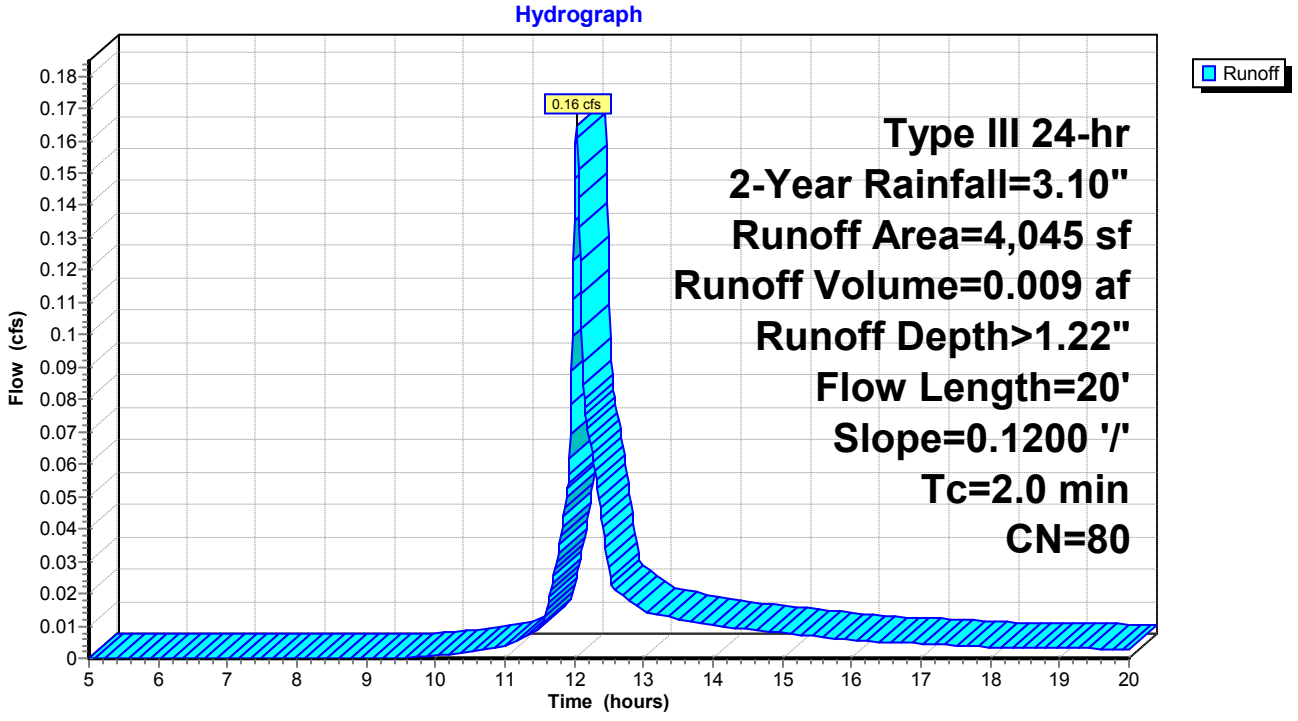
Runoff = 0.16 cfs @ 12.03 hrs, Volume= 0.009 af, Depth> 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
216	98	Paved parking, HSG C
3,829	79	50-75% Grass cover, Fair, HSG C
4,045	80	Weighted Average
3,829		94.66% Pervious Area
216		5.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	20	0.1200	0.17		**Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.10"

Subcatchment 2S: Valet Parking Site



Summary for Subcatchment 3S: Valet Parking Site

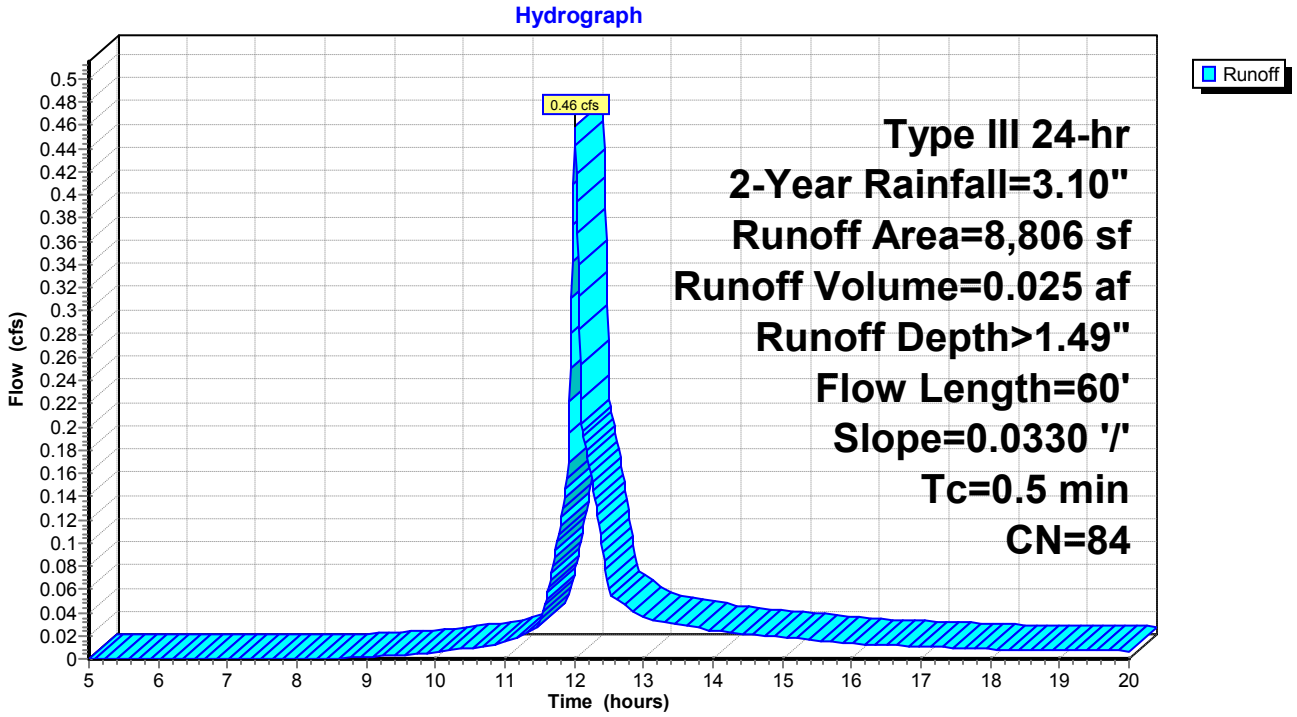
Runoff = 0.46 cfs @ 12.01 hrs, Volume= 0.025 af, Depth> 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
2,173	98	Paved parking, HSG C
6,633	79	50-75% Grass cover, Fair, HSG C
8,806	84	Weighted Average
6,633		75.32% Pervious Area
2,173		24.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	25	0.0330	1.25		**Sheet Flow, A to B** Smooth surfaces n= 0.011 P2= 3.10"
0.2	35	0.0330	3.69		**Shallow Concentrated Flow, B to C** Paved Kv= 20.3 fps
0.5	60	Total			

Subcatchment 3S: Valet Parking Site

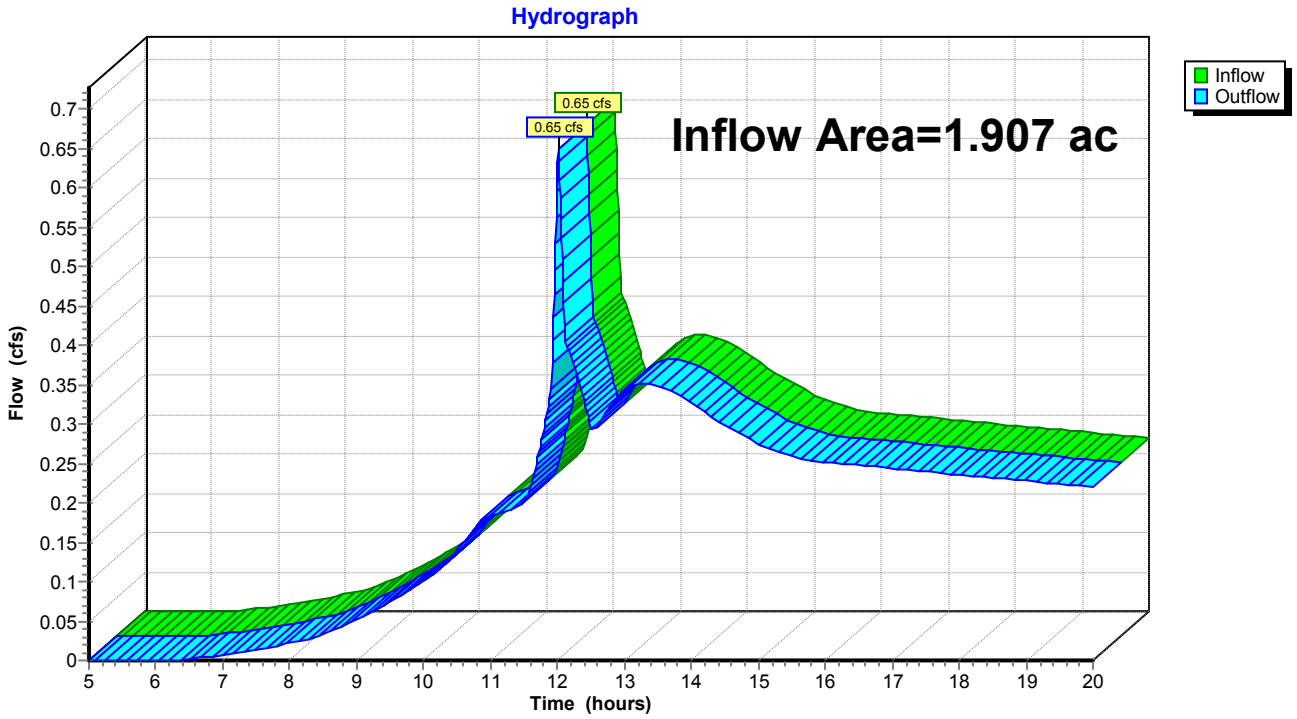


Summary for Reach SP1: Exist CB7

Inflow Area = 1.907 ac, 55.80% Impervious, Inflow Depth > 1.41" for 2-Year event
Inflow = 0.65 cfs @ 12.01 hrs, Volume= 0.225 af
Outflow = 0.65 cfs @ 12.01 hrs, Volume= 0.225 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs

Reach SP1: Exist CB7

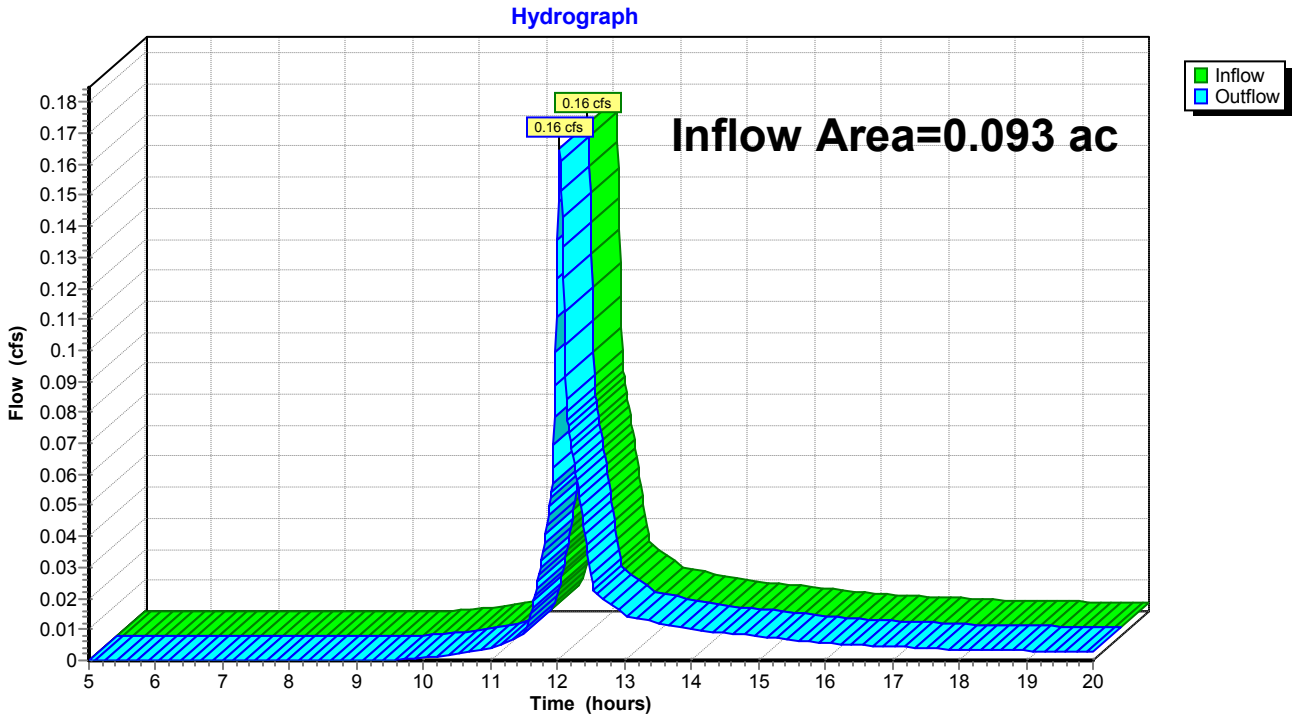


Summary for Reach SP2: To Detention Pond

Inflow Area = 0.093 ac, 5.34% Impervious, Inflow Depth > 1.22" for 2-Year event
Inflow = 0.16 cfs @ 12.03 hrs, Volume= 0.009 af
Outflow = 0.16 cfs @ 12.03 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs

Reach SP2: To Detention Pond



Summary for Pond DH86: Exist DH86

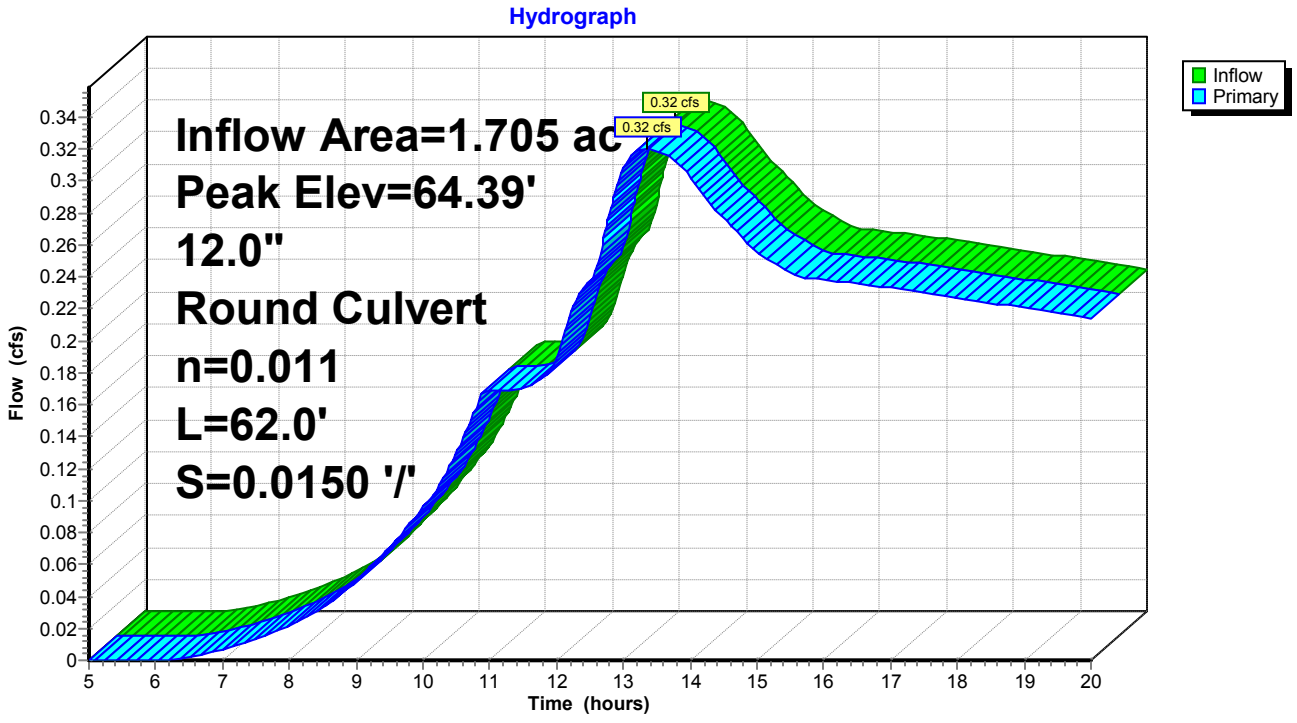
Inflow Area = 1.705 ac, 59.49% Impervious, Inflow Depth > 1.40" for 2-Year event
Inflow = 0.32 cfs @ 13.36 hrs, Volume= 0.200 af
Outflow = 0.32 cfs @ 13.36 hrs, Volume= 0.200 af, Atten= 0%, Lag= 0.0 min
Primary = 0.32 cfs @ 13.36 hrs, Volume= 0.200 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Peak Elev= 64.39' @ 13.36 hrs
Flood Elev= 71.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	64.11'	**12.0" Round Culvert** L= 62.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 64.11' / 63.18' S= 0.0150 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.32 cfs @ 13.36 hrs HW=64.39' (Free Discharge)
1=Culvert (Inlet Controls 0.32 cfs @ 1.79 fps)

Pond DH86: Exist DH86



Summary for Pond SF1: Soil Filter 1

Inflow Area = 1.705 ac, 59.49% Impervious, Inflow Depth > 1.95" for 2-Year event
Inflow = 3.66 cfs @ 12.13 hrs, Volume= 0.277 af
Outflow = 0.32 cfs @ 13.36 hrs, Volume= 0.200 af, Atten= 91%, Lag= 73.7 min
Primary = 0.32 cfs @ 13.36 hrs, Volume= 0.200 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Peak Elev= 71.61' @ 13.36 hrs Surf.Area= 4,509 sf Storage= 5,942 cf
Flood Elev= 73.50' Surf.Area= 5,254 sf Storage= 11,678 cf

Plug-Flow detention time= 177.1 min calculated for 0.199 af (72% of inflow)
Center-of-Mass det. time= 113.6 min (891.9 - 778.3)

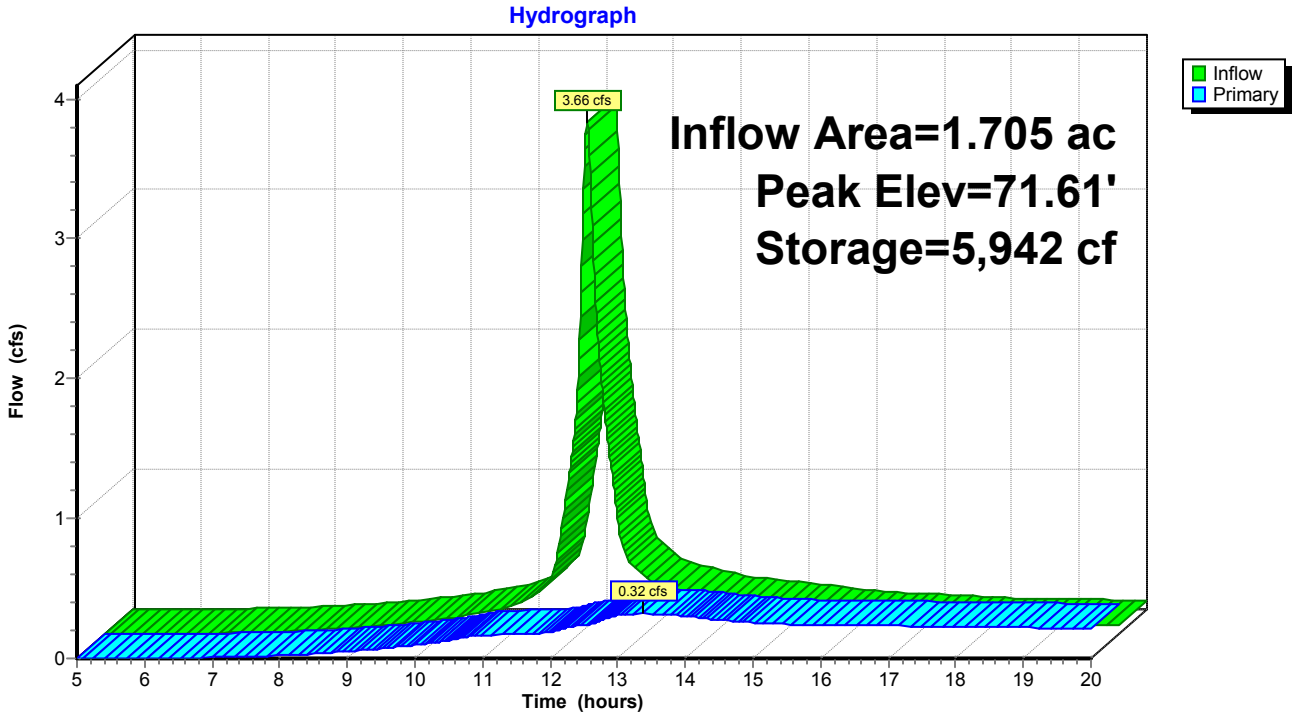
Volume	Invert	Avail.Storage	Storage Description
#1	70.00'	11,678 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
70.00	2,997	0	0
71.00	3,857	3,427	3,427
71.50	4,309	2,042	5,469
71.75	4,774	1,135	6,604
72.50	5,254	3,761	10,364
72.75	5,254	1,314	11,678

Device	Routing	Invert	Outlet Devices
#1	Primary	67.33'	**12.0" Round Culvert** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 67.33' / 66.93' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	67.66'	**6.0" Vert. Underdrain** C= 0.600
#3	Device 2	70.00'	**2.400 in/hr Exfiltration over Surface area**
#4	Device 1	71.50'	**6.0" Vert. Orifices X 2.00** C= 0.600
#5	Device 1	72.50'	**18.0" Horiz. Nyloplast Grate X 0.65** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.32 cfs @ 13.36 hrs HW=71.61' (Free Discharge)
- **1=Culvert** (Passes 0.32 cfs of 6.03 cfs potential flow)
  - **2=Underdrain** (Passes 0.25 cfs of 1.82 cfs potential flow)
    - **3=Exfiltration** (Exfiltration Controls 0.25 cfs)
  - **4=Orifices** (Orifice Controls 0.07 cfs @ 1.12 fps)
  - **5=Nyloplast Grate** (Controls 0.00 cfs)

Pond SF1: Soil Filter 1



Time span=5.00-20.00 hrs, dt=0.01 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Valet Parking Site Runoff Area=74,272 sf 59.49% Impervious Runoff Depth>3.29"
Flow Length=488' Tc=9.5 min CN=90 Runoff=6.03 cfs 0.468 af

Subcatchment 2S: Valet Parking Site Runoff Area=4,045 sf 5.34% Impervious Runoff Depth>2.38"
Flow Length=20' Slope=0.1200 '/' Tc=2.0 min CN=80 Runoff=0.32 cfs 0.018 af

Subcatchment 3S: Valet Parking Site Runoff Area=8,806 sf 24.68% Impervious Runoff Depth>2.73"
Flow Length=60' Slope=0.0330 '/' Tc=0.5 min CN=84 Runoff=0.83 cfs 0.046 af

Reach SP1: Exist CB7 Inflow=1.63 cfs 0.414 af
Outflow=1.63 cfs 0.414 af

Reach SP2: To Detention Pond Inflow=0.32 cfs 0.018 af
Outflow=0.32 cfs 0.018 af

Pond DH86: Exist DH86 Peak Elev=64.77' Inflow=1.53 cfs 0.368 af
12.0" Round Culvert n=0.011 L=62.0' S=0.0150 '/' Outflow=1.53 cfs 0.368 af

Pond SF1: Soil Filter 1 Peak Elev=72.18' Storage=8,733 cf Inflow=6.03 cfs 0.468 af
Outflow=1.53 cfs 0.368 af

Total Runoff Area = 2.000 ac Runoff Volume = 0.532 af Average Runoff Depth = 3.19"
46.54% Pervious = 0.931 ac 53.46% Impervious = 1.069 ac

Summary for Subcatchment 1S: Valet Parking Site

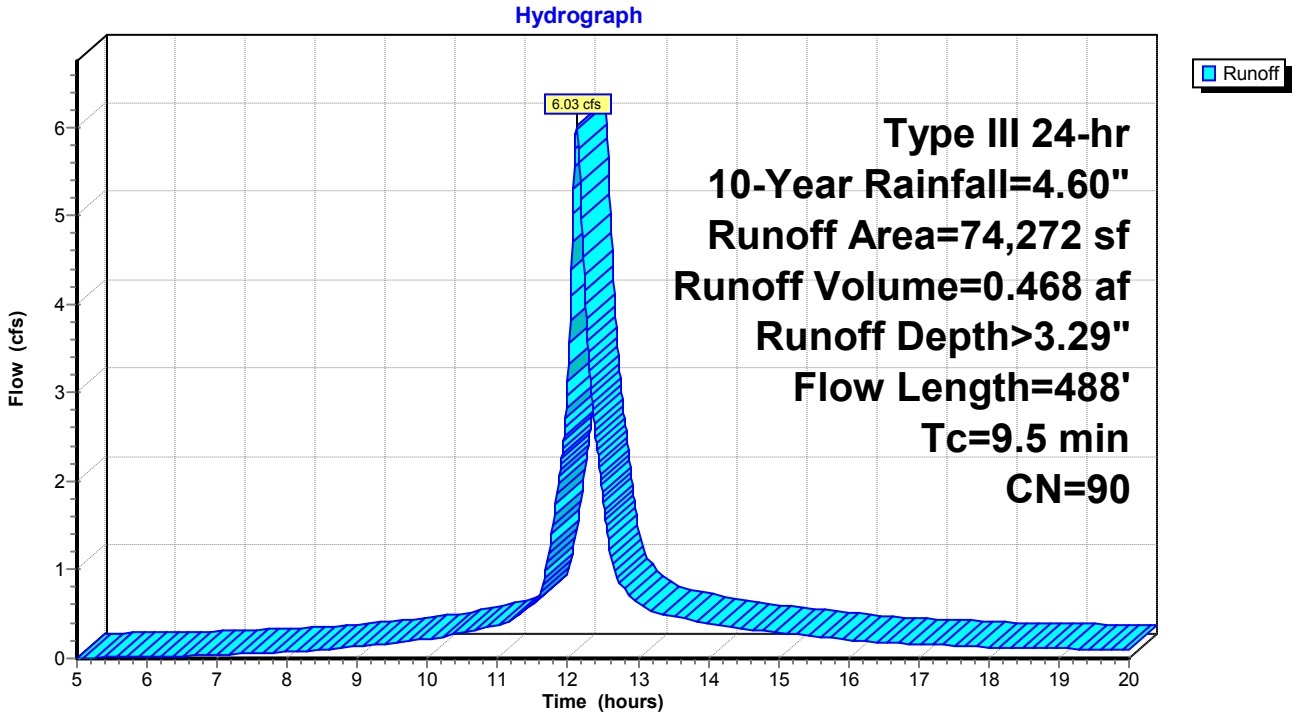
Runoff = 6.03 cfs @ 12.13 hrs, Volume= 0.468 af, Depth> 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
44,188	98	Paved parking, HSG C
30,084	79	50-75% Grass cover, Fair, HSG C
74,272	90	Weighted Average
30,084		40.51% Pervious Area
44,188		59.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0300	0.12		**Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.10"
1.1	185	0.0350	2.81		**Shallow Concentrated Flow, B to C** Grassed Waterway Kv= 15.0 fps
0.1	20	0.0300	2.60		**Shallow Concentrated Flow, C to D** Grassed Waterway Kv= 15.0 fps
1.2	215	0.0220	3.01		**Shallow Concentrated Flow, D to E** Paved Kv= 20.3 fps
0.0	18	0.1900	6.54		**Shallow Concentrated Flow, E to F** Grassed Waterway Kv= 15.0 fps
9.5	488	Total			

Subcatchment 1S: Valet Parking Site



Summary for Subcatchment 2S: Valet Parking Site

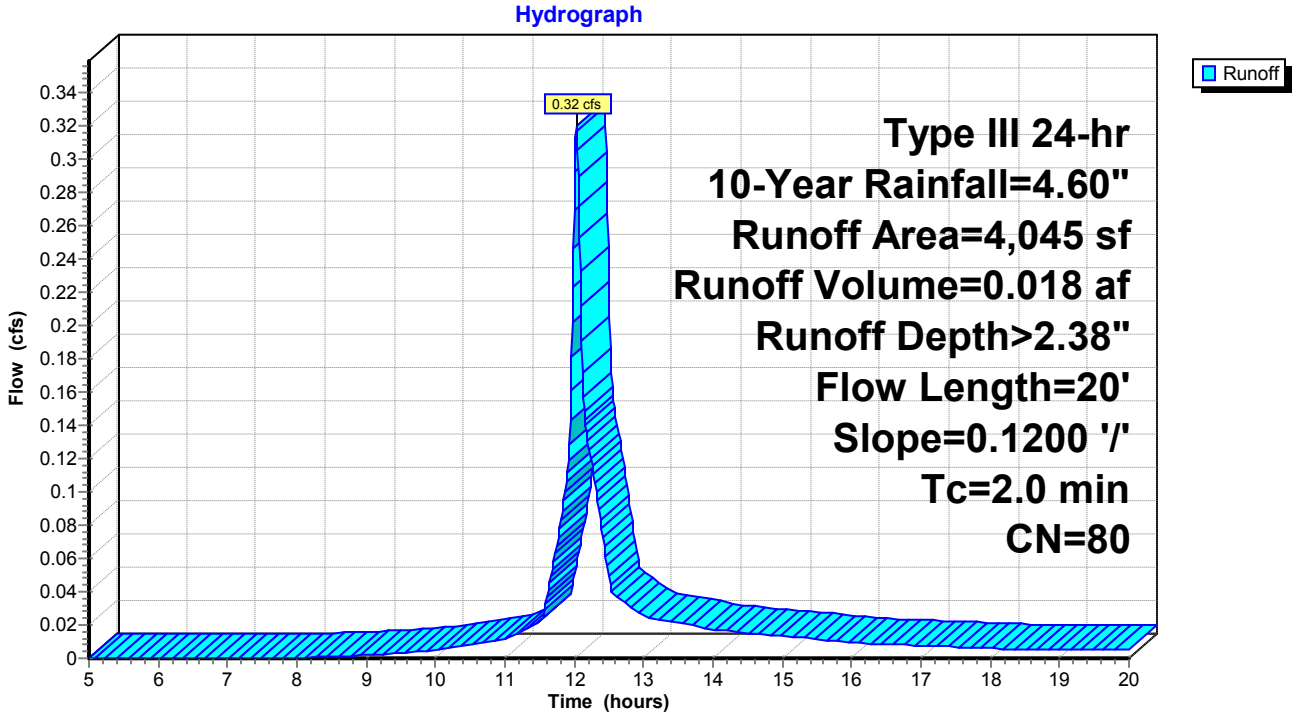
Runoff = 0.32 cfs @ 12.03 hrs, Volume= 0.018 af, Depth> 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
216	98	Paved parking, HSG C
3,829	79	50-75% Grass cover, Fair, HSG C
4,045	80	Weighted Average
3,829		94.66% Pervious Area
216		5.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	20	0.1200	0.17		**Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.10"

Subcatchment 2S: Valet Parking Site



Summary for Subcatchment 3S: Valet Parking Site

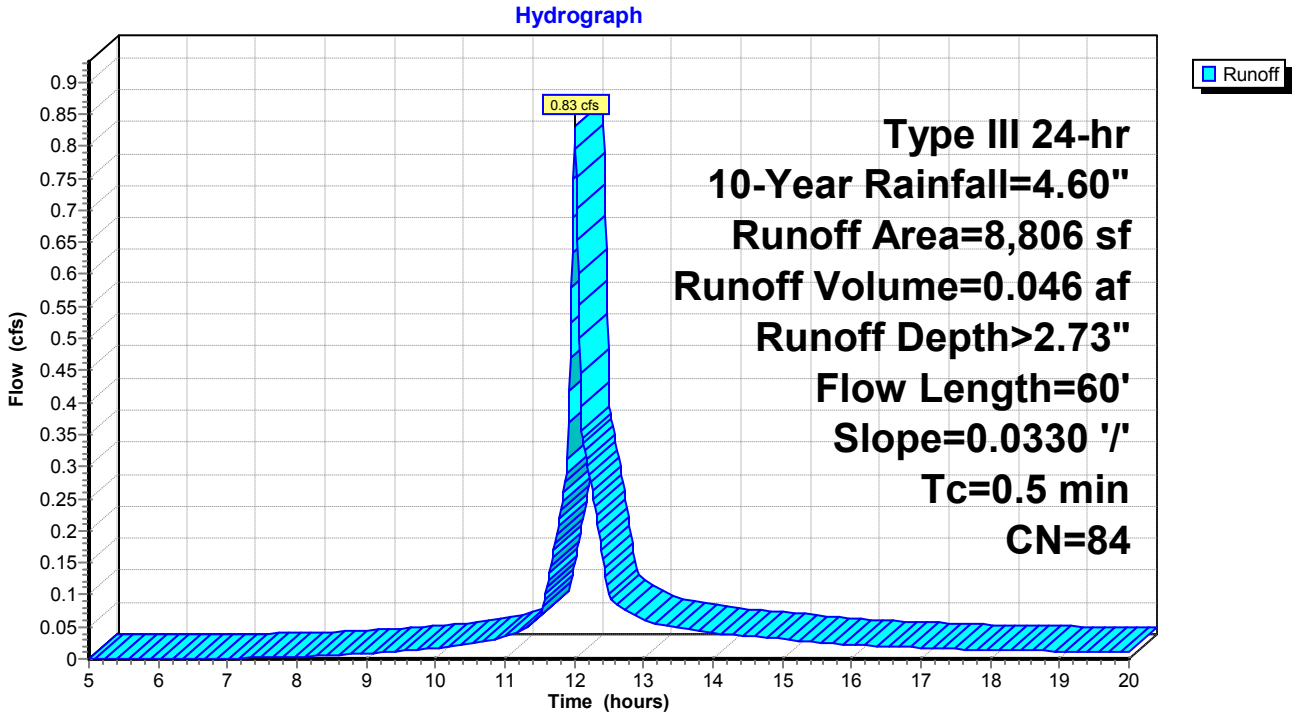
Runoff = 0.83 cfs @ 12.01 hrs, Volume= 0.046 af, Depth> 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
2,173	98	Paved parking, HSG C
6,633	79	50-75% Grass cover, Fair, HSG C
8,806	84	Weighted Average
6,633		75.32% Pervious Area
2,173		24.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	25	0.0330	1.25		**Sheet Flow, A to B** Smooth surfaces n= 0.011 P2= 3.10"
0.2	35	0.0330	3.69		**Shallow Concentrated Flow, B to C** Paved Kv= 20.3 fps
0.5	60	Total			

Subcatchment 3S: Valet Parking Site

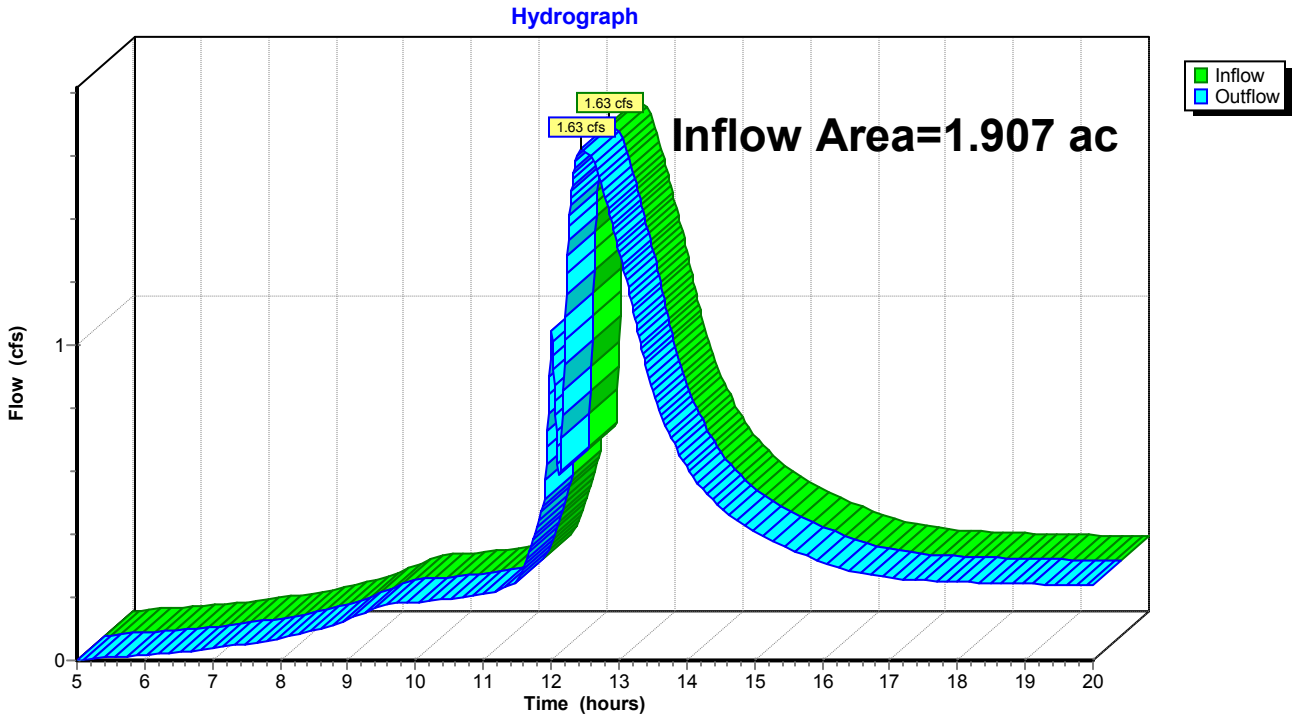


Summary for Reach SP1: Exist CB7

Inflow Area = 1.907 ac, 55.80% Impervious, Inflow Depth > 2.61" for 10-Year event
Inflow = 1.63 cfs @ 12.45 hrs, Volume= 0.414 af
Outflow = 1.63 cfs @ 12.45 hrs, Volume= 0.414 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs

Reach SP1: Exist CB7

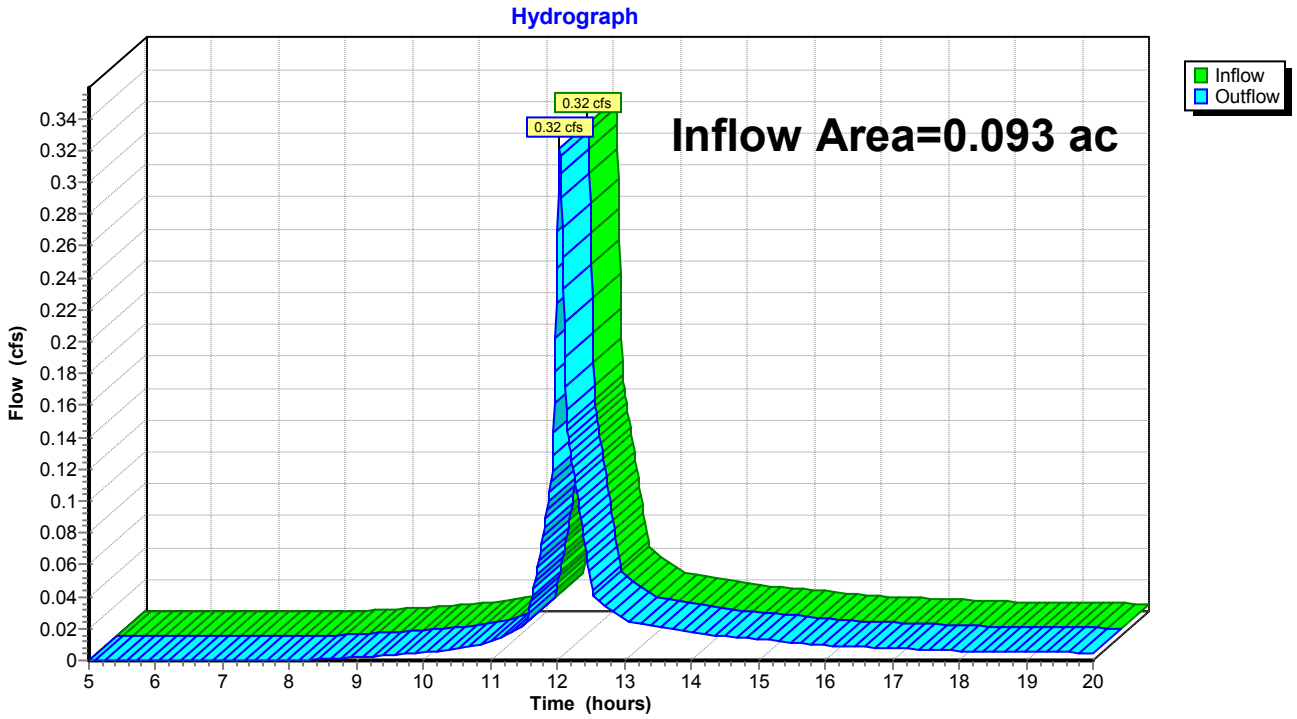


Summary for Reach SP2: To Detention Pond

Inflow Area = 0.093 ac, 5.34% Impervious, Inflow Depth > 2.38" for 10-Year event
Inflow = 0.32 cfs @ 12.03 hrs, Volume= 0.018 af
Outflow = 0.32 cfs @ 12.03 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs

Reach SP2: To Detention Pond



Summary for Pond DH86: Exist DH86

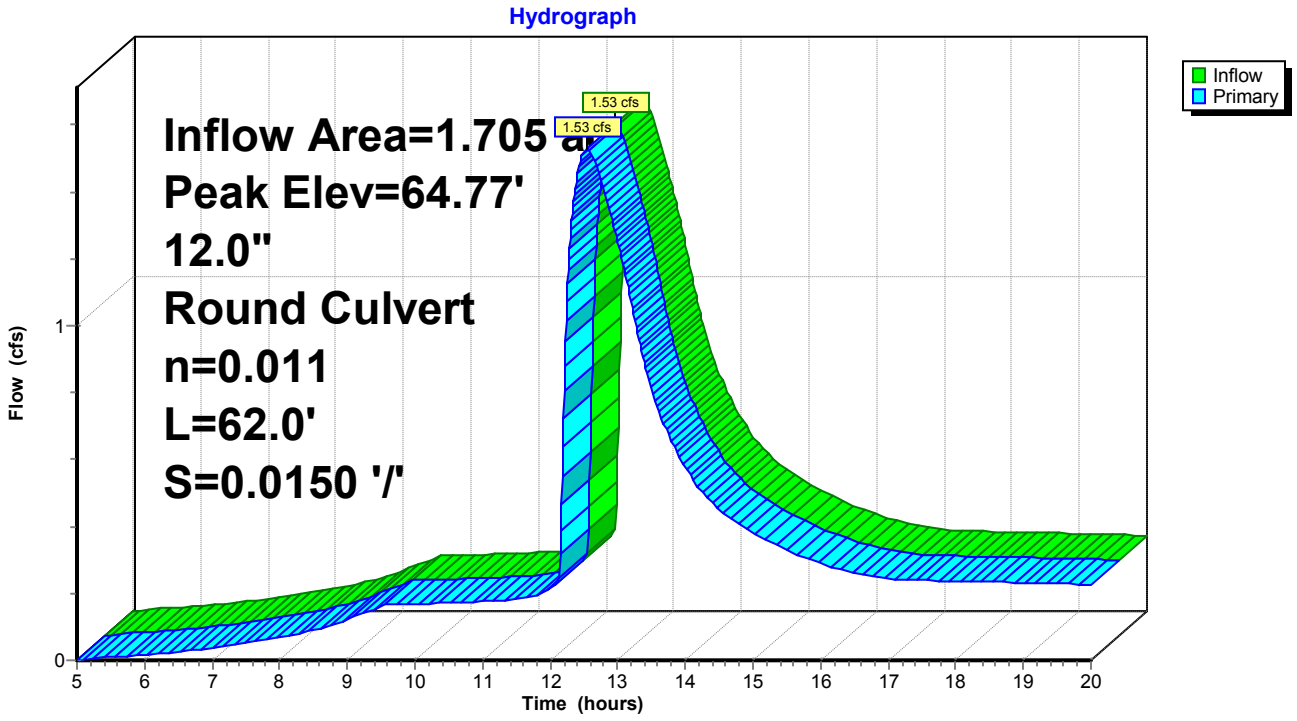
Inflow Area = 1.705 ac, 59.49% Impervious, Inflow Depth > 2.59" for 10-Year event
Inflow = 1.53 cfs @ 12.55 hrs, Volume= 0.368 af
Outflow = 1.53 cfs @ 12.55 hrs, Volume= 0.368 af, Atten= 0%, Lag= 0.0 min
Primary = 1.53 cfs @ 12.55 hrs, Volume= 0.368 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Peak Elev= 64.77' @ 12.55 hrs
Flood Elev= 71.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	64.11'	**12.0" Round Culvert** L= 62.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 64.11' / 63.18' S= 0.0150 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.52 cfs @ 12.55 hrs HW=64.77' (Free Discharge)
1=Culvert (Inlet Controls 1.52 cfs @ 2.77 fps)

Pond DH86: Exist DH86



Summary for Pond SF1: Soil Filter 1

Inflow Area = 1.705 ac, 59.49% Impervious, Inflow Depth > 3.29" for 10-Year event
Inflow = 6.03 cfs @ 12.13 hrs, Volume= 0.468 af
Outflow = 1.53 cfs @ 12.55 hrs, Volume= 0.368 af, Atten= 75%, Lag= 25.0 min
Primary = 1.53 cfs @ 12.55 hrs, Volume= 0.368 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Peak Elev= 72.18' @ 12.55 hrs Surf.Area= 5,051 sf Storage= 8,733 cf
Flood Elev= 73.50' Surf.Area= 5,254 sf Storage= 11,678 cf

Plug-Flow detention time= 122.5 min calculated for 0.368 af (79% of inflow)
Center-of-Mass det. time= 67.7 min (833.5 - 765.8)

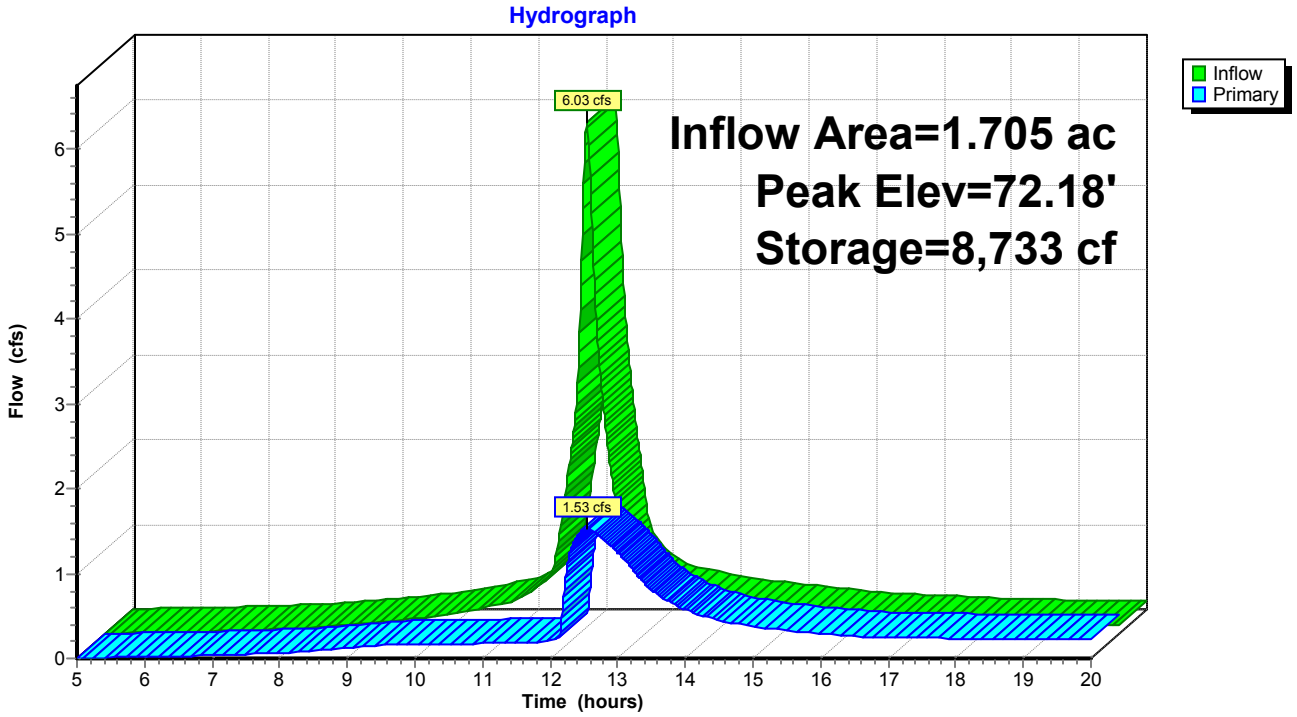
Volume	Invert	Avail.Storage	Storage Description
#1	70.00'	11,678 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
70.00	2,997	0	0
71.00	3,857	3,427	3,427
71.50	4,309	2,042	5,469
71.75	4,774	1,135	6,604
72.50	5,254	3,761	10,364
72.75	5,254	1,314	11,678

Device	Routing	Invert	Outlet Devices
#1	Primary	67.33'	**12.0" Round Culvert** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 67.33' / 66.93' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	67.66'	**6.0" Vert. Underdrain** C= 0.600
#3	Device 2	70.00'	**2.400 in/hr Exfiltration over Surface area**
#4	Device 1	71.50'	**6.0" Vert. Orifices X 2.00** C= 0.600
#5	Device 1	72.50'	**18.0" Horiz. Nyloplast Grate X 0.65** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.53 cfs @ 12.55 hrs HW=72.18' (Free Discharge)
- **1=Culvert** (Passes 1.53 cfs of 6.49 cfs potential flow)
  - **2=Underdrain** (Passes 0.28 cfs of 1.95 cfs potential flow)
    - **3=Exfiltration** (Exfiltration Controls 0.28 cfs)
  - **4=Orifices** (Orifice Controls 1.24 cfs @ 3.17 fps)
  - **5=Nyloplast Grate** (Controls 0.00 cfs)

Pond SF1: Soil Filter 1



Time span=5.00-20.00 hrs, dt=0.01 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Valet Parking Site Runoff Area=74,272 sf 59.49% Impervious Runoff Depth>4.39"
Flow Length=488' Tc=9.5 min CN=90 Runoff=7.91 cfs 0.624 af

Subcatchment 2S: Valet Parking Site Runoff Area=4,045 sf 5.34% Impervious Runoff Depth>3.38"
Flow Length=20' Slope=0.1200 '/' Tc=2.0 min CN=80 Runoff=0.45 cfs 0.026 af

Subcatchment 3S: Valet Parking Site Runoff Area=8,806 sf 24.68% Impervious Runoff Depth>3.78"
Flow Length=60' Slope=0.0330 '/' Tc=0.5 min CN=84 Runoff=1.14 cfs 0.064 af

Reach SP1: Exist CB7 Inflow=2.90 cfs 0.576 af
Outflow=2.90 cfs 0.576 af

Reach SP2: To Detention Pond Inflow=0.45 cfs 0.026 af
Outflow=0.45 cfs 0.026 af

Pond DH86: Exist DH86 Peak Elev=65.13' Inflow=2.72 cfs 0.513 af
12.0" Round Culvert n=0.011 L=62.0' S=0.0150 '/' Outflow=2.72 cfs 0.513 af

Pond SF1: Soil Filter 1 Peak Elev=72.66' Storage=11,194 cf Inflow=7.91 cfs 0.624 af
Outflow=2.72 cfs 0.513 af

Total Runoff Area = 2.000 ac Runoff Volume = 0.714 af Average Runoff Depth = 4.28"
46.54% Pervious = 0.931 ac 53.46% Impervious = 1.069 ac

Summary for Subcatchment 1S: Valet Parking Site

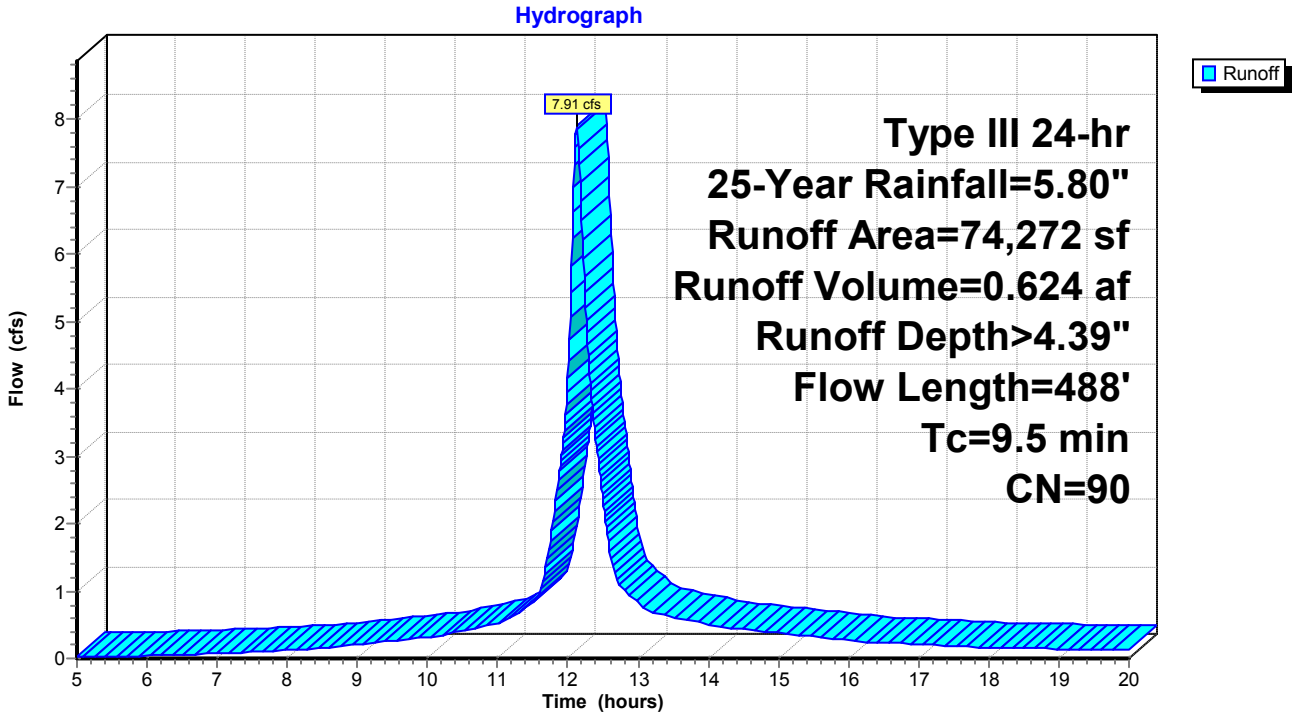
Runoff = 7.91 cfs @ 12.13 hrs, Volume= 0.624 af, Depth> 4.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
44,188	98	Paved parking, HSG C
30,084	79	50-75% Grass cover, Fair, HSG C
74,272	90	Weighted Average
30,084		40.51% Pervious Area
44,188		59.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0300	0.12		**Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.10"
1.1	185	0.0350	2.81		**Shallow Concentrated Flow, B to C** Grassed Waterway Kv= 15.0 fps
0.1	20	0.0300	2.60		**Shallow Concentrated Flow, C to D** Grassed Waterway Kv= 15.0 fps
1.2	215	0.0220	3.01		**Shallow Concentrated Flow, D to E** Paved Kv= 20.3 fps
0.0	18	0.1900	6.54		**Shallow Concentrated Flow, E to F** Grassed Waterway Kv= 15.0 fps
9.5	488	Total			

Subcatchment 1S: Valet Parking Site



Summary for Subcatchment 2S: Valet Parking Site

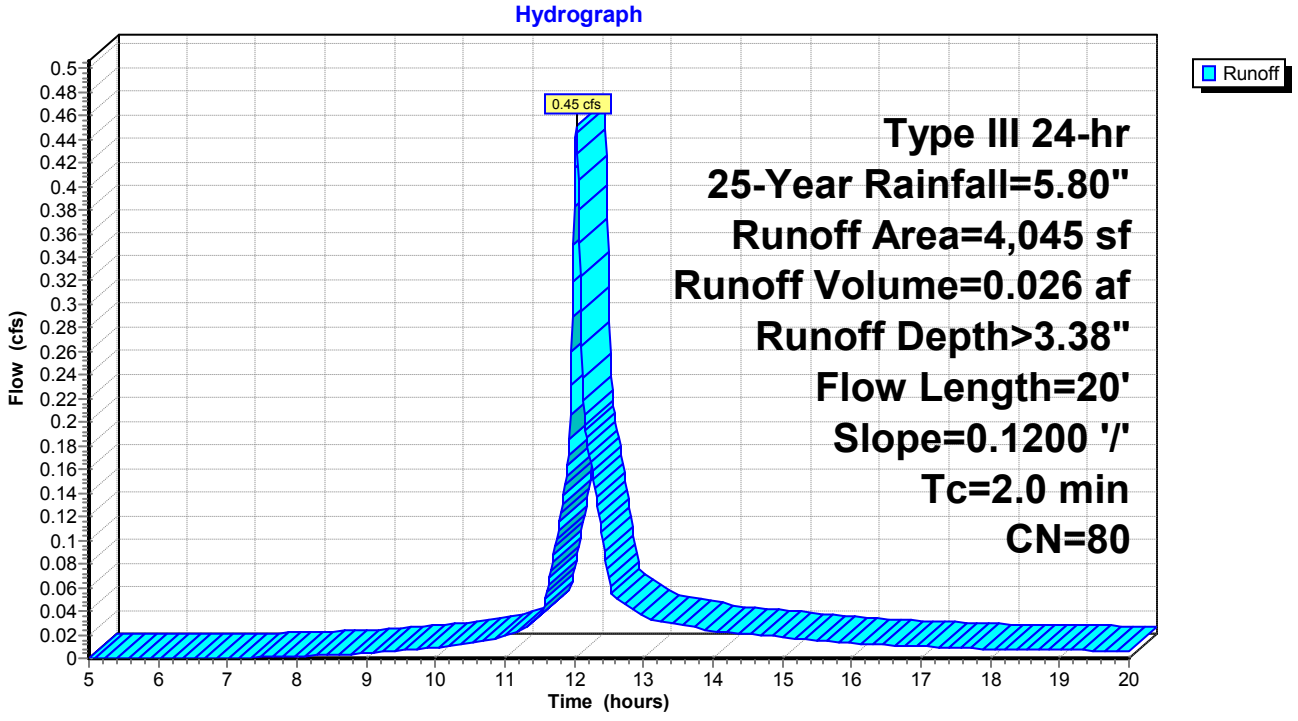
Runoff = 0.45 cfs @ 12.03 hrs, Volume= 0.026 af, Depth> 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
216	98	Paved parking, HSG C
3,829	79	50-75% Grass cover, Fair, HSG C
4,045	80	Weighted Average
3,829		94.66% Pervious Area
216		5.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	20	0.1200	0.17		**Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.10"

Subcatchment 2S: Valet Parking Site



Summary for Subcatchment 3S: Valet Parking Site

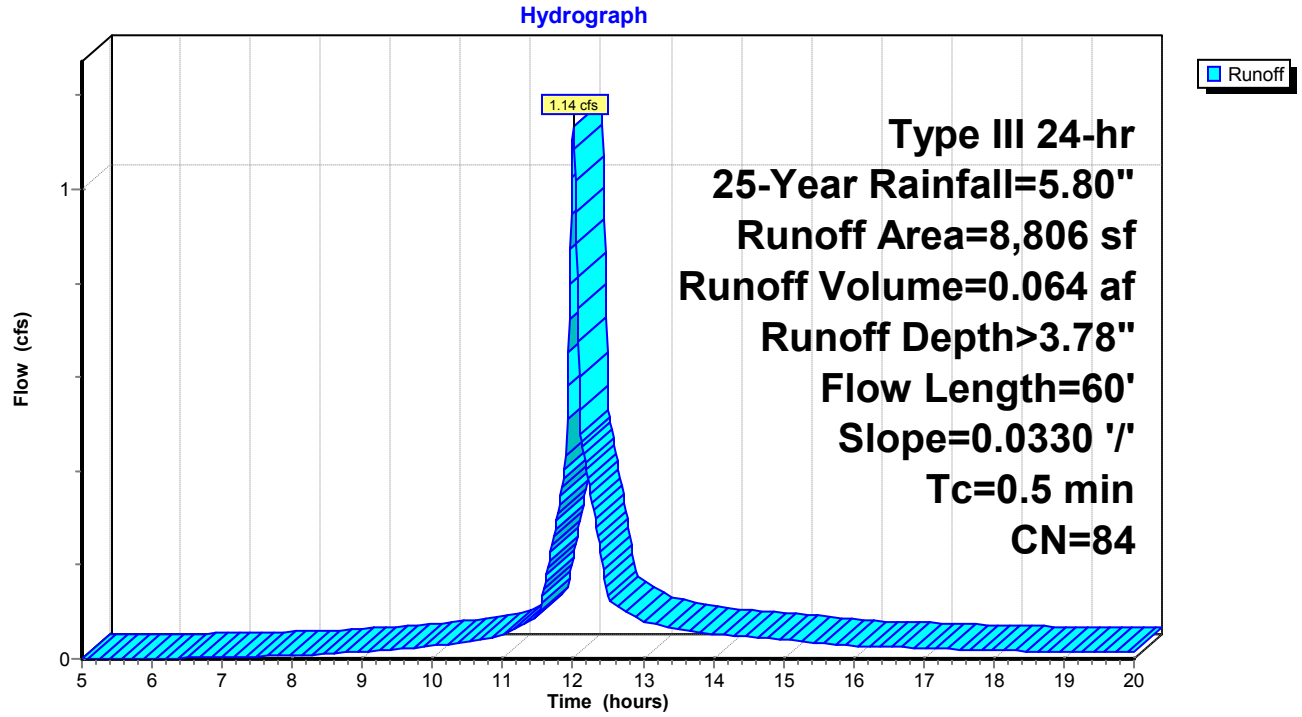
Runoff = 1.14 cfs @ 12.01 hrs, Volume= 0.064 af, Depth> 3.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
2,173	98	Paved parking, HSG C
6,633	79	50-75% Grass cover, Fair, HSG C
8,806	84	Weighted Average
6,633		75.32% Pervious Area
2,173		24.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	25	0.0330	1.25		**Sheet Flow, A to B** Smooth surfaces n= 0.011 P2= 3.10"
0.2	35	0.0330	3.69		**Shallow Concentrated Flow, B to C** Paved Kv= 20.3 fps
0.5	60	Total			

Subcatchment 3S: Valet Parking Site

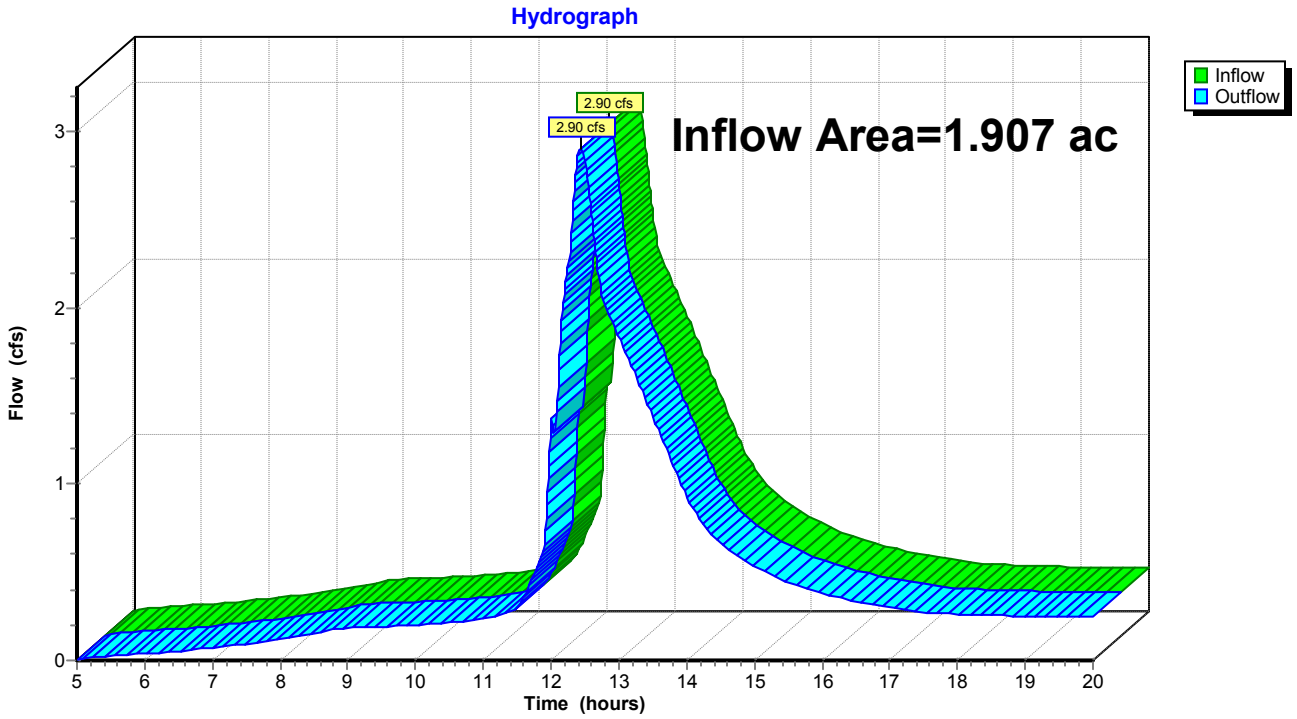


Summary for Reach SP1: Exist CB7

Inflow Area = 1.907 ac, 55.80% Impervious, Inflow Depth > 3.63" for 25-Year event
Inflow = 2.90 cfs @ 12.44 hrs, Volume= 0.576 af
Outflow = 2.90 cfs @ 12.44 hrs, Volume= 0.576 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs

Reach SP1: Exist CB7

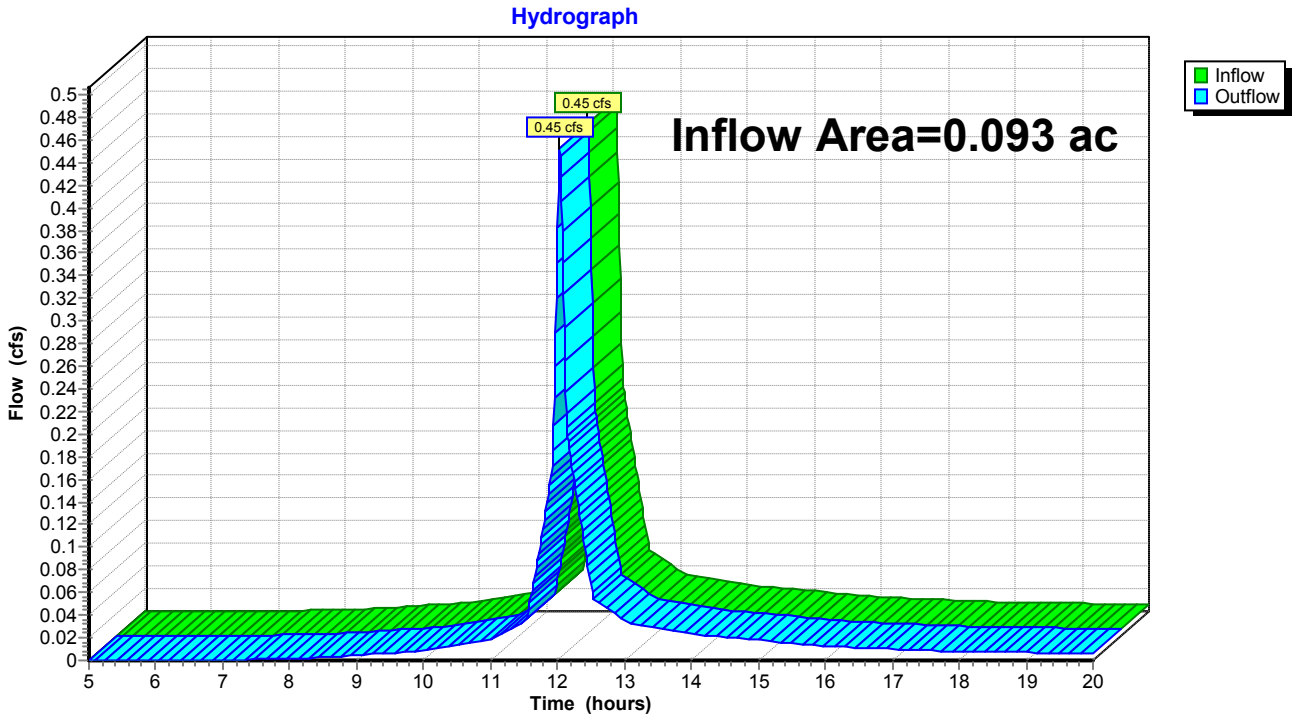


Summary for Reach SP2: To Detention Pond

Inflow Area = 0.093 ac, 5.34% Impervious, Inflow Depth > 3.38" for 25-Year event
Inflow = 0.45 cfs @ 12.03 hrs, Volume= 0.026 af
Outflow = 0.45 cfs @ 12.03 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs

Reach SP2: To Detention Pond



Summary for Pond DH86: Exist DH86

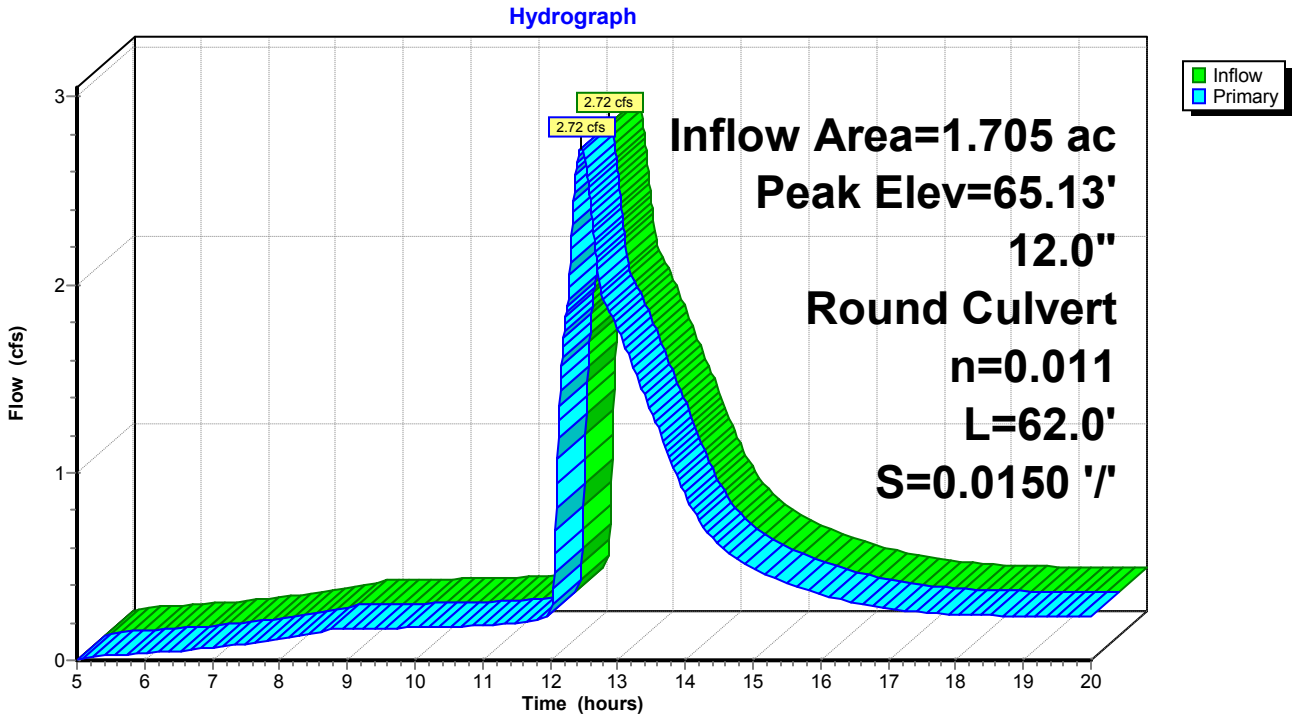
Inflow Area = 1.705 ac, 59.49% Impervious, Inflow Depth > 3.61" for 25-Year event
Inflow = 2.72 cfs @ 12.46 hrs, Volume= 0.513 af
Outflow = 2.72 cfs @ 12.46 hrs, Volume= 0.513 af, Atten= 0%, Lag= 0.0 min
Primary = 2.72 cfs @ 12.46 hrs, Volume= 0.513 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Peak Elev= 65.13' @ 12.46 hrs
Flood Elev= 71.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	64.11'	**12.0" Round Culvert** L= 62.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 64.11' / 63.18' S= 0.0150 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.72 cfs @ 12.46 hrs HW=65.13' (Free Discharge)
1=Culvert (Inlet Controls 2.72 cfs @ 3.47 fps)

Pond DH86: Exist DH86



Summary for Pond SF1: Soil Filter 1

Inflow Area = 1.705 ac, 59.49% Impervious, Inflow Depth > 4.39" for 25-Year event
Inflow = 7.91 cfs @ 12.13 hrs, Volume= 0.624 af
Outflow = 2.72 cfs @ 12.46 hrs, Volume= 0.513 af, Atten= 66%, Lag= 19.7 min
Primary = 2.72 cfs @ 12.46 hrs, Volume= 0.513 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.01 hrs
Peak Elev= 72.66' @ 12.46 hrs Surf.Area= 5,254 sf Storage= 11,194 cf
Flood Elev= 73.50' Surf.Area= 5,254 sf Storage= 11,678 cf

Plug-Flow detention time= 105.9 min calculated for 0.513 af (82% of inflow)
Center-of-Mass det. time= 56.7 min (816.2 - 759.6)

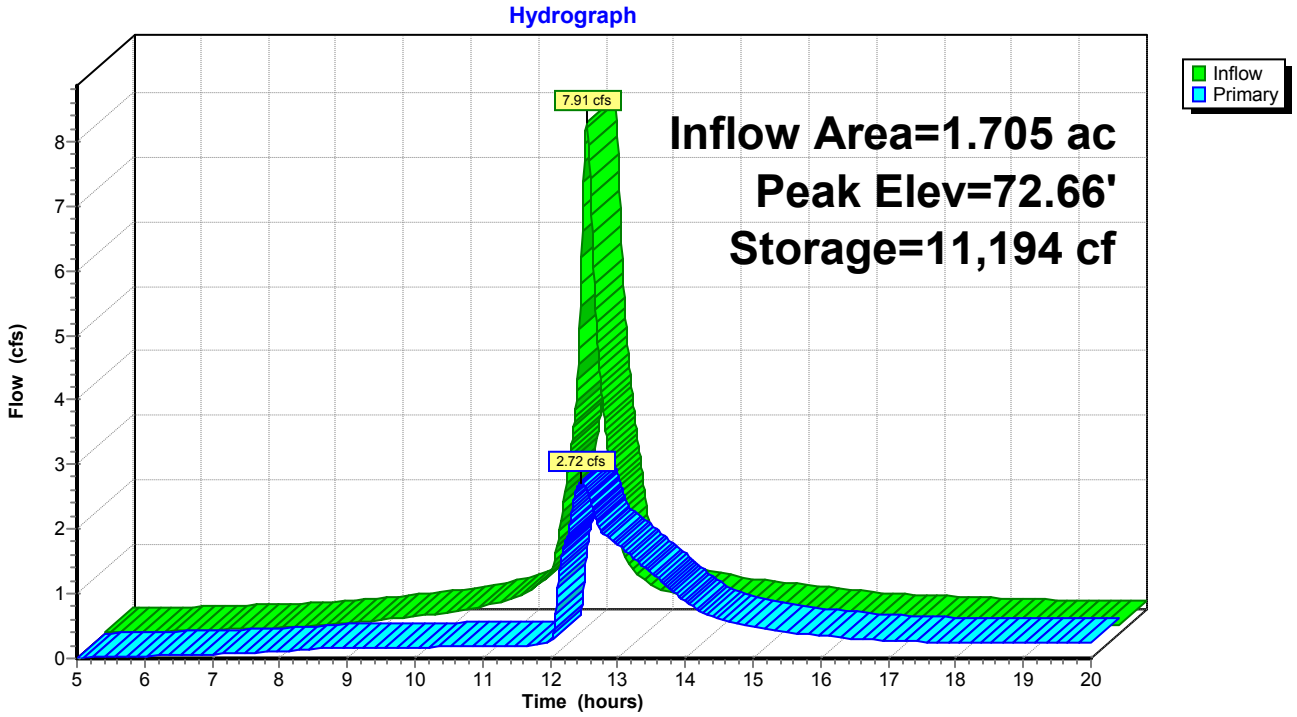
Volume	Invert	Avail.Storage	Storage Description
#1	70.00'	11,678 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
70.00	2,997	0	0
71.00	3,857	3,427	3,427
71.50	4,309	2,042	5,469
71.75	4,774	1,135	6,604
72.50	5,254	3,761	10,364
72.75	5,254	1,314	11,678

Device	Routing	Invert	Outlet Devices
#1	Primary	67.33'	**12.0" Round Culvert** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 67.33' / 66.93' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	67.66'	**6.0" Vert. Underdrain** C= 0.600
#3	Device 2	70.00'	**2.400 in/hr Exfiltration over Surface area**
#4	Device 1	71.50'	**6.0" Vert. Orifices X 2.00** C= 0.600
#5	Device 1	72.50'	**18.0" Horiz. Nyloplast Grate X 0.65** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.72 cfs @ 12.46 hrs HW=72.66' (Free Discharge)
- **1=Culvert** (Passes 2.72 cfs of 6.84 cfs potential flow)
  - **2=Underdrain** (Passes 0.29 cfs of 2.06 cfs potential flow)
    - **3=Exfiltration** (Exfiltration Controls 0.29 cfs)
  - **4=Orifices** (Orifice Controls 1.80 cfs @ 4.59 fps)
  - **5=Nyloplast Grate** (Weir Controls 0.63 cfs @ 0.84 fps)

Pond SF1: Soil Filter 1



Attachment C

Inspection, Maintenance and Housekeeping Plan

88125

INSPECTION, MAINTENANCE, AND HOUSEKEEPING PLAN

Valet Parking Lot
Portland, ME

Introduction

Upon completion of the proposed development, Toye Realty Holdings III, LLC (or a subsidiary of) will be the responsible party for maintaining the stormwater management system. Until such time as the parking lot is established, such as during construction, the contractor shall be responsible for maintaining the stormwater management system. The responsible party shall schedule maintenance of all stormwater management structures, the establishment of any contract services required to implement the program, and the keeping of records and maintenance logbook.

Records of all inspections and maintenance work accomplished must be kept on file and retained for a minimum 5-year time span. The maintenance logbook will be made available to the Maine Department of Environmental Protection (MDEP) and the City of Portland upon request. At a minimum, the appropriate and relevant activities for each of the stormwater management systems will be performed on the prescribed schedule.

The following plan outlines the anticipated inspection, maintenance, and housekeeping procedures for the erosion and sedimentation controls as well as stormwater management devices for the project site. Also, this plan outlines several housekeeping requirements that shall be followed during and after construction. These procedures should be followed in order to ensure the intended function of the designed measures and to prevent unreasonable adverse impacts to the surrounding environment.

The procedures outlined in the Inspection, Maintenance, and Housekeeping Plan is provided as an overview of the anticipated practices to be used on this site. In some instances, additional measures may be required due to unexpected conditions. For additional details on any of the erosion and sedimentation control measures or stormwater management devices to be utilized on this project, refer to the most recently revised edition of the "Maine Erosion and Sedimentation Control BMP" manual and/or the "Stormwater Management for Maine: Best Management Practices" manual as published by the MDEP.

During Construction

1. **Inspection:** During the construction process, it is the Contractor's responsibility to comply with the inspection and maintenance procedures outlined in this section. These responsibilities include

inspecting disturbed and impervious areas, erosion control measures, materials storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site. These areas shall be inspected at least once a week as well as before and after a storm event, and prior to completing permanent stabilization measures. A person with knowledge of erosion and stormwater control, including the standards and conditions in any applicable permits, shall conduct the inspections.

2. **Maintenance:** All measures shall be maintained in an effective operating condition until areas are permanently stabilized. If Best Management Practices (BMPs) need to be maintained or modified, additional BMPs are necessary, or other corrective action is needed, implementation must be completed within seven (7) calendar days and prior to any storm event (rainfall).

3. **Documentation:** A log summarizing the inspections and any corrective action taken must be maintained on-site. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of erosion and sedimentation controls, material storage areas, and vehicle access points to the site. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken.

   The log must be made accessible to the appropriate regulatory agency upon request. The permittee shall retain a copy of the log for a period of at least three (3) years from the completion of permanent stabilization.

4. **Specific Inspection and Maintenance Tasks:** The following is a list of erosion control and stormwater management measures and the specific inspection and maintenance tasks to be performed during construction.

   A. <u>Sediment Barriers:</u>

   - Hay bale barriers, silt fences, and filter berms shall be inspected immediately after each rainfall and at least daily during prolonged rainfall.
   - If the fabric on silt fence or filter barrier should decompose or become ineffective prior to the end of the expected usable life and the barrier is still necessary, it shall be replaced.
   - Sediment deposits should be removed after each storm event. They must be removed before deposits reach approximately one-half the height of the barrier.
   - Filter berms shall be reshaped as needed.
   - Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required should be dressed to conform to the existing grade, prepared, and seeded.

B. Riprap Materials:

- Once a riprap installation has been completed, it should require very little maintenance. It shall, however, be inspected periodically to determine if high flows have caused scour beneath the riprap or dislodged any of the stone.

C. Erosion Control Blankets:

- Inspect these reinforced areas semi-annually and after significant rainfall events for slumping, sliding, seepage, and scour. Pay close attention to unreinforced areas adjacent to the erosion control blankets, which may experience accelerated erosion.
- Review all applicable inspection and maintenance procedures recommended by the specific blanket manufacturer. These tasks shall be included in addition to this plan.

D. Temporary Storm Drain Inlet Protection:

- The inlet protection structure shall be inspected before each rain event and repaired as necessary.
- Sediment shall be removed and the storm drain sediment barrier restored to its original dimensions when the sediment has accumulated to half of the design depth of the trap.
- Structures shall be removed upon permanent stabilization of the tributary area.
- Upon removal of the structure, all accumulated sediments downstream of the structure shall be cleaned from the storm drain system.

E. Stabilized Construction Entrances/Exits:

- The exit shall be maintained in a condition that will prevent tracking of sediment onto public rights-of-way.
- When the control pad becomes ineffective, the stone shall be removed along with the collected soil material. The entrance should then be reconstructed.
- Areas that have received mud-tracking or sediment deposits shall be swept or washed. Washing shall be done on an area stabilized with aggregate, which drains into an approved sediment-trapping device (not into storm drains, ditches, or waterways).

F. Temporary Seed and Mulch:

- Mulched areas should be inspected after rain events to check for rill erosion.
- If less than 90% of the soil surface is covered by mulch, additional mulch shall be applied in bare areas.
- In applications where seeding and mulch have been applied in conjunction with erosion

control blankets, the blankets must be inspected after rain events for dislocation or undercutting.

- Mulch shall continue to be reapplied until 95% of the soil surface has established temporary vegetative cover.

G. Stabilized Drainage Swales:

- Sediment accumulation in the swale shall be removed once the cross section of the swale is reduced by 25%.
- The swales shall be inspected after rainfall events. Any evidence of sloughing of the side slopes or channel erosion shall be repaired and corrective action should be taken to prevent reoccurrence of the problem.
- In addition to the stabilized lining of the channel (i.e. erosion control blankets), stone check dams may be needed to further reduce channel velocity.

5. **Housekeeping:** The following general performance standards apply to the proposed project.

A. Spill Prevention: Controls must be used to prevent pollutants from being discharged from materials on-site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.

B. Groundwater Protection: During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors, accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

C. Fugitive Sediment and Dust: Actions must be taken to insure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control.

D. Debris and Other Materials: Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

E. Trench or Foundation Dewatering: Trench dewatering is the removal of water from trenches, foundations, cofferdams, ponds, and other areas within the construction area that retain water after excavation. In most cases, the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over

disturbed areas of the site. Equivalent measures may be taken if approved.

After Construction

1. **Inspection:** After construction, the owner or operator shall hire a qualified post-construction stormwater inspector to at least annually, inspect the BMPs, in accordance with all municipal and state inspection, cleaning and maintenance requirements of the approved post-construction stormwater management plan.

2. **Maintenance, and repair:** If a BMP requires maintenance, repair or replacement to function as intended by the approved post-construction stormwater management plan, the owner or operator shall take corrective actions to address the deficiency or deficiencies as soon as possible after the deficiency is discovered and shall provide a record of the deficiency and corrective actions to the Department of Public Services (DPS). The following is a list of permanent erosion control and stormwater management measures and the inspection, maintenance, and housekeeping tasks to be performed after construction.

   A. Vegetated Areas:
      - Inspect vegetated areas, particularly slopes and embankments, early in the growing season or after heavy rains to identify active or potential erosion problems.
      - Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

   B. Ditches, Swales and Other Open Channels:
      - Inspect ditches, swales, and other open stormwater channels in the spring, in the late fall, and after heavy rains to remove any obstructions to the flow. Remove accumulated sediments and debris, remove woody vegetative growth that could obstruct flow and repair any erosion of the ditch lining.
      - Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity.
      - Any woody vegetation growing through riprap linings must also be removed. Repair any slumping side slopes as soon as practicable.
      - Replace riprap in areas where any underlying filter fabric or underlying gravel is showing through the stone or where stones have dislodged.

   C. Level Lip Spreaders/Ditch Turnouts:
      - The level lip spreader pool shall be inspected after significant rainfall events for sediment accumulation and debris that may reduce its capacity. Sediment and debris buildup shall be removed once the volume of the pool has been reduced by 25%.
      - The level lip must be constructed so that runoff flows slowly over the lip to a sheet flow

condition through the receiving area. Repair or reconstruction of the level lip is required when the flow from the spreader becomes channelized.

- Do not store snow removed from the street/parking lot within the area of the level spreader.

D. Winter Sanding:

- Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring.
- Accumulations on pavement may be removed by pavement sweeping.
- Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader or other acceptable method.

E. Underdrained Grass Filter

- The inlet and outlet of the BMP shall be checked periodically to ensure that flow structures are not blocked by debris. Inspections should be conducted monthly during wet weather conditions from March to November.
- Debris and sediment buildup shall be removed from the forebay and basin upon reaching a 6-inch accumulation within the forebay and 2 inches within the basin, but not less than annually.
- Mowing of grass may be conducted semiannually to a height of no less than 6-inches, with hand held trimmers or push mowers
- Grass filters shall be inspected annually for erosion, destabilization of sideslopes, embankment settling and other signs of structural failure. Corrective action should be taken immediately upon identification of problems.
- Rototill top of filter bed when ponding exceeds 48 hours
- Replace top several inches of filter material when ponding exceeds 72 hours

F. Catch Basins:

- Inspect and, if required, clean-out catch basins at least once a year, preferably in early spring.
- Clean out must include the removal and legal disposal of accumulated sediments and debris at the bottom of the basin, at any inlet grates, at any inflow channels to the basin, and at any pipes between basins.

G. Culverts:

- Inspect culverts in the spring, in the late fall, and after heavy rains to remove any obstructions to flow.
- Remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit.
- Inspect and repair any erosion damage at the culvert's inlet and outlet.

- Inspect embankment for erosion, settling, and structural failure.

3. **Annual Report:** The owner or operator or a qualified post-construction stormwater inspector hired by that person, shall, on or by June 30 of each year, provide a completed and signed certification that the person has inspected the BMPs and that they are adequately maintained and functioning as intended by the approved post-construction stormwater management plan, or that they require maintenance or repair, including the record of the deficiency and corrective actions taken.

4. **Duration of Maintenance:** Perform maintenance as described and required for any associated permits unless and until the system is formally accepted by a municipality or quasi-municipal district, or is placed under the jurisdiction of a legally created association that will be responsible for the maintenance of the system. If a municipality or quasi-municipal district chooses to accept a stormwater management system, or a component of a stormwater system, it must provide a letter to the MDEP stating that it assumes responsibility for the system. The letter must specify the components of the system for which the municipality or district will assume responsibility, and that the municipality or district agrees to maintain those components of the system in compliance with MDEP standards. Upon such assumption of responsibility, and approval by the MDEP, the municipality, quasi-municipal district, or association becomes a co-permittee for this purpose only and must comply with all terms and conditions of the permit.

Attachments

Attachment 1 – Sample Stormwater Inspection and Maintenance Form

88125

Sample Stormwater Inspection and Maintenance Form

Valet Parking Lot; Portland, ME
Attachment 1

This log is intended to accompany the stormwater Inspection, Maintenance and Housekeeping Plan for the Valet Parking Lot. The following items shall be checked, cleaned and maintained on a regular basis as specified in the Maintenance Plan and as described in the table below. This log shall be kept on file for a minimum of five (5) years and shall be available for review. Qualified personnel familiar with drainage systems and soils shall perform all inspections. Attached is a copy of the construction and post-construction maintenance logs.

Item	Maintenance Required & Frequency	Date Completed	Maintenance Personnel	Comments
Ditches and Swales	Inspect after major rainfall event producing greater than 3" of rain in 2 hours.			
	Repair erosion or damage immediately.			
Catch Basins and Culverts	Remove accumulated sediment and debris			
	Sump depth			
Vegetated Areas	Inspect Slopes			
	Replant Bare Areas			
	Check after Major Storms			
Winter Sanding	Clean annually (Spring)			
	Remove sand and sediment from roadway shoulders			
Level Lip Spreaders	Inspect after significant rainfall			
	Remove sediment if pool volume reduced by 25%			
	Repair the riprap if flow become s channelized			
Underdrained Grass Filter	Inspect inlets/outlets to ensure no blockage from debris			
	Inspect sideslopes annually for erosion, destabilization, and embankment settling.			

Attachment D

Application for Stormwater Fee Credits

FORM 2

Non-Residential Stormwater Credits: New Development/Re-Development

(Site Plan Review Required)

Project Site Information

Address: Jetport Boulevard, Portland, ME 04103
Street Address Zip Code

Parcel ID (Chart, Block, Lot # + 3-digit ID): 210A A006001

Project ID (if assigned): _____

Contact Information

Applicant (must be owner, lessee or buyer)

Name: Toye, Thomas
Last First M.I.

Business Name (if Applicable): Toye Realty Holdings III, LLC

Relation to Owner (lessee, buyer, etc, if Applicable): Owner

Mailing Address: P.O. Box 6285
Street Address Apartment/Unit #

Cape, Elizabeth, ME 04107
City State Zip Code

Phone #: (305) 450 - 2552 E-mail Address: ttoye3@aol.com

Owner (if different from Applicant)

Name: _____
Last First M.I.

Mailing Address: _____
Street Address Apartment/Unit #

_____
City State Zip Code

Phone #: (___) ____ - _____ E-mail Address: _____

Agent/Representative

Name: Sebago Technics, Inc. c/o Robert A. McSorley, P.E.
Last First M.I.

Mailing Address: 75 John Roberts Road, Suite 1A
Street Address Apartment/Unit #

South Portland, ME 04106
City State Zip Code

Phone #: (207) 200 - 2074 E-mail Address: rmcsorley@sebagotechnics.com

Credit Information

Final Total Impervious Area: 43,619 square feet

The credit options and their corresponding credit values are listed in columns A and B, respectively. Indicate in column C the amount of impervious area that is eligible for each credit option, and note the product of columns B and C in column D. *The billable impervious area equal to the Total Impervious Area minus the sum of column D.*

A	B		C		D
Minimum Water Quality Credit:	0.25	x	_____ square feet	=	_____ square feet
Minimum Water Quantity Credit:	0.05	x	_____ square feet	=	_____ square feet
Basic Water Quality Credit:	0.50	x	43,619 square feet	=	21,809 square feet
Basic Water Quantity Credit:	0.10	x	43,619 square feet	=	4,362 square feet
Extra Water Quality Credit:	0.75	x	_____ square feet	=	_____ square feet
Extra Water Quantity Credit:	0.25	x	_____ square feet	=	_____ square feet
			Total	=	26,171 square feet

Billable Impervious Area (Total IA minus Sum of Column D): 17,448 square feet

Applicant Signature

I hereby certify that I am the owner of record of the named property, or that the owner of record has authorized me to submit this application on his or her behalf. I agree to conform to all applicable laws of the City of Portland. In addition, I understand that the City of Portland Department of Public Services has the authority to enter and inspect all areas that pertain to this application at any reasonable hour to verify that the information contained in this form is accurate.

Signature: _____ Date: _____

Robert A. McSorley
Senior Project Manager
2017.05.02
19:26:41 -04'00'