DRAINAGE CALCULATIONS AND STORMWATER MANAGEMENT REPORT

For:

PROPOSED COMMERCIAL BUILDING AND ADDITION SITE DEVELOPMENT

Located at:

343 & 333 WEYMOUTH STREET
(APN'S 3-1, 3-1A, 3-2, 8-27 & 8-28)
ROCKLAND, MA 02370

Submitted to:

TOWN OF ROCKLAND

Prepared For:

DTC, LLC
333 WEYMOUTH ST.
ROCKLAND, MA 02370

MCKENZIE ENGINEERING GROUP

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June 13, 2022
Revised: November 30, 2022

TABLE OF CONTENTS

Drainage Calculations and Stormwater Management Report
Proposed Commercial Development
343 & 333 Weymouth Street
Rockland, Massachusetts

Project Summary

The project proponent, DTC, LLC, proposes to develop an approximate 4.58-acre site located at 343 & 333 Weymouth Street in Rockland (Formerly APN's 3-1, 3-1A, portion of 3-2, 8-27 & 8-28). The proposed development will consist of the construction of an approximate 13,600 square ft. addition to the existing building located at 333 Weymouth Street. The project will also include the construction of related site improvements at 343 Weymouth Street, including asphalt parking area and access driveway, landscaping, stormwater management facilities, utility connections and other relevant infrastructure. The site is located within the Town of Rockland's Industrial Park-Hotel (H-1) Zoning District. Refer to Figure 1- USGS Locus Map for the location of the parcel.

This report contains stormwater runoff calculations for the pre-development and post-development conditions and includes the sizing of the proposed stormwater best management practices (BMPs). The proposed and existing site conditions are illustrated on the project *site plans* entitled "Site Development Plans, (Formerly APN'S 3-1, 3-1A, Portion of 3-2, 8-27 & 8-28), 343 & 333 Weymouth Street, Rockland, Massachusetts", prepared by McKenzie Engineering Group, Inc. dated November 30, 2022.

Pre-Development Condition

The site has frontage on both Weymouth Street and Abington Street to the south and west and is bordered by developed commercial property to the southeast and southwest, residential property to the northwest and undeveloped woodland to the north. An Approval Not Required Plan was approved by the Rockland Planning Board on May 24, 2022 combining APN's 3-1, 3-1A, portion of 3-2, 8-27 & 8-28 to create 'Lot 1' comprising an area of 4.58± AC. The portion of the site located at 333 Weymouth Street (Formerly APN 08-27) is comprised of a developed commercial building with associated site infrastructure. The portion of the site located at 343 Weymouth Street (Formerly APN's 3-1, 3-1A, 3-2 & 8-28) is currently undeveloped. A bordering vegetated wetland complex is located along the northeast portion of the site. The topography of the site ranges in elevation from approximately 170 ft. (NAVD 1988) along the site's frontage at Weymouth & Abington Street, to elevation of approximately 150 ft (NAVD 1988) at the boundary of the bordering vegetated wetlands. Runoff from the developed portion of the site at 333 Weymouth Street generally flows towards the closed drainage system located onsite, where it is conveyed toward the wetlands via an existing spillway outlet. Runoff from the undeveloped portion of the site generally flows towards the existing limit of bordering vegetated wetlands due to the topography. The limit of bordering vegetated wetland resource area on the site was delineated by Environmental Consulting & Restoration, LLC on August 10, 2020.

A portion of the site is located within the Zone A, the remaining area is situated in Zone X of the Flood Insurance Rate Map, as shown on the current FEMA Flood Insurance Rate Map Panel No. 25023C0091K with an effective date of July 6, 2021. Refer to Figure 2 – FEMA Flood Map.

Review of available environmental databases such as MassGIS reveals that the Site is located within a Zone C Surface Water Protection Area. The Site is not located within a DEP Zone 2, Town of Rockland Watershed Protection Zone or Natural Heritage Endangered Species Area. Refer to Figure 4 – NHESP Map.

The soil types as identified by the Soil Survey, Plymouth County, MA prepared by the NRCS Soil Conservation Service (NRCS) are classified as 51A-Swansea Muck, 0 to 1 percent slopes with hydrologic soil group (HSG) B/D, 316B-Scituate Gravelly Sandy Loam, 3 to 8 percent slopes with HSG C/D, and 640B-Urban Land, Till Substratum, 0 to 8 percent slopes with no HSG. Soil testing conducted by McKenzie Engineering Group, Inc. (MEG) on November 22, 2022 identified the soils to be generally comprised of sandy loam underlain by a loamy sand parent layer. Refer to Figure 3 - Soil Map for the NRCS delineation of soil types.

In the pre- and post- development stormwater analysis, the watershed area analyzed was approximately 4.24 acres consisting of the subject parcels to be developed. The pre-development watershed consists of three (3) design points. Refer to Pre-Development Watershed Delineation Plan WS-1 in Appendix A for a delineation of drainage subareas for the pre-development design condition.

The SCS Technical Release 20 (TR-20) and Technical Release 55 (TR-55) method-based program “HydroCAD” was employed to develop pre- and post-development peak flows. Drainage calculations were prepared for the pre-development condition for the 2, 10, 25 and 100-year, Type III storm events. Refer to Appendix A for computer results, soil characteristics, cover descriptions and times of concentrations for all subareas.

Post-Development Condition

The proposed development will consist of the construction of an approximate 13,600 square ft. addition to the existing building located at 333 Weymouth Street. The project will also include the construction of related site improvements at 343 Weymouth Street, including asphalt parking area and access driveway, landscaping, stormwater management facilities, utility connections and other relevant infrastructure. The stormwater management system will be designed to fully comply with all standards of the Department of Environment Protection’s Stormwater Management Regulations.

In both the pre-development and post-development condition, an approximate watershed area of 4.24 acres was analyzed. Watershed areas were analyzed in the post-development condition to design low impact stormwater management facilities to mitigate impacts resulting from the developing the site. The objective in designing the proposed drainage facilities for the project was to maintain existing drainage patterns to the extent practicable and to ensure that the post-development rates of runoff are less than pre-development rates at all design points. Refer to Proposed Watershed Delineation Plan WS-2 in Appendix B for a delineation of the post-development drainage subareas. The design points for the post-development design conditions correspond to those analyzed for the pre-development design condition. All design points are shown on Plan No. WS-2. The infiltration basin is shown as Pond 1P on Plan No. WS-2.

The developed parcel located at 333 Weymouth Street will continue to utilize the existing on-site stormwater management strategy consisting of catch basins and pre-treatment

units conveying stormwater into the wetland located to the north. The proposed building addition and site development located at 343 Weymouth Street will utilize a proposed stormwater management system and treatment stream consisting of deep sump hooded catch basins, a proprietary pre-treatment unit and a stormwater infiltration basin. Runoff from the proposed parking areas, landscaped areas and roof runoff produced from the proposed building addition will be directed to catch basins and treated by the proprietary pre-treatment unit, then conveyed into the infiltration basin where it will infiltrate into the surrounding native soils. The stormwater infiltration basin will include an overflow outlet directed at the wetland complex located within in the eastern portion of the site. The stormwater infiltration basin was designed to attenuate peak flows generated by all storms up to and including the 100-year storm event and will outlet stormwater directed at the bordering vegetated wetland within the subject parcel at a regulated rate. Refer to the site plans for the drainage system design All BMPs shall be supported by a comprehensive Construction Phase Pollution Prevention and Erosion Control Plan and Post-Development BMP Operation and Maintenance Plan.

Stormwater Infiltration Basin

Runoff from subcatchment 5S, within the limit of pavement of the central portion of the site, and subcatchment 6S, consisting of grass, woodlands at off-site tributary areas to the north, will be captured in a stormwater infiltration basin shown as pond 1P on Plan No. WS-2. The stormwater infiltration basin subsoil shall be over excavated until the native sand and gravel materials are encountered and placed on top of imported sand conforming with the requirements of the Massachusetts Sanitary Code (Title 5) supplied as needed. Runoff within the limit of pavement will be directed to the catch basin and treated by the proprietary pretreatment unit, then conveyed into the stormwater infiltration basin where it will infiltrate into the surrounding sand and gravel soil, with an overflow outlet directed at the adjacent bordering vegetated wetlands located to the east. The stormwater infiltration basin was designed to accommodate peak flow generated by all storms up and including to the 100-year storm event. Refer to the site plans for the drainage system design. All BMPs shall be supported by a comprehensive Construction Phase Pollution Prevention Plan and Erosion Control Plan and Post-Development BMP Operation and Maintenance Plan.

Stormwater Best Management Practices (BMP's)

Treatment stream for the new development shall consist of parking lot maintenance and sweeping, deep sump hooded catch basins, proprietary pre-treatment units and the stormwater infiltration basin to achieve the required removal of at least 80% of the total suspended solids (TSS) and mitigate the anticipated pollutant loading.

Refer to the TSS Removal Worksheets in Appendix D for TSS removal rates.

Erosion and Sedimentation Controls

Compost filter tube (Silt sock) erosion control barriers will be placed at the limit of work as indicated on the plan prior to the commencement of any construction activity. The integrity of the silt sock will be maintained by periodic inspection and replacement as necessary. The silt sock will remain in place until the first course of pavement has been placed and all side slopes have been loamed and seeded and vegetation has been established. Refer to the Erosion Control details on the Site Development Plan and BMP Operation and Maintenance Plan for proposed erosion control measures to be employed for the project.

Compliance with Stormwater Management Standards

Standard 1 – No New Untreated Discharges

The proposed redevelopment will not introduce any new untreated discharges to a wetland area or waters of the Commonwealth of Massachusetts. All discharges from impervious areas of the site will be treated through proposed stormwater quality controls such as parking lot maintenance and sweeping, deep sump hooded catch basins, proprietary pre-treatment units and the infiltration basin including the establishment of proper maintenance procedures.

Standard 2 – Peak Rate Attenuation

The SCS Technical Release 20 (TR-20) and Technical Release 55 (TR-55) method-based program "HydroCAD" was employed to develop pre- and post-development peak flows. Drainage calculations were prepared for the pre-development condition for the 2, 10, 25 and 100-year, Type III storm events. Refer to Appendices A and B for computer results, soil characteristics, cover descriptions and times of concentrations for all subareas. All drainage structures will be designed employing the Rational Method and the Mass. DPW Design Manual to accommodate peak flows generated by a minimum of a 25-year storm event or a 100-year storm event where applicable. The stormwater management systems were designed to accommodate peak flows generated by a 100-year storm event.

In the pre-development and post-development stormwater analysis, the watershed area analyzed was approximately 4.24 acres consisting of the subject parcel to be developed and off-site tributary areas to the north. Refer to Existing Watershed Delineation Plan WS-1 for a delineation of drainage subareas for the pre-development design condition and refer to Post-Development Watershed Delineation Plan WS-2 for a delineation of drainage subareas for the post-development design condition.

A separate HydroCAD file included in this submission analyzes the design point associated with the northwest property line to ensure that stormwater runoff directed to the northwest abutter does not exceed pre-development conditions. Subcatchment 4SA represents the northwestern portion of the site tributary to the abutter in the pre-development condition, Subcatchment 4SB represents the tributary area in the post-development condition. Similarly Design Point DP-2A represents the northwestern property line in the pre-development condition, and Design Point DP-2B represents the northwestern property line in the post-development condition.

The peak rates of runoff are as follows:

Pre-Development vs. Post-Development Peak Rates of Runoff

Design Point	2 Year Storm **(3.20 Inches)**		10 Year Storm **(4.70 Inches)**		25 Year Storm **(5.50 Inches)**		100 Year Storm **(7.00 Inches)**	
	Exist. (CFS)	**Prop. (CFS)**	**Exist. (CFS)**	**Prop. (CFS)**	**Exist. (CFS)**	**Prop. (CFS)**	**Exist. (CFS)**	**Prop. (CFS)**
Design Point 1	*5.19*	3.88	*9.20*	8.08	*11.35*	10.85	*15.76*	15.64
Design Point 2	*0.25*	0.08	*0.48*	0.17	*0.61*	0.22	*0.85*	0.32
Design Point 3	*0.52*	0.52	*0.77*	0.77	*0.90*	0.90	*1.15*	1.15

The peak volumes of runoff are as follows:

Pre-Development vs. Post-Development Peak Volumes of Runoff

Design Point	2 Year Storm **(3.20 Inches)**		10 Year Storm **(4.70 Inches)**		25 Year Storm **(5.50 Inches)**		100 Year Storm **(7.00 Inches)**	
	Exist. (AC-FT)	**Prop. (AC-FT)**	**Exist. (AC-FT)**	**Prop. (AC-FT)**	**Exist. (AC-FT)**	**Prop. (AC-FT)**	**Exist. (AC-FT)**	**Prop. (AC-FT)**
Design Point 1	*0.530*	0.429	*0.934*	0.835	*1.164*	1.068	*1.611*	1.519
Design Point 2	*0.019*	0.006	*0.035*	0.012	*0.044*	0.016	*0.062*	0.023
Design Point 3	*0.042*	0.042	*0.062*	0.062	*0.073*	0.073	*0.093*	0.093

A comparison of the pre-development and post-development peak rates of runoff indicates that the peak rates of runoff for the post-development condition will be less than the pre-development condition for all storm events.

Standard 3 – Groundwater Recharge

An analysis of Soil Tests indicates that the site is comprised of sandy loam underlain by a loamy sand parent layer, conducive to infiltration. Runoff will be infiltrated by a stormwater infiltration basin which will meet the Stormwater Guidelines for infiltration:

- Infiltration structures will be a minimum of four (4) feet above seasonal high groundwater.
- Utilize the “Simple Dynamic” method for sizing the storage volume, which takes into account the fact that stormwater is exfiltrating from the infiltration basin at the same time that the basin is filling.
- Hydraulic conductivity is based on soil data from the Geotechnical Report and values developed from Rawls, Brakensiek and Saxton, 1982, Estimation of Soil Water Properties, *Transactions of the American Society of Agricultural Engineers*, vol.25, no. 5.
- Refer to Appendix D for infiltration and drawdown calculations and Appendix F for soil data.

Groundwater Recharge Volume

Stormwater System	Soil Type	Target Depth Factor (F) (in)	Total Impervious Area (sf)	Required Recharge Volume (cf)[1]	Provided Recharge Volume (cf)[2]
	C	0.25	46,577	987	
1P (Stormwater Infiltration Basin)	C				3,920
				987	**3,920**

1. Required Recharge Volume = Target Depth Factor X Impervious Area (d+Kt) [Simple dynamic method]
2. Provided Recharge Volume = Volume Provided from Bottom of System to peak elevation

The stormwater infiltration basin will provide both water quality treatment and recharge. Per Standard 4, Water Quality, the BMP must be sized to treat or hold the Target Volume, the larger of the Required Water Quality Volume and the Required Recharge Volume. The Required Water Quality Volume is based on one inch of runoff and the Required Recharge Volume is based on 0.25-inches (Soil Type C), therefore the Target Volume is the Required Water Quality Volume of 3,881 cubic feet. Refer to Appendix D supplemental calculations.

The proposed stormwater infiltration basin has been designed to completely drain within 72 hours. The drawdown analysis is based on the required recharge volume exfiltrating at the Rawls Rates based on the soil textural analysis conducted at the proposed exfiltration location.

Standard 4 – Water Quality

The stormwater management system was designed to be in full compliance with the DEP Stormwater Management Policy. A treatment stream consisting of deep-sump catch basins with hooded outlets, First Defense proprietary separators (FD-4HC) and a stormwater infiltration basin will be employed in the design of drainage facilities for the project to achieve the required removal of 80% total suspended solids. The proposed treatment streams will renovate the stormwater and improve the water quality by promoting the settlement of sediments and pollutants before runoff is released.

First Defense proprietary separators were sized to accommodate and treat all tributary impervious areas within the watershed using the one inch rule of precipitation during the 100-year storm event. Refer to the TSS Removal Worksheets in Appendix D for TSS removal rates and water quality calculations. The water quality treatment volume is provided within the storm water management facilities as follows:

Water Quality Treatment Volume

Design Point	Required WQ Volume (cf)	Proposed WQ Volume (cf)	
Pond 1P	3,881	3,920	Stormwater Infiltration Basin
	3,881	3,920	

Standard 5 – Land Use with Higher Potential Pollutant Loads (LUHPPL)

The proposed project does not include land uses with higher potential pollutant loads. Not Applicable.

Standard 6 – Critical Areas

The proposed project does not discharge to any critical areas. Not Applicable.

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

The proposed project is not a redevelopment project. Not Applicable.

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

The project will require a NPDES Construction General Permit and the preparation of a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP will be submitted prior to any proposed construction. A Construction Phase BMP Operation and Maintenance Plan is provided in Appendix F.

Standard 9 – Operation and Maintenance Plan

The Post Construction Operation and Maintenance Plan is provided in Appendix F.

Standard 10 – Prohibition of Illicit Discharges

No illicit discharges are anticipated on site. An Illicit Discharge Compliance Statement will be submitted prior to the discharge of any stormwater to the post-construction best management practices. Measures to prevent illicit discharges will be included in the Long-Term Pollution Prevention Plan.

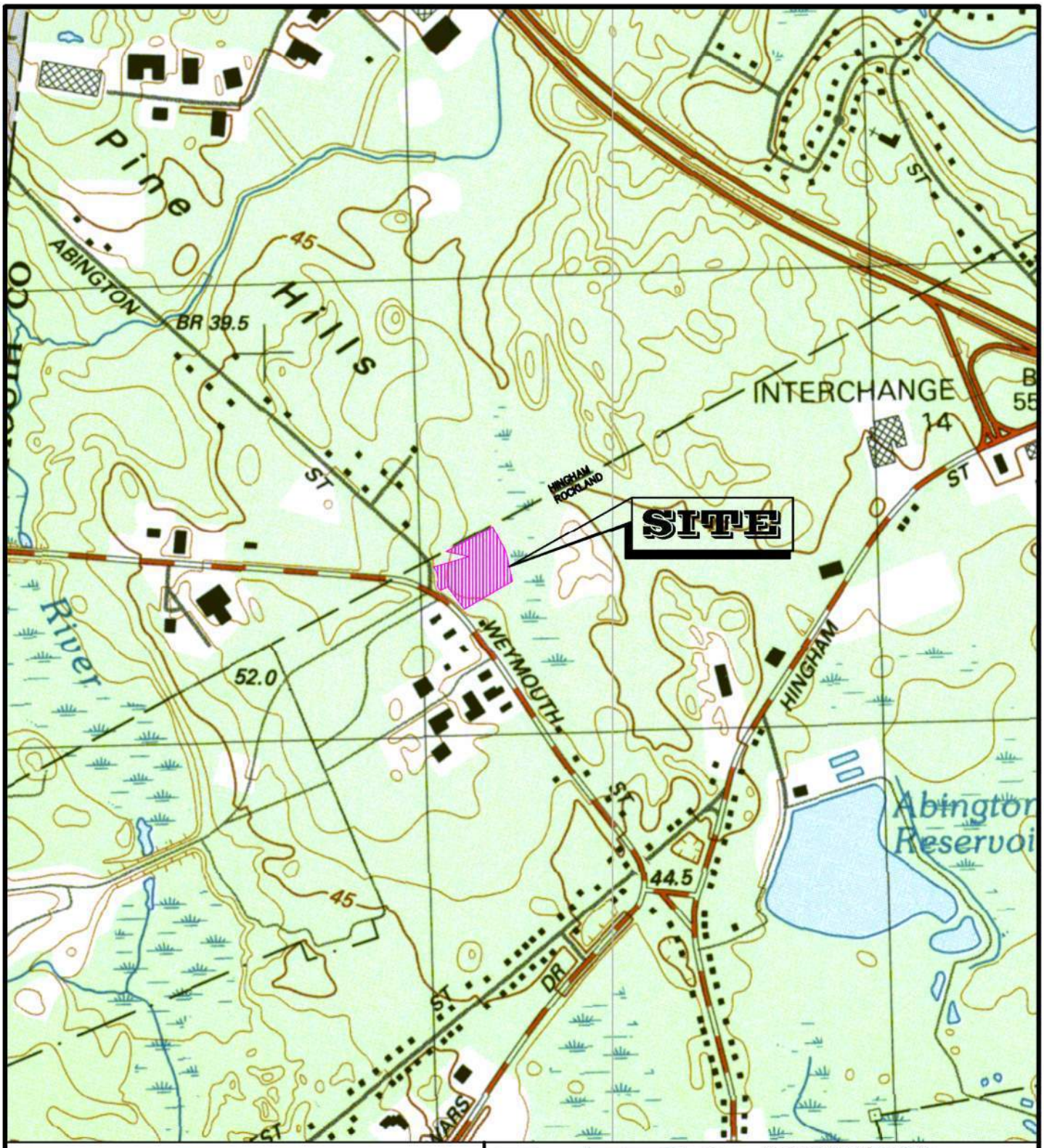

FIGURE - 1

0 1000' 2000' 2500'

U.S. GEOLOGICAL SURVEY
7.5 X 15 MINUTE SERIES

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DATE: OCTOBER 26, 2020

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USGS LOCUS MAP

343 & 333 WEYMOUTH STREET
APN 3-1, 3-1A, 3-2, 8-27 & 8-28
ROCKLAND, MASSACHUSETTS

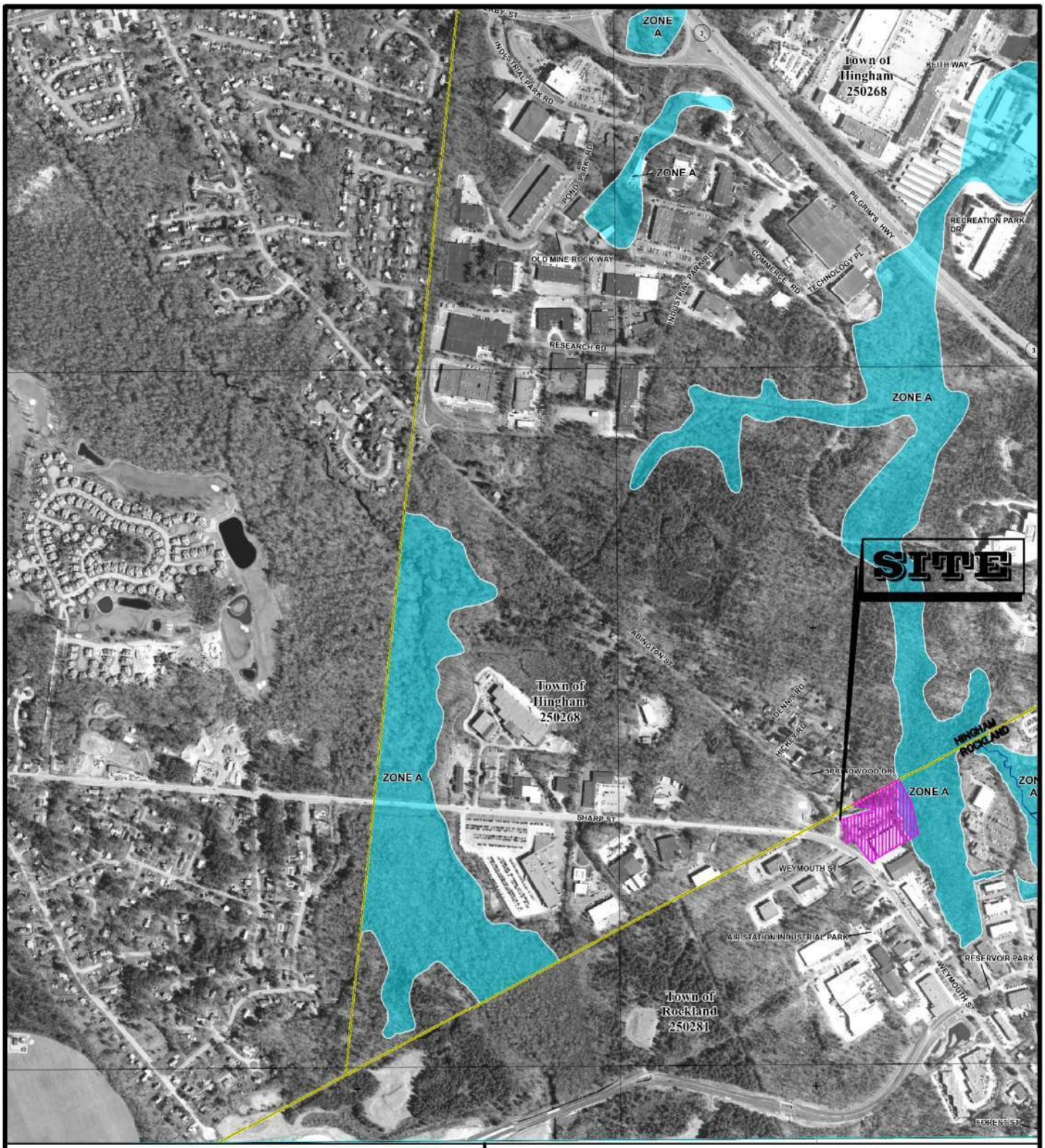

FIGURE - 2

0 1000' 2000' 2500'

COMMUNITY PANEL NO: 25023C0091K
EFFECTIVE DATE: JULY 6, 2021

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DATE: AUGUST 12, 2020

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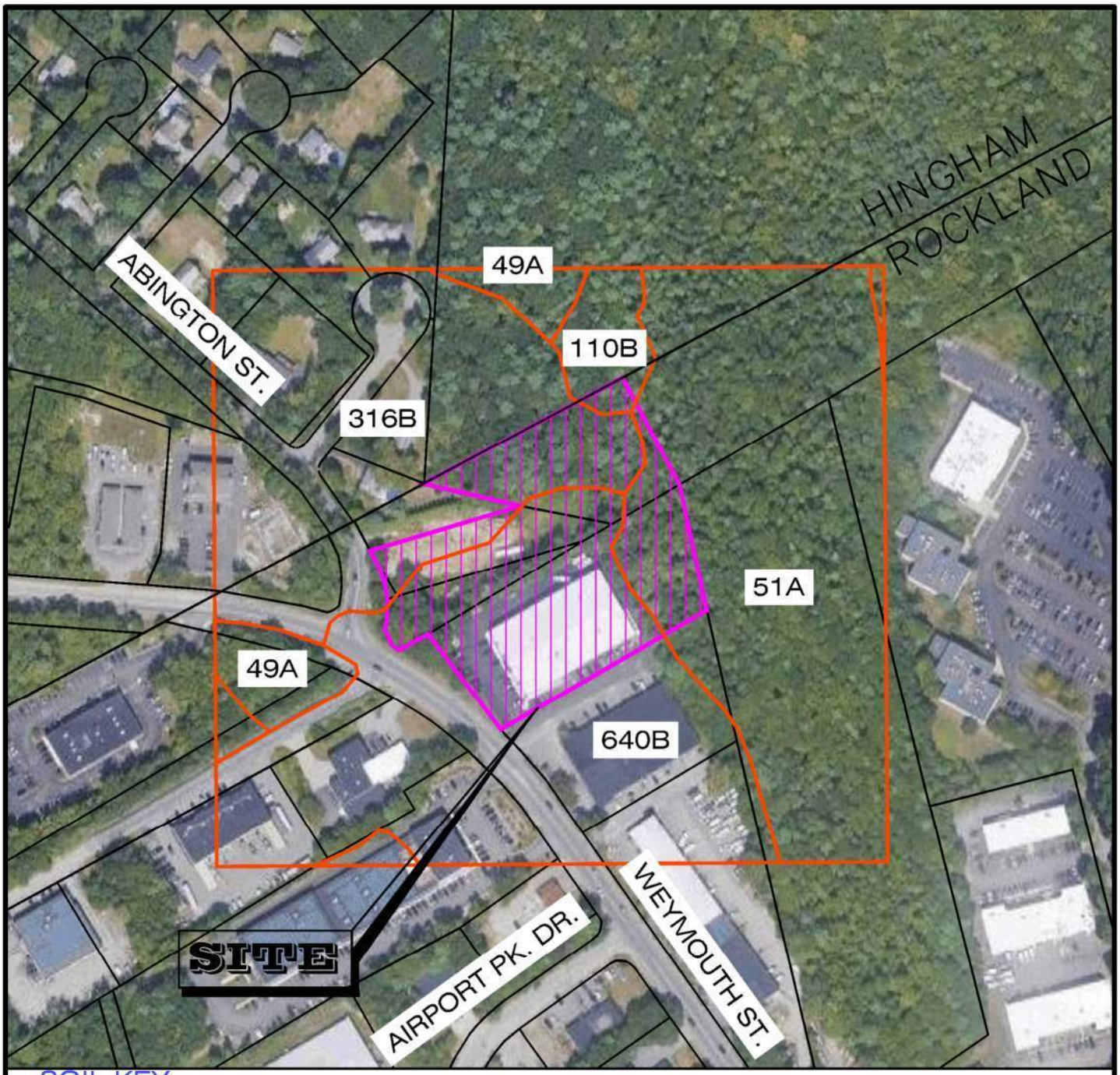
FEMA FLOOD MAP

343 & 333 WEYMOUTH STREET
APN 3-1, 3-1A, 3-2, 8-27 & 8-28
ROCKLAND, MASSACHUSETTS



SOIL KEY

SOIL CLASSIFICATION	DESCRIPTION	HYDROLOGIC SOIL GROUP
51A	SWANSEA MUCK, 0–1% SLOPES	B/D
110B	CANTON–CHATFIELD–ROCK OUTCROP COMPLEX, 0–8% SLOPES, VERY STONEY	B
316B	SCITUATE GRAVELLY SANDY LOAM, 3–8% SLOPES, VERY STONY	C/D
640B	URBAN LAND, TILL SUBSTRATUM, 0–8% SLOPES	N/A

FIGURE - 3

0 250' 500' 625'

NRCS SOIL SURVEY
NORFOLK COUNTY

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DATE: AUGUST 12, 2020

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NRCS SOILS MAP

343 & 333 WEYMOUTH STREET
APN 3-1, 3-1A, 3-2, 8-27 & 8-28
ROCKLAND, MASSACHUSETTS

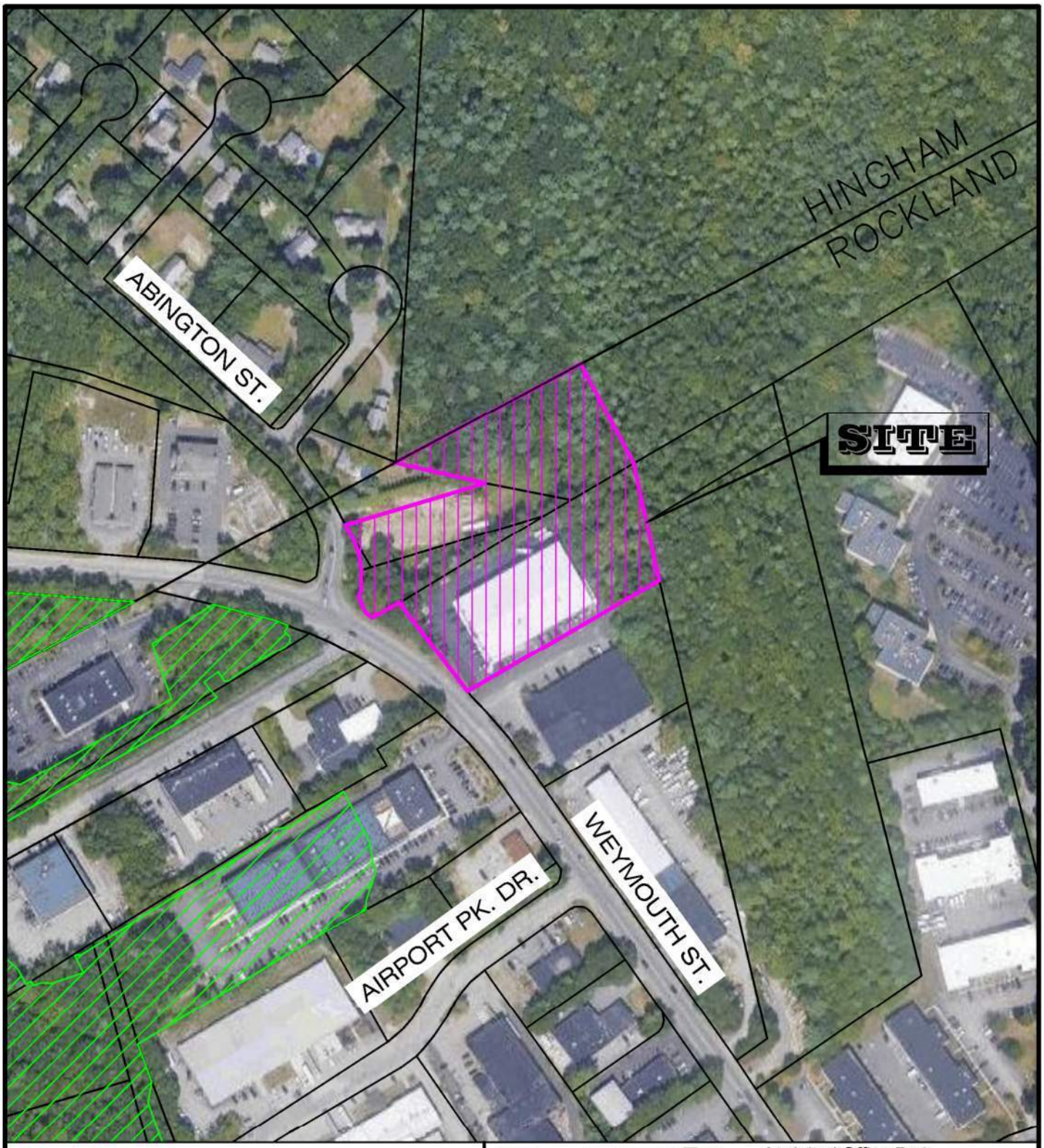

FIGURE - 4

0 250' 500' 625'

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NATIONAL HERITAGE AND ENDANGERED SPECIES MAP

343 & 333 WEYMOUTH STREET
APN 3-1, 3-1A, 3-2, 8-27 & 8-28
ROCKLAND, MASSACHUSETTS

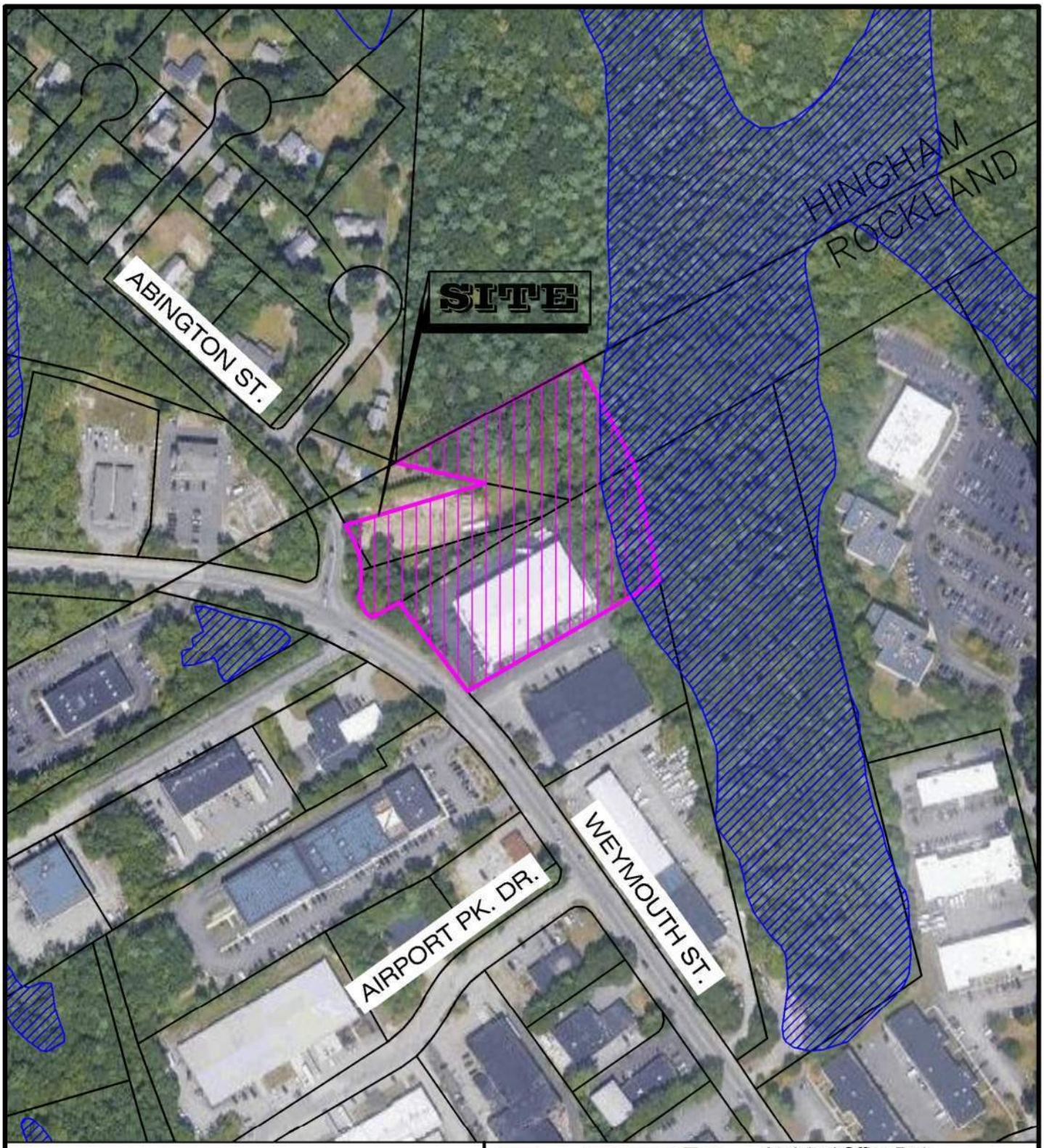

FIGURE - 5

0 250' 500' 625'

DEP WETLANDS

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DATE: AUGUST 12, 2020

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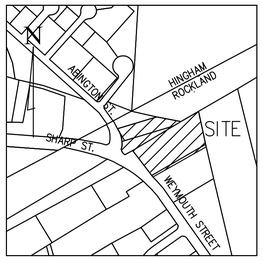
DEP WETLANDS

343 & 333 WEYMOUTH STREET
APN 3-1, 3-1A, 3-2, 8-27 & 8-28
ROCKLAND, MASSACHUSETTS

A P P E N D I X A

Pre-Development Condition



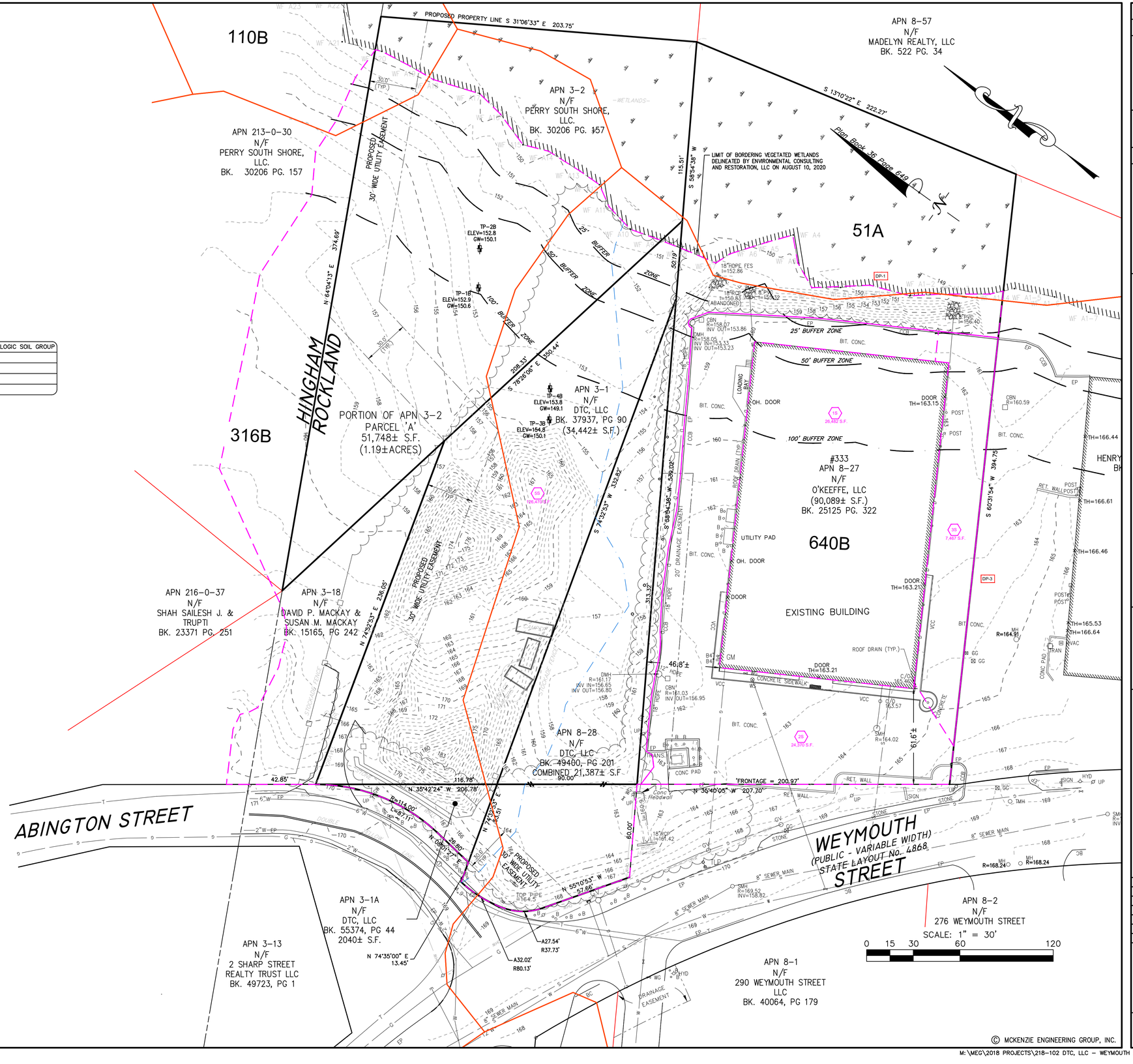
LOCUS MAP
Not to Scale

SOIL KEY

SOIL CLASSIFICATION	DESCRIPTION	HYDROLOGIC SOIL GROUP
51A	SWANSEA MUCK, 0–1% SLOPES	B/D
110B	CANTON–CHATFIELD–ROCK OUTCROP COMPLEX, 0–8% SLOPES, VERY STONEY	B
316B	SCITUATE GRAVELLY SANDY LOAM, 3–8% SLOPES, VERY STONY	C/D
640B	URBAN LAND, TILL SUBSTRATUM, 0–8% SLOPES	N/A

LEGEND

- LIMIT OF WATERSHED
- TIME OF CONCENTRATION FLOW PATH
- LIMIT OF NRCS SOIL MAPPING



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REV	DATE	DESCRIPTION	BY	APP
-	-	-	-	-

MCKENZIE ENGINEERING GROUP
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SITE DEVELOPMENT PLAN

(APNS 3-1, 3-1A, PORTION OF 3-2, 8-27 & 8-28)
343 & 333 WEYMOUTH STREET
ROCKLAND, MASSACHUSETTS

PROFESSIONAL ENGINEER:

APPLICANT:
DTC, LLC
333 WEYMOUTH ST.
ROCKLAND, MA 02370

DRAWN BY:	ESS
DESIGNED BY:	ESS
CHECKED BY:	BCM
APPROVED BY:	BCM
DATE:	OCTOBER 4, 2021
SCALE:	1"=30'
PROJECT NO.:	218–102

DWG. TITLE:
PRE-DEV. WATERSHED PLAN

DWG. NO:
WS-1

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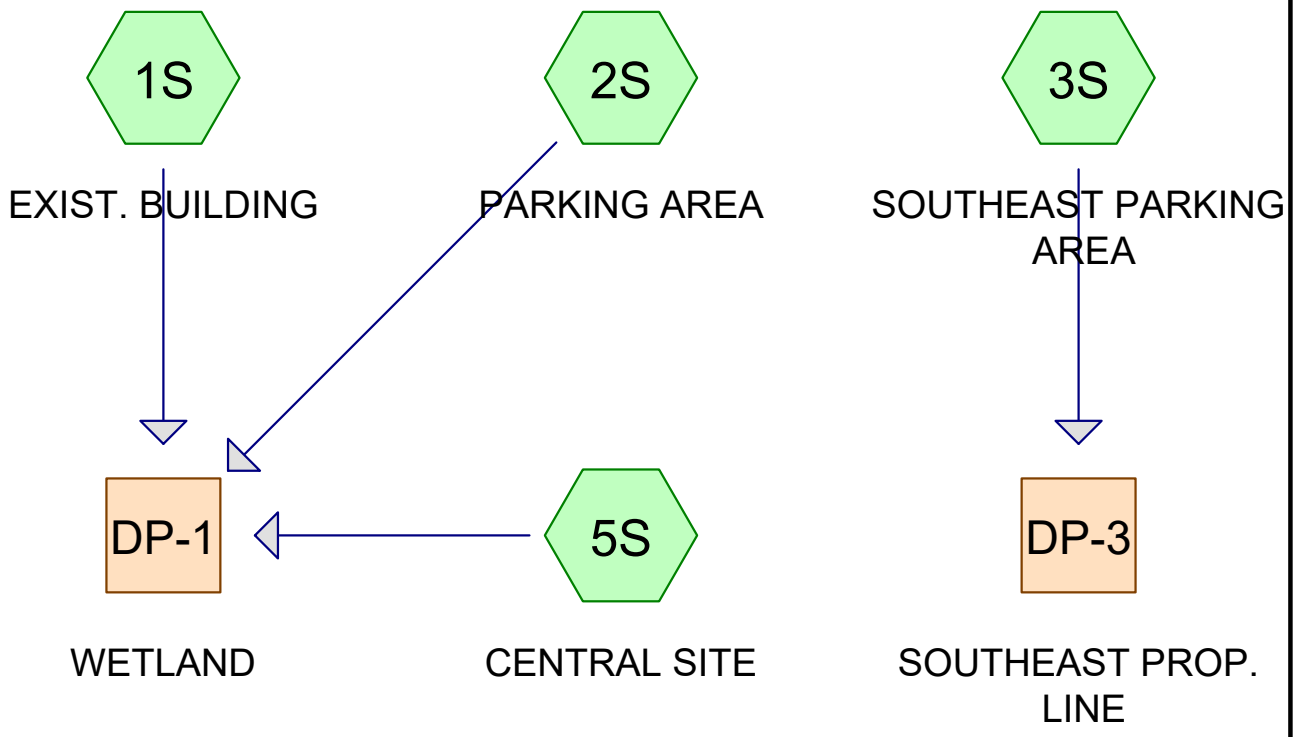


Subcat Reach Pond Link

Routing Diagram for 218-102 PRE DEVELOPMENT1_rev
Prepared by McKenzie Engineering Group, Inc., Printed 11/23/2022
HydroCAD® 10.10-7a s/n 00452 © 2021 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.20	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.70	2
3	25-Year	Type III 24-hr		Default	24.00	1	5.50	2
4	100-Year	Type III 24-hr		Default	24.00	1	7.00	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.328	79	50-75% Grass cover, Fair, HSG C (5S)
0.025	74	>75% Grass cover, Good, HSG C (2S, 3S)
0.705	98	Paved parking, HSG C (2S, 3S)
0.608	98	Roofs, HSG C (1S)
0.046	98	Unconnected pavement, HSG C (5S)
1.531	70	Woods, Good, HSG C (2S, 5S)
4.242	**82**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
4.242	HSG C	1S, 2S, 3S, 5S
0.000	HSG D	
0.000	Other	
4.242		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	1.328	0.000	0.000	1.328	50-75% Grass cover, Fair	5S
0.000	0.000	0.025	0.000	0.000	0.025	>75% Grass cover, Good	2S, 3S
0.000	0.000	0.705	0.000	0.000	0.705	Paved parking	2S, 3S
0.000	0.000	0.608	0.000	0.000	0.608	Roofs	1S
0.000	0.000	0.046	0.000	0.000	0.046	Unconnected pavement	5S
0.000	0.000	1.531	0.000	0.000	1.531	Woods, Good	2S, 5S
0.000	**0.000**	**4.242**	**0.000**	**0.000**	**4.242**	**TOTAL AREA**	

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: EXIST. BUILDING Runoff Area=26,482 sf 100.00% Impervious Runoff Depth>2.91"
Tc=6.0 min CN=98 Runoff=1.84 cfs 0.148 af

Subcatchment2S: PARKING AREA Runoff Area=24,370 sf 95.51% Impervious Runoff Depth>2.83"
Tc=6.0 min CN=97 Runoff=1.67 cfs 0.132 af

Subcatchment3S: SOUTHEAST PARKING Runoff Area=7,467 sf 99.71% Impervious Runoff Depth>2.91"
Tc=6.0 min CN=98 Runoff=0.52 cfs 0.042 af

Subcatchment5S: CENTRAL SITE Runoff Area=126,470 sf 1.57% Impervious Runoff Depth=1.04"
Flow Length=468' Tc=14.8 min UI Adjusted CN=74 Runoff=2.52 cfs 0.251 af

Reach DP-1: WETLAND Inflow=5.19 cfs 0.530 af
Outflow=5.19 cfs 0.530 af

Reach DP-3: SOUTHEAST PROP. LINE Inflow=0.52 cfs 0.042 af
Outflow=0.52 cfs 0.042 af

Total Runoff Area = 4.242 ac Runoff Volume = 0.572 af Average Runoff Depth = 1.62"
67.97% Pervious = 2.883 ac 32.03% Impervious = 1.359 ac

Summary for Subcatchment 1S: EXIST. BUILDING

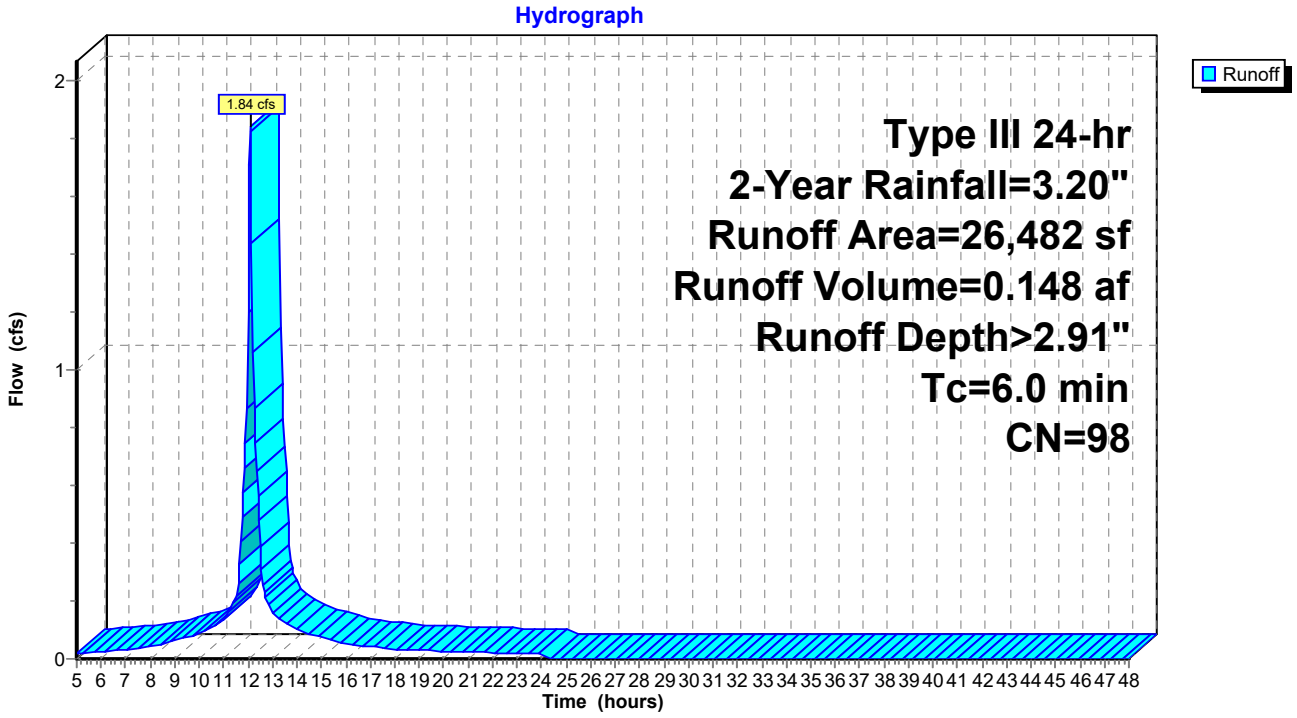
Runoff = 1.84 cfs @ 12.09 hrs, Volume= 0.148 af, Depth> 2.91"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
26,482	98	Roofs, HSG C
26,482		100.00% Impervious Area

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

Subcatchment 1S: EXIST. BUILDING



Summary for Subcatchment 2S: PARKING AREA

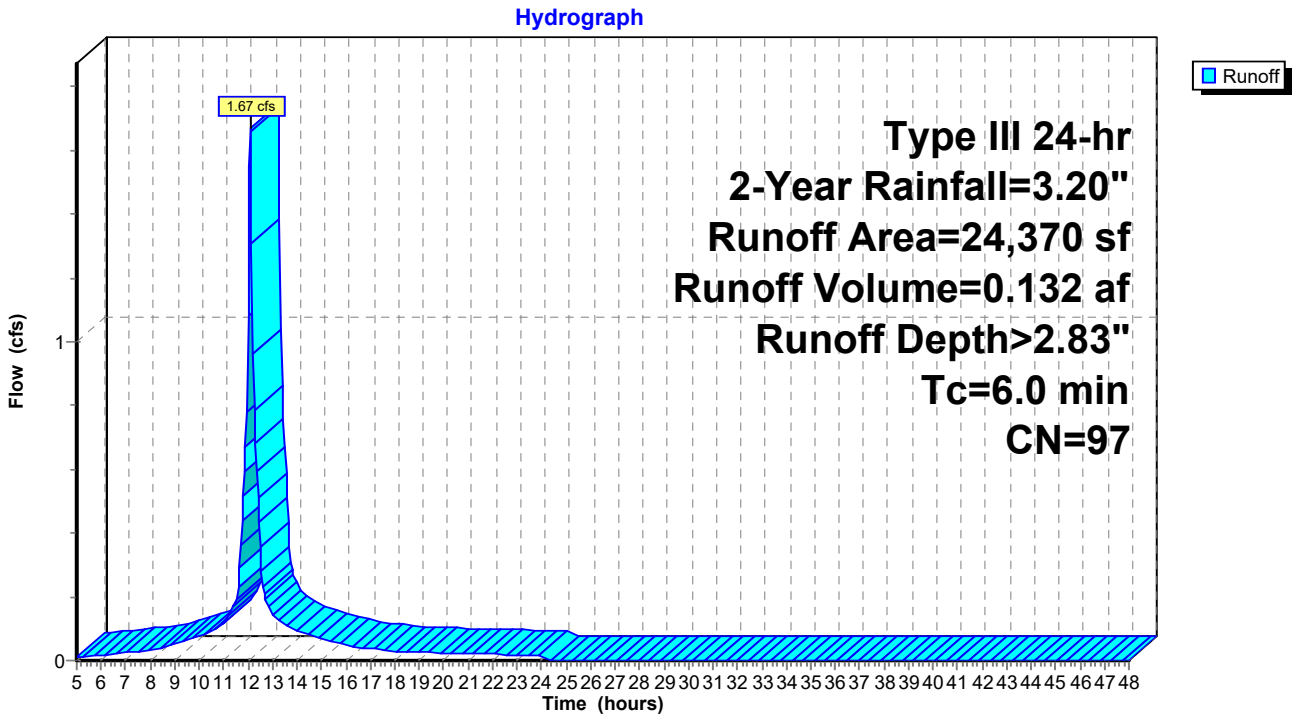
Runoff = 1.67 cfs @ 12.09 hrs, Volume= 0.132 af, Depth> 2.83"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
1,060	74	>75% Grass cover, Good, HSG C
23,275	98	Paved parking, HSG C
35	70	Woods, Good, HSG C
24,370	97	Weighted Average
1,095		4.49% Pervious Area
23,275		95.51% Impervious Area

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

Subcatchment 2S: PARKING AREA



Summary for Subcatchment 3S: SOUTHEAST PARKING AREA

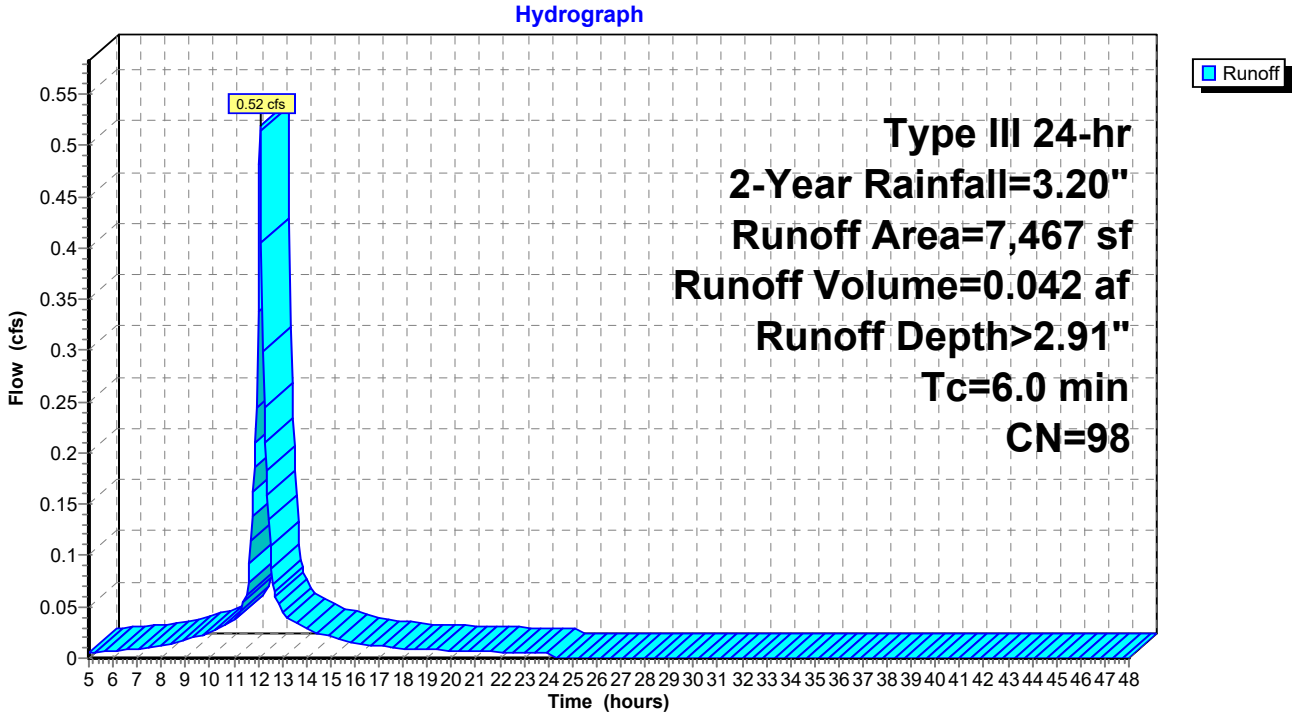
Runoff = 0.52 cfs @ 12.09 hrs, Volume= 0.042 af, Depth> 2.91"
Routed to Reach DP-3 : SOUTHEAST PROP. LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
22	74	>75% Grass cover, Good, HSG C
7,445	98	Paved parking, HSG C
7,467	98	Weighted Average
22		0.29% Pervious Area
7,445		99.71% Impervious Area

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

Subcatchment 3S: SOUTHEAST PARKING AREA



Summary for Subcatchment 5S: CENTRAL SITE

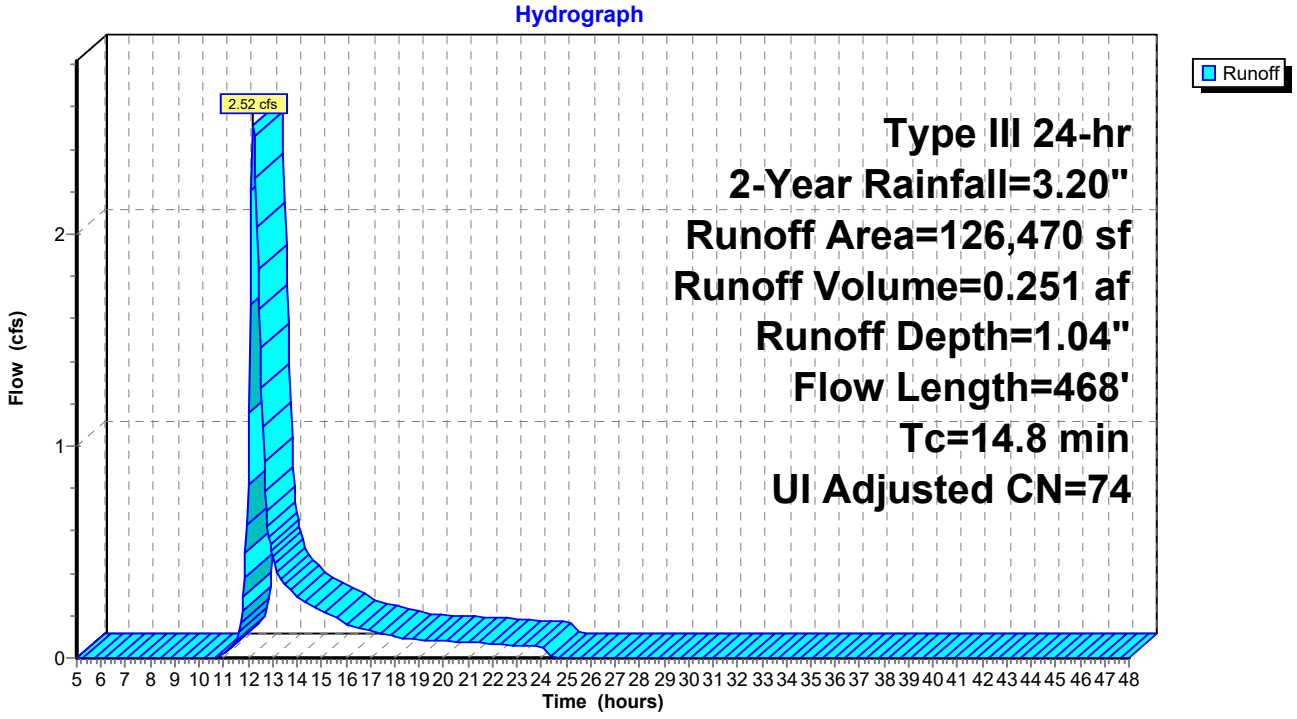
Runoff = 2.52 cfs @ 12.22 hrs, Volume= 0.251 af, Depth= 1.04"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Adj	Description
1,986	98		Unconnected pavement, HSG C
66,648	70		Woods, Good, HSG C
57,836	79		50-75% Grass cover, Fair, HSG C
126,470	75	74	Weighted Average, UI Adjusted
124,484			98.43% Pervious Area
1,986			1.57% Impervious Area
1,986			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.20"
7.7	418	0.0330	0.91		**Shallow Concentrated Flow, SHALLOW CONC.** Woodland Kv= 5.0 fps
14.8	468	Total			

Subcatchment 5S: CENTRAL SITE



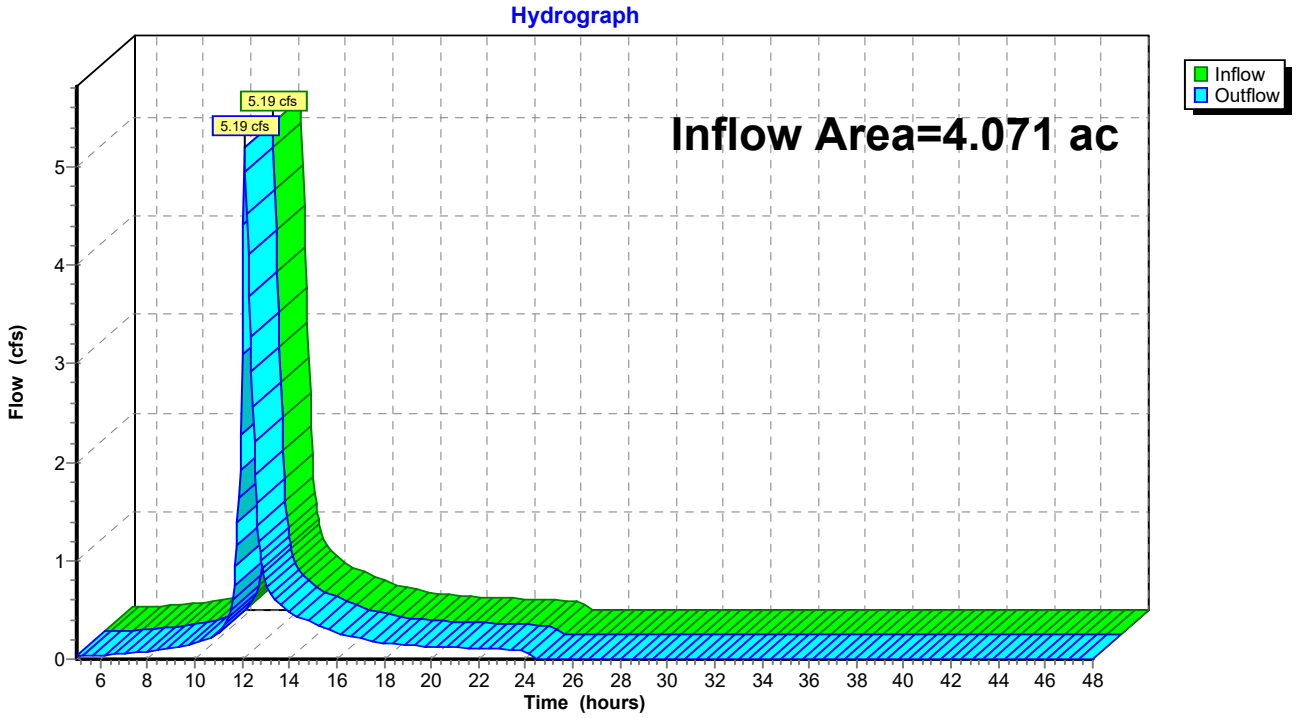
Summary for Reach DP-1: WETLAND

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.071 ac, 29.18% Impervious, Inflow Depth > 1.56" for 2-Year event
Inflow = 5.19 cfs @ 12.11 hrs, Volume= 0.530 af
Outflow = 5.19 cfs @ 12.11 hrs, Volume= 0.530 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: WETLAND



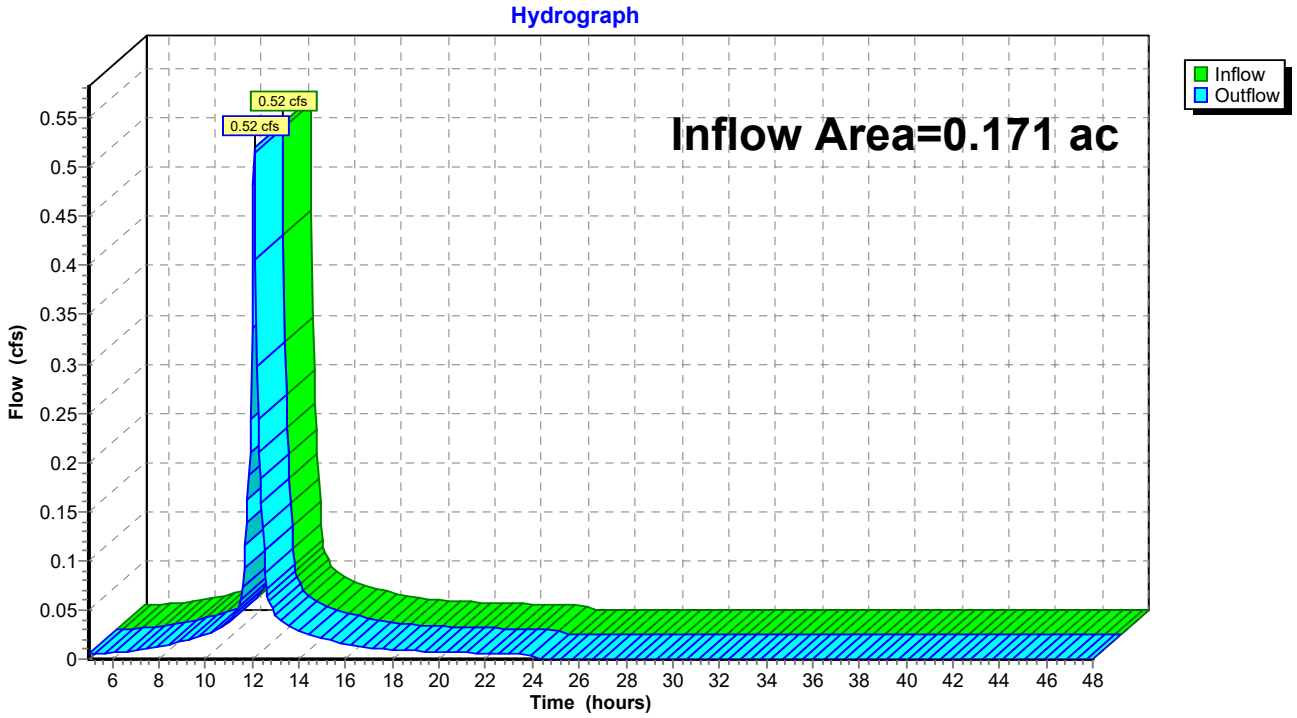
Summary for Reach DP-3: SOUTHEAST PROP. LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.171 ac, 99.71% Impervious, Inflow Depth > 2.91" for 2-Year event
Inflow = 0.52 cfs @ 12.09 hrs, Volume= 0.042 af
Outflow = 0.52 cfs @ 12.09 hrs, Volume= 0.042 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-3: SOUTHEAST PROP. LINE



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: EXIST. BUILDING Runoff Area=26,482 sf 100.00% Impervious Runoff Depth>4.35"
Tc=6.0 min CN=98 Runoff=2.73 cfs 0.220 af

Subcatchment2S: PARKING AREA Runoff Area=24,370 sf 95.51% Impervious Runoff Depth>4.27"
Tc=6.0 min CN=97 Runoff=2.49 cfs 0.199 af

Subcatchment3S: SOUTHEAST PARKING Runoff Area=7,467 sf 99.71% Impervious Runoff Depth>4.35"
Tc=6.0 min CN=98 Runoff=0.77 cfs 0.062 af

Subcatchment5S: CENTRAL SITE Runoff Area=126,470 sf 1.57% Impervious Runoff Depth=2.13"
Flow Length=468' Tc=14.8 min UI Adjusted CN=74 Runoff=5.43 cfs 0.515 af

Reach DP-1: WETLAND Inflow=9.20 cfs 0.934 af
Outflow=9.20 cfs 0.934 af

Reach DP-3: SOUTHEAST PROP. LINE Inflow=0.77 cfs 0.062 af
Outflow=0.77 cfs 0.062 af

Total Runoff Area = 4.242 ac Runoff Volume = 0.996 af Average Runoff Depth = 2.82"
67.97% Pervious = 2.883 ac 32.03% Impervious = 1.359 ac

Summary for Subcatchment 1S: EXIST. BUILDING

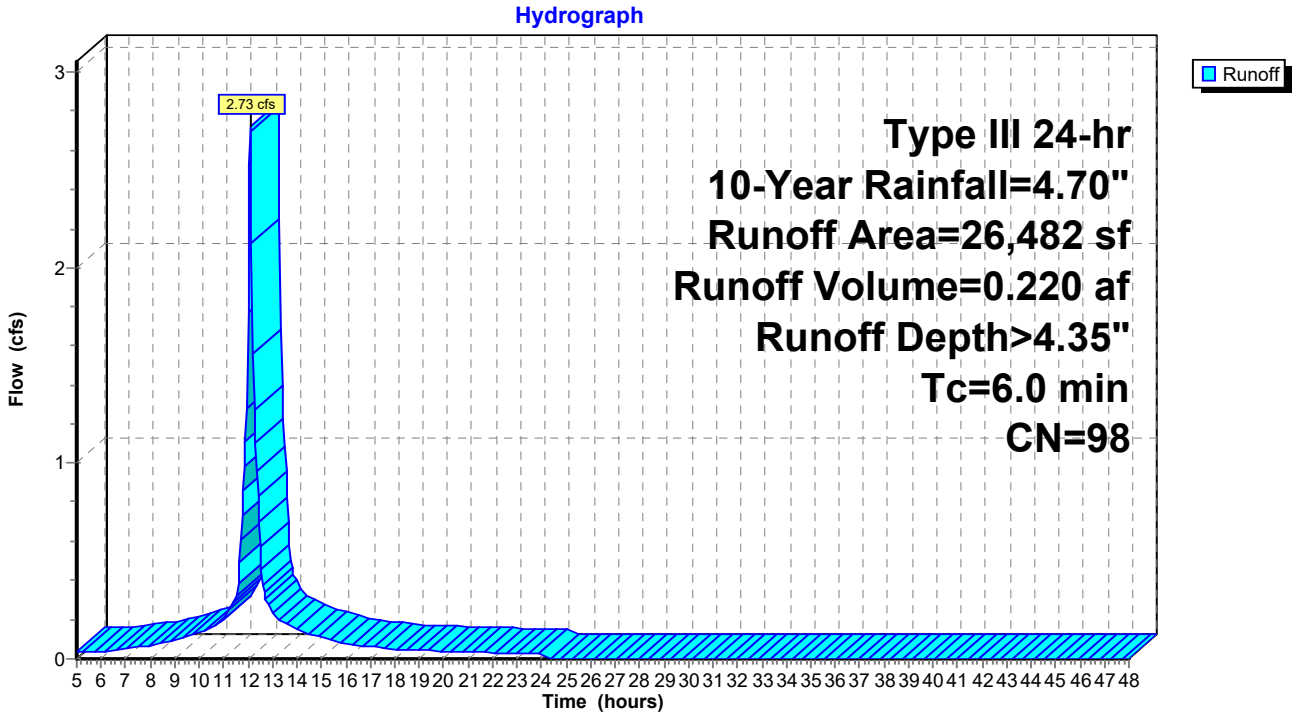
Runoff = 2.73 cfs @ 12.09 hrs, Volume= 0.220 af, Depth> 4.35"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
26,482	98	Roofs, HSG C
26,482		100.00% Impervious Area

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

Subcatchment 1S: EXIST. BUILDING



Summary for Subcatchment 2S: PARKING AREA

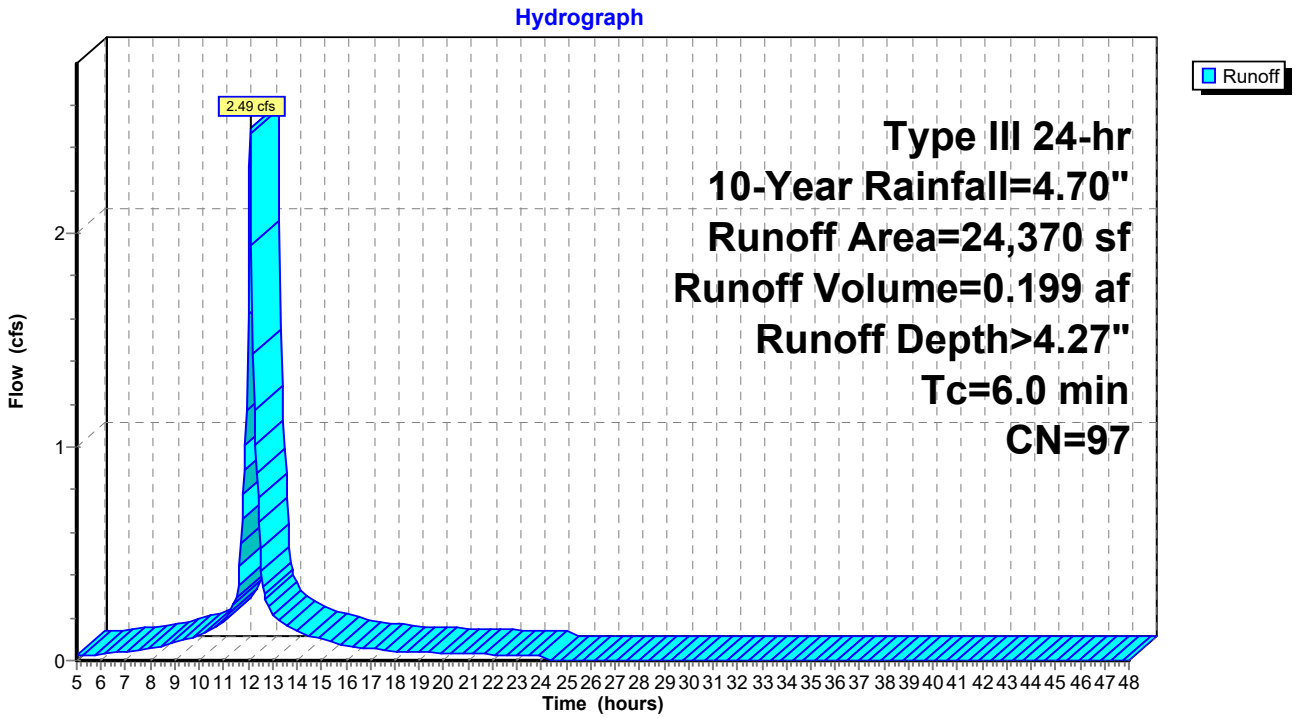
Runoff = 2.49 cfs @ 12.09 hrs, Volume= 0.199 af, Depth> 4.27"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
1,060	74	>75% Grass cover, Good, HSG C
23,275	98	Paved parking, HSG C
35	70	Woods, Good, HSG C
24,370	97	Weighted Average
1,095		4.49% Pervious Area
23,275		95.51% Impervious Area

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

Subcatchment 2S: PARKING AREA



Summary for Subcatchment 3S: SOUTHEAST PARKING AREA

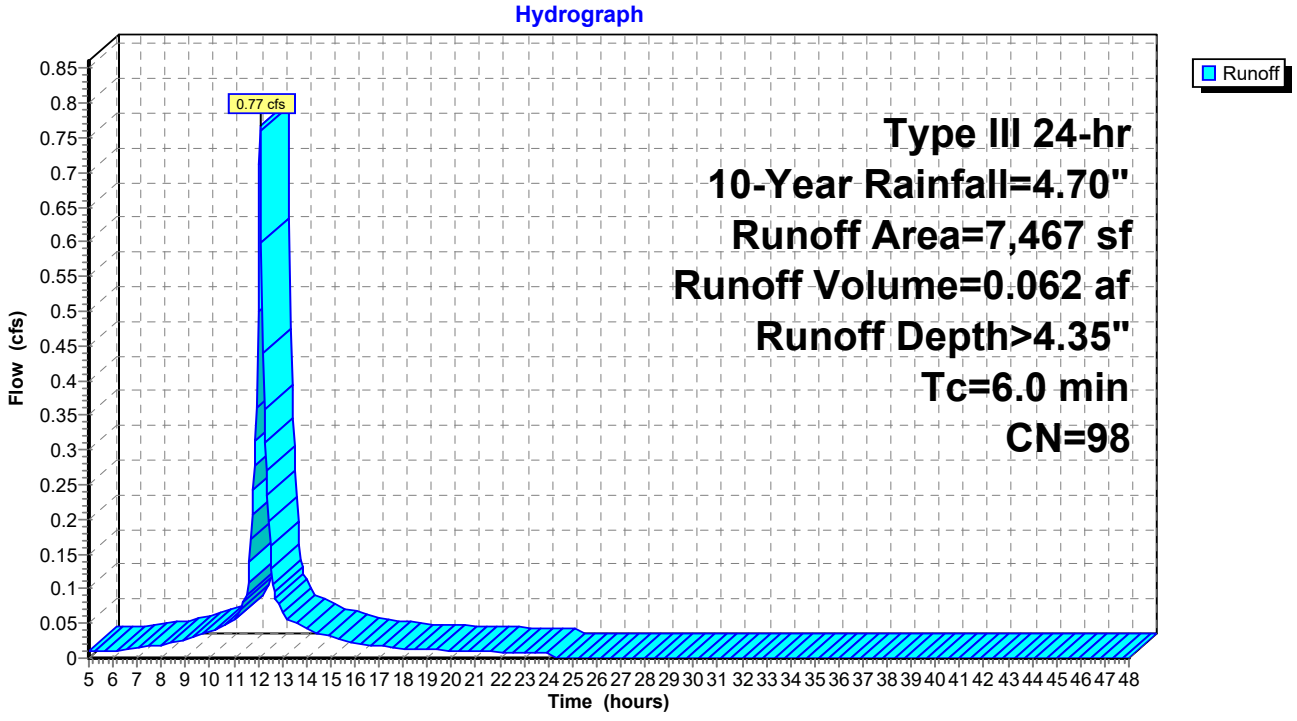
Runoff = 0.77 cfs @ 12.09 hrs, Volume= 0.062 af, Depth> 4.35"
Routed to Reach DP-3 : SOUTHEAST PROP. LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
22	74	>75% Grass cover, Good, HSG C
7,445	98	Paved parking, HSG C
7,467	98	Weighted Average
22		0.29% Pervious Area
7,445		99.71% Impervious Area

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

Subcatchment 3S: SOUTHEAST PARKING AREA



Summary for Subcatchment 5S: CENTRAL SITE

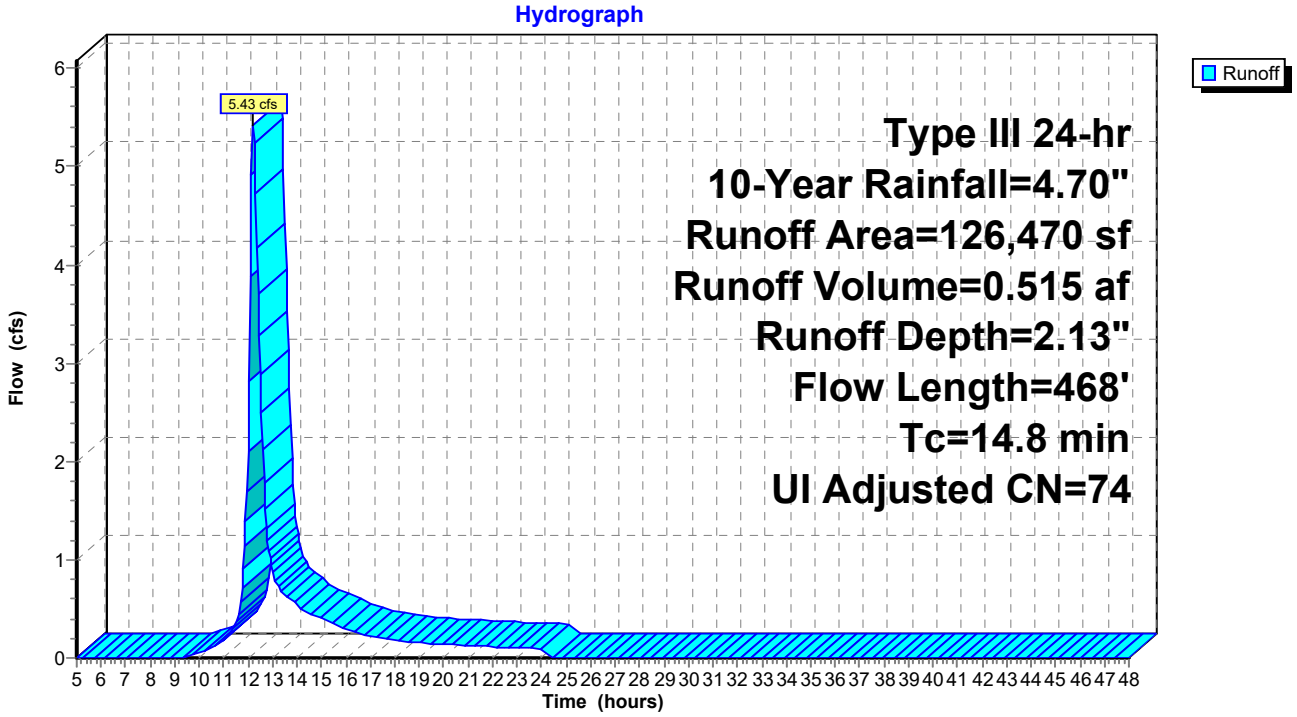
Runoff = 5.43 cfs @ 12.21 hrs, Volume= 0.515 af, Depth= 2.13"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Adj	Description
1,986	98		Unconnected pavement, HSG C
66,648	70		Woods, Good, HSG C
57,836	79		50-75% Grass cover, Fair, HSG C
126,470	75	74	Weighted Average, UI Adjusted
124,484			98.43% Pervious Area
1,986			1.57% Impervious Area
1,986			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.20"
7.7	418	0.0330	0.91		**Shallow Concentrated Flow, SHALLOW CONC.** Woodland Kv= 5.0 fps
14.8	468	Total			

Subcatchment 5S: CENTRAL SITE



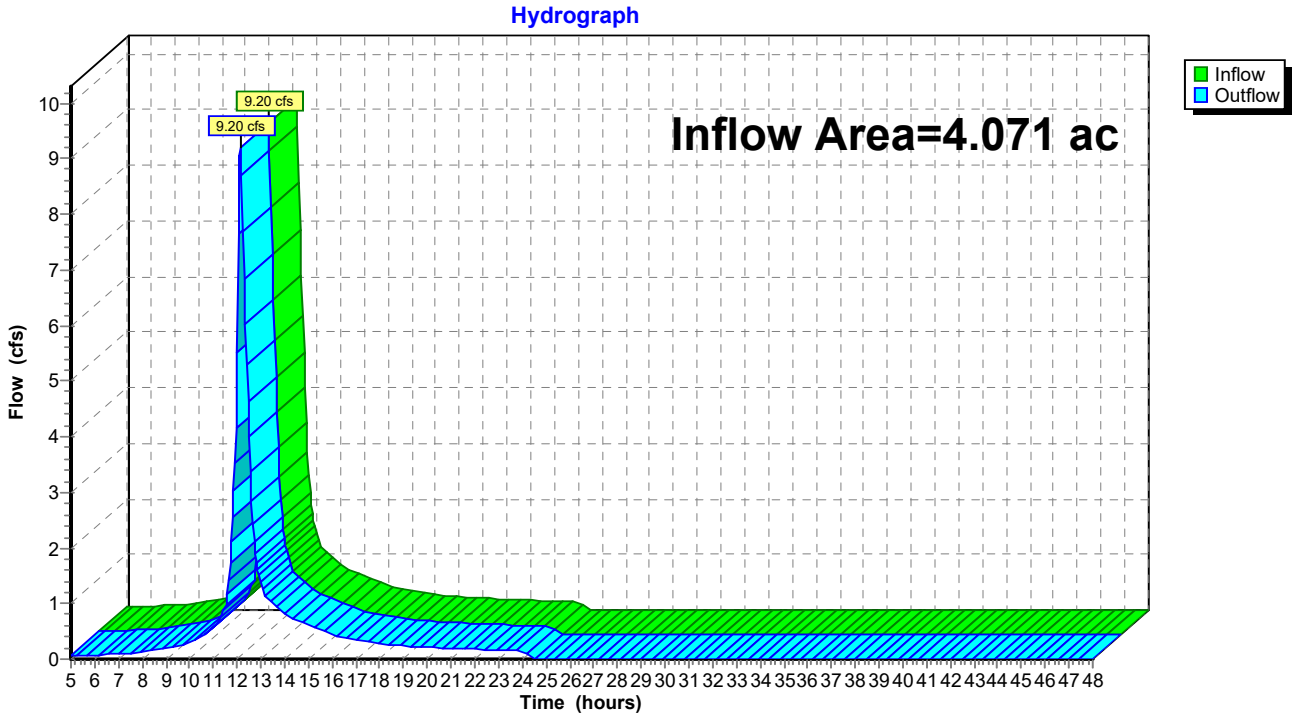
Summary for Reach DP-1: WETLAND

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.071 ac, 29.18% Impervious, Inflow Depth > 2.75" for 10-Year event
Inflow = 9.20 cfs @ 12.12 hrs, Volume= 0.934 af
Outflow = 9.20 cfs @ 12.12 hrs, Volume= 0.934 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: WETLAND



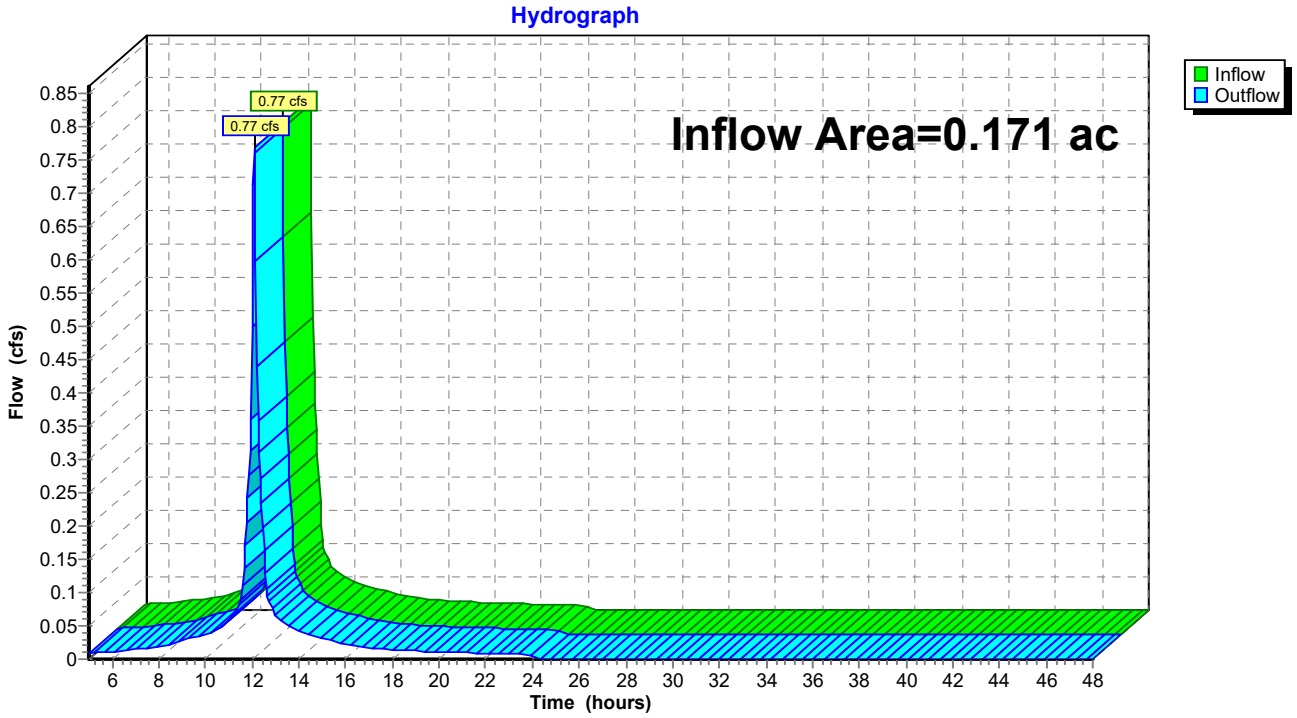
Summary for Reach DP-3: SOUTHEAST PROP. LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.171 ac, 99.71% Impervious, Inflow Depth > 4.35" for 10-Year event
Inflow = 0.77 cfs @ 12.09 hrs, Volume= 0.062 af
Outflow = 0.77 cfs @ 12.09 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-3: SOUTHEAST PROP. LINE



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: EXIST. BUILDING Runoff Area=26,482 sf 100.00% Impervious Runoff Depth>5.12"
Tc=6.0 min CN=98 Runoff=3.20 cfs 0.259 af

Subcatchment2S: PARKING AREA Runoff Area=24,370 sf 95.51% Impervious Runoff Depth>5.04"
Tc=6.0 min CN=97 Runoff=2.93 cfs 0.235 af

Subcatchment3S: SOUTHEAST PARKING Runoff Area=7,467 sf 99.71% Impervious Runoff Depth>5.12"
Tc=6.0 min CN=98 Runoff=0.90 cfs 0.073 af

Subcatchment5S: CENTRAL SITE Runoff Area=126,470 sf 1.57% Impervious Runoff Depth=2.77"
Flow Length=468' Tc=14.8 min UI Adjusted CN=74 Runoff=7.12 cfs 0.670 af

Reach DP-1: WETLAND Inflow=11.35 cfs 1.164 af
Outflow=11.35 cfs 1.164 af

Reach DP-3: SOUTHEAST PROP. LINE Inflow=0.90 cfs 0.073 af
Outflow=0.90 cfs 0.073 af

Total Runoff Area = 4.242 ac Runoff Volume = 1.237 af Average Runoff Depth = 3.50"
67.97% Pervious = 2.883 ac 32.03% Impervious = 1.359 ac

Summary for Subcatchment 1S: EXIST. BUILDING

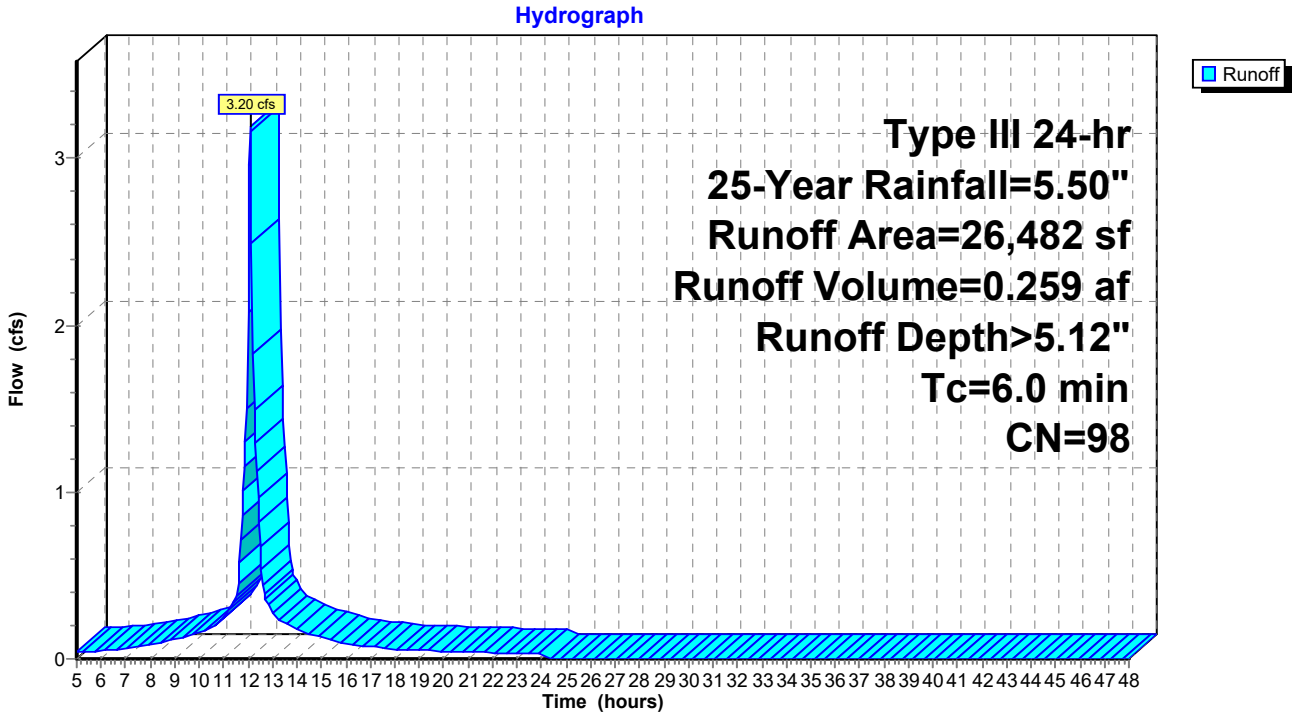
Runoff = 3.20 cfs @ 12.09 hrs, Volume= 0.259 af, Depth> 5.12"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
26,482	98	Roofs, HSG C
26,482		100.00% Impervious Area

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

Subcatchment 1S: EXIST. BUILDING



Summary for Subcatchment 2S: PARKING AREA

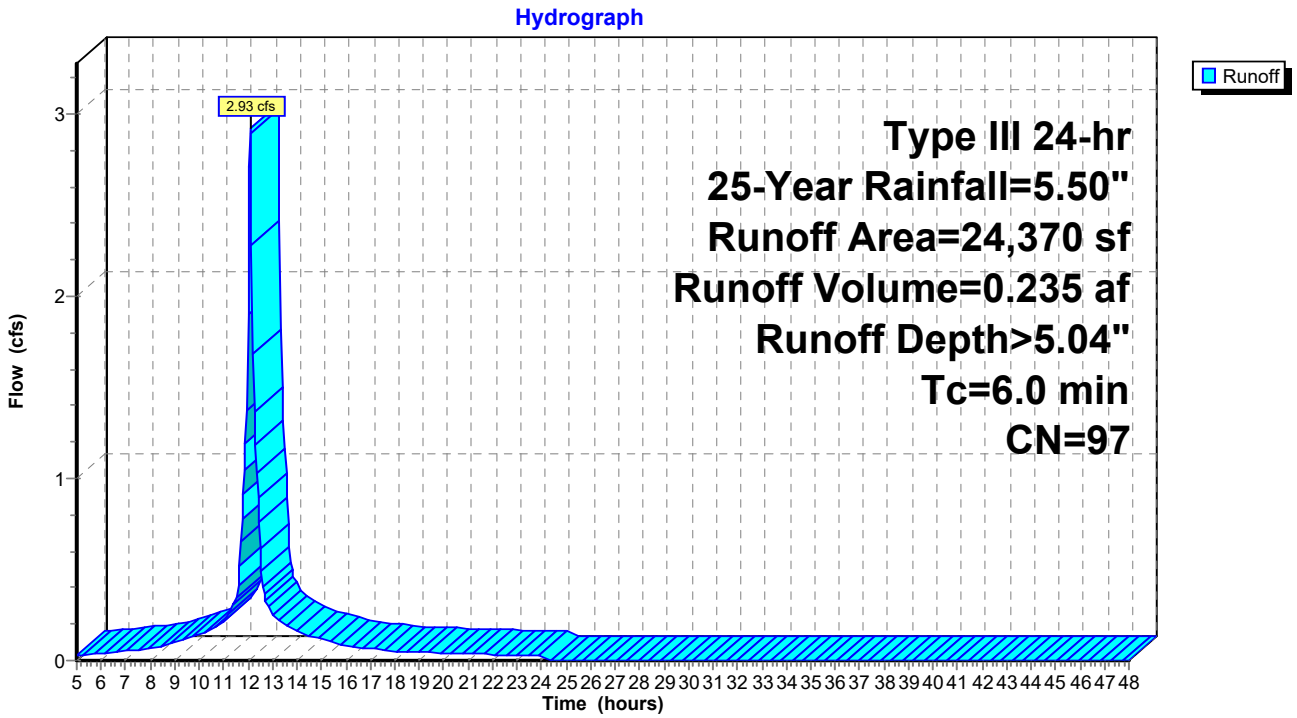
Runoff = 2.93 cfs @ 12.09 hrs, Volume= 0.235 af, Depth> 5.04"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
1,060	74	>75% Grass cover, Good, HSG C
23,275	98	Paved parking, HSG C
35	70	Woods, Good, HSG C
24,370	97	Weighted Average
1,095		4.49% Pervious Area
23,275		95.51% Impervious Area

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

Subcatchment 2S: PARKING AREA



Summary for Subcatchment 3S: SOUTHEAST PARKING AREA

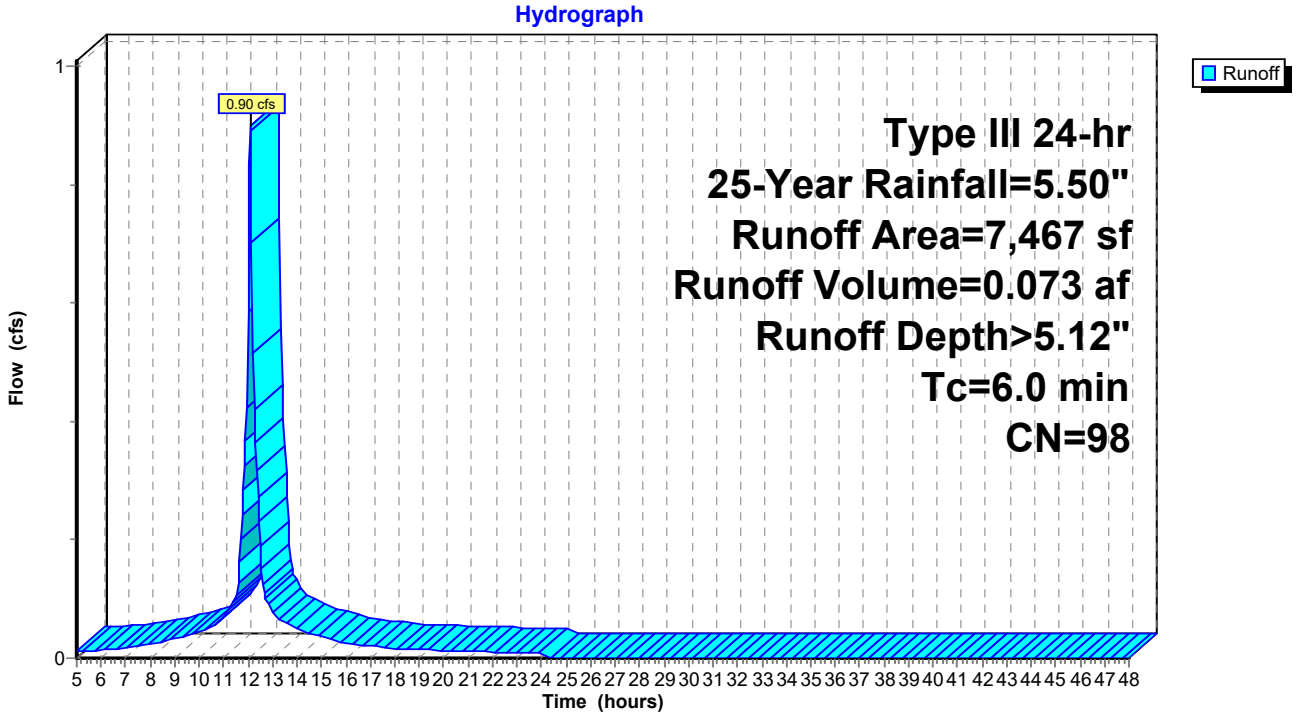
Runoff = 0.90 cfs @ 12.09 hrs, Volume= 0.073 af, Depth> 5.12"
Routed to Reach DP-3 : SOUTHEAST PROP. LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
22	74	>75% Grass cover, Good, HSG C
7,445	98	Paved parking, HSG C
7,467	98	Weighted Average
22		0.29% Pervious Area
7,445		99.71% Impervious Area

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

Subcatchment 3S: SOUTHEAST PARKING AREA



Summary for Subcatchment 5S: CENTRAL SITE

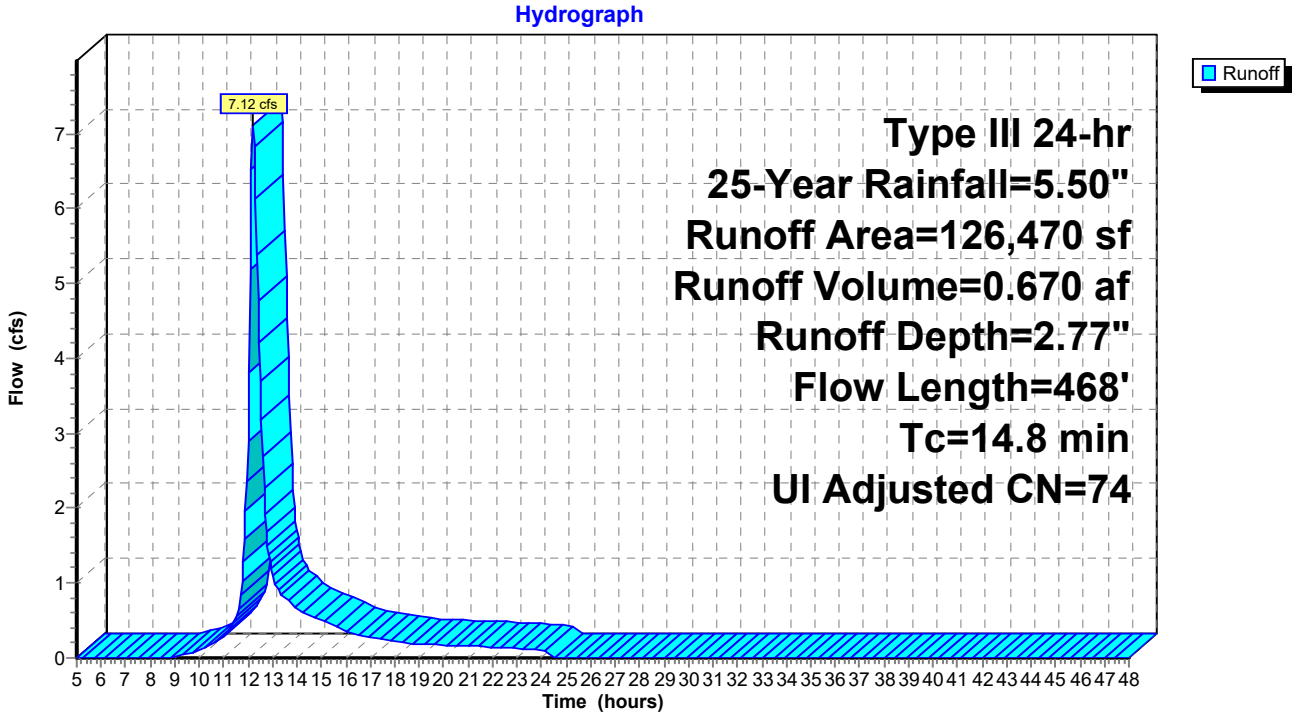
Runoff = 7.12 cfs @ 12.21 hrs, Volume= 0.670 af, Depth= 2.77"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Adj	Description
1,986	98		Unconnected pavement, HSG C
66,648	70		Woods, Good, HSG C
57,836	79		50-75% Grass cover, Fair, HSG C
126,470	75	74	Weighted Average, UI Adjusted
124,484			98.43% Pervious Area
1,986			1.57% Impervious Area
1,986			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.20"
7.7	418	0.0330	0.91		**Shallow Concentrated Flow, SHALLOW CONC.** Woodland Kv= 5.0 fps
14.8	468	Total			

Subcatchment 5S: CENTRAL SITE



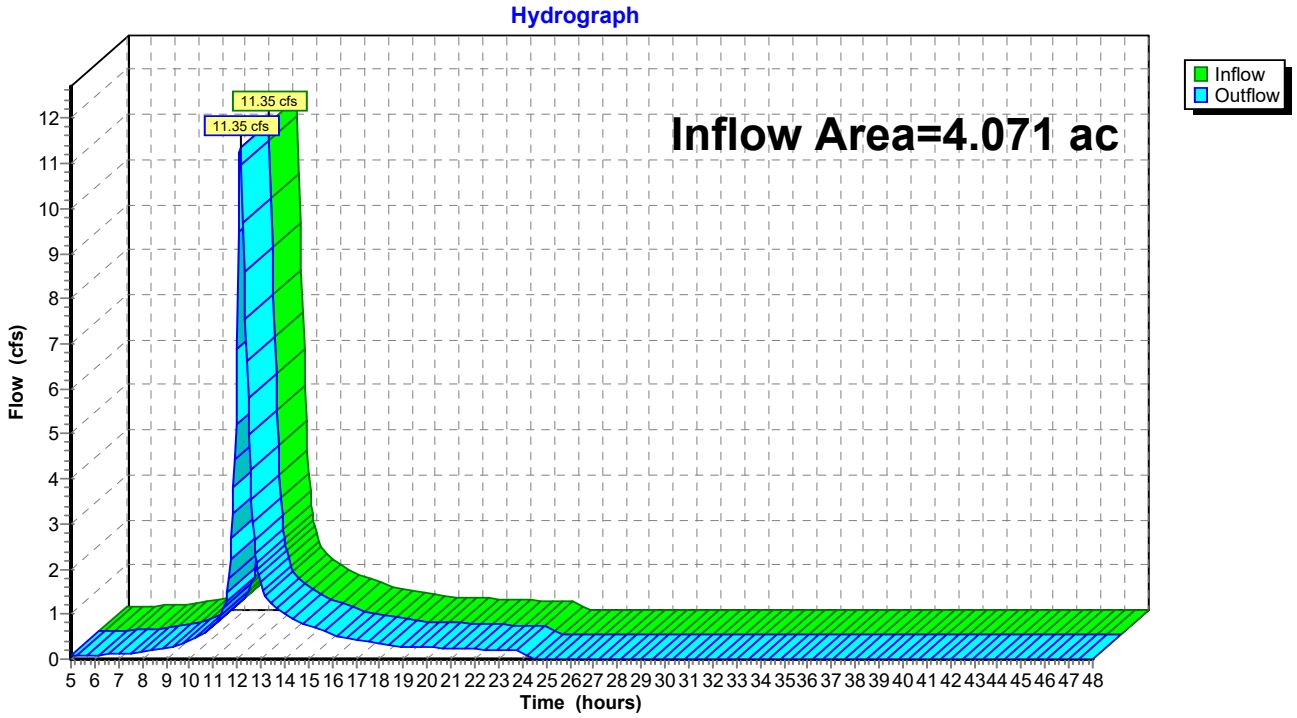
Summary for Reach DP-1: WETLAND

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.071 ac, 29.18% Impervious, Inflow Depth > 3.43" for 25-Year event
Inflow = 11.35 cfs @ 12.13 hrs, Volume= 1.164 af
Outflow = 11.35 cfs @ 12.13 hrs, Volume= 1.164 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: WETLAND



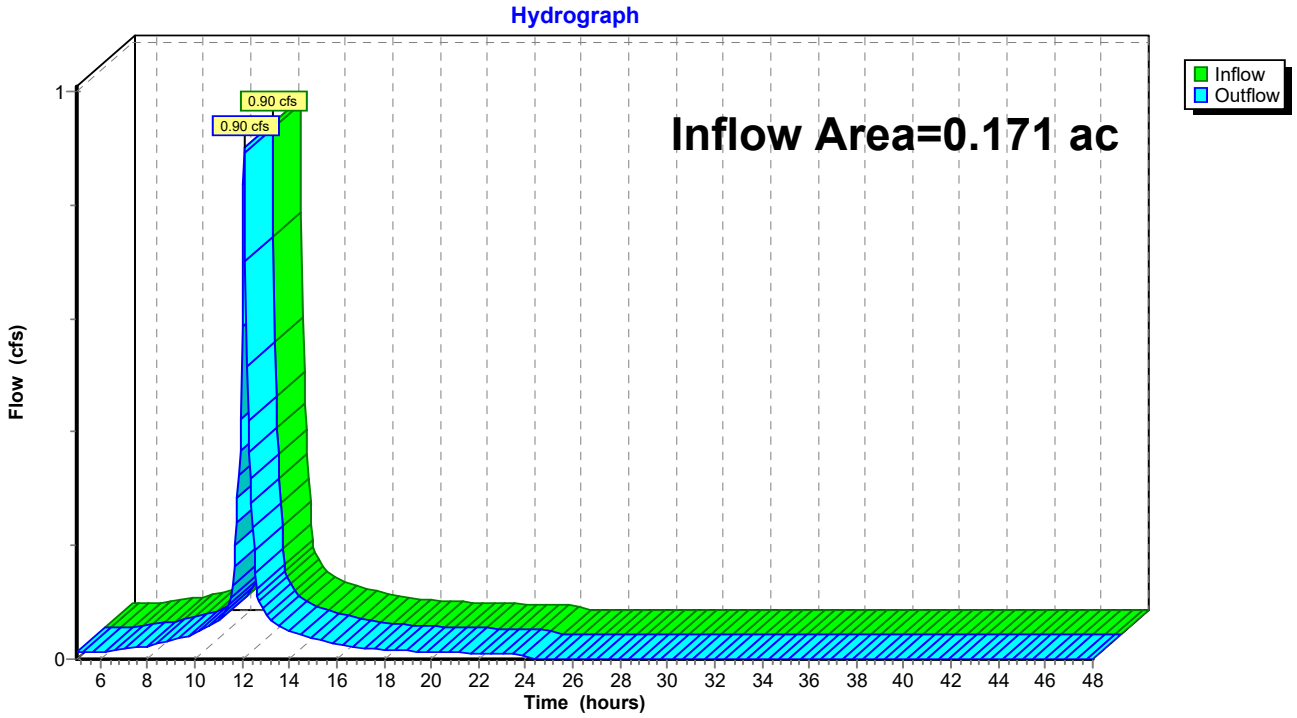
Summary for Reach DP-3: SOUTHEAST PROP. LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.171 ac, 99.71% Impervious, Inflow Depth > 5.12" for 25-Year event
Inflow = 0.90 cfs @ 12.09 hrs, Volume= 0.073 af
Outflow = 0.90 cfs @ 12.09 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-3: SOUTHEAST PROP. LINE



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: EXIST. BUILDING Runoff Area=26,482 sf 100.00% Impervious Runoff Depth>6.54"
Tc=6.0 min CN=98 Runoff=4.08 cfs 0.332 af

Subcatchment2S: PARKING AREA Runoff Area=24,370 sf 95.51% Impervious Runoff Depth>6.48"
Tc=6.0 min CN=97 Runoff=3.74 cfs 0.302 af

Subcatchment3S: SOUTHEAST PARKING Runoff Area=7,467 sf 99.71% Impervious Runoff Depth>6.54"
Tc=6.0 min CN=98 Runoff=1.15 cfs 0.093 af

Subcatchment5S: CENTRAL SITE Runoff Area=126,470 sf 1.57% Impervious Runoff Depth=4.04"
Flow Length=468' Tc=14.8 min UI Adjusted CN=74 Runoff=10.42 cfs 0.978 af

Reach DP-1: WETLAND Inflow=15.76 cfs 1.611 af
Outflow=15.76 cfs 1.611 af

Reach DP-3: SOUTHEAST PROP. LINE Inflow=1.15 cfs 0.093 af
Outflow=1.15 cfs 0.093 af

Total Runoff Area = 4.242 ac Runoff Volume = 1.705 af Average Runoff Depth = 4.82"
67.97% Pervious = 2.883 ac 32.03% Impervious = 1.359 ac

Summary for Subcatchment 1S: EXIST. BUILDING

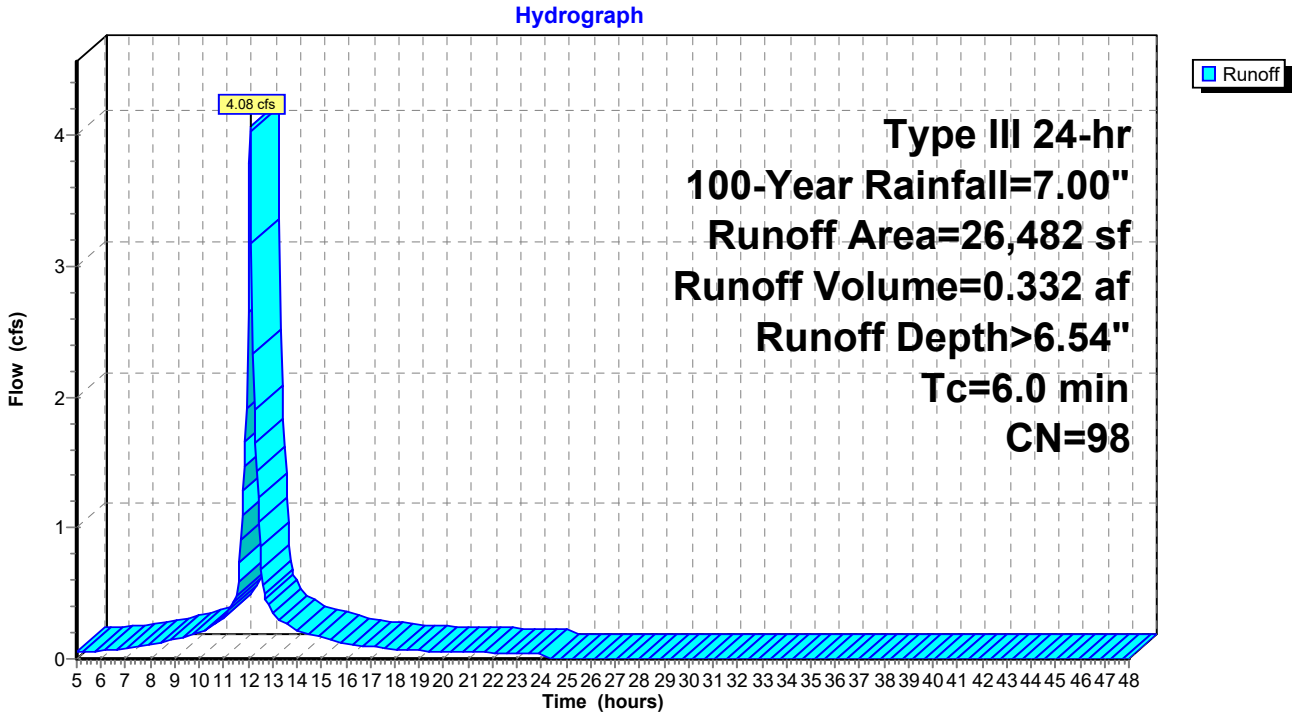
Runoff = 4.08 cfs @ 12.09 hrs, Volume= 0.332 af, Depth> 6.54"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
26,482	98	Roofs, HSG C
26,482		100.00% Impervious Area

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

Subcatchment 1S: EXIST. BUILDING



Summary for Subcatchment 2S: PARKING AREA

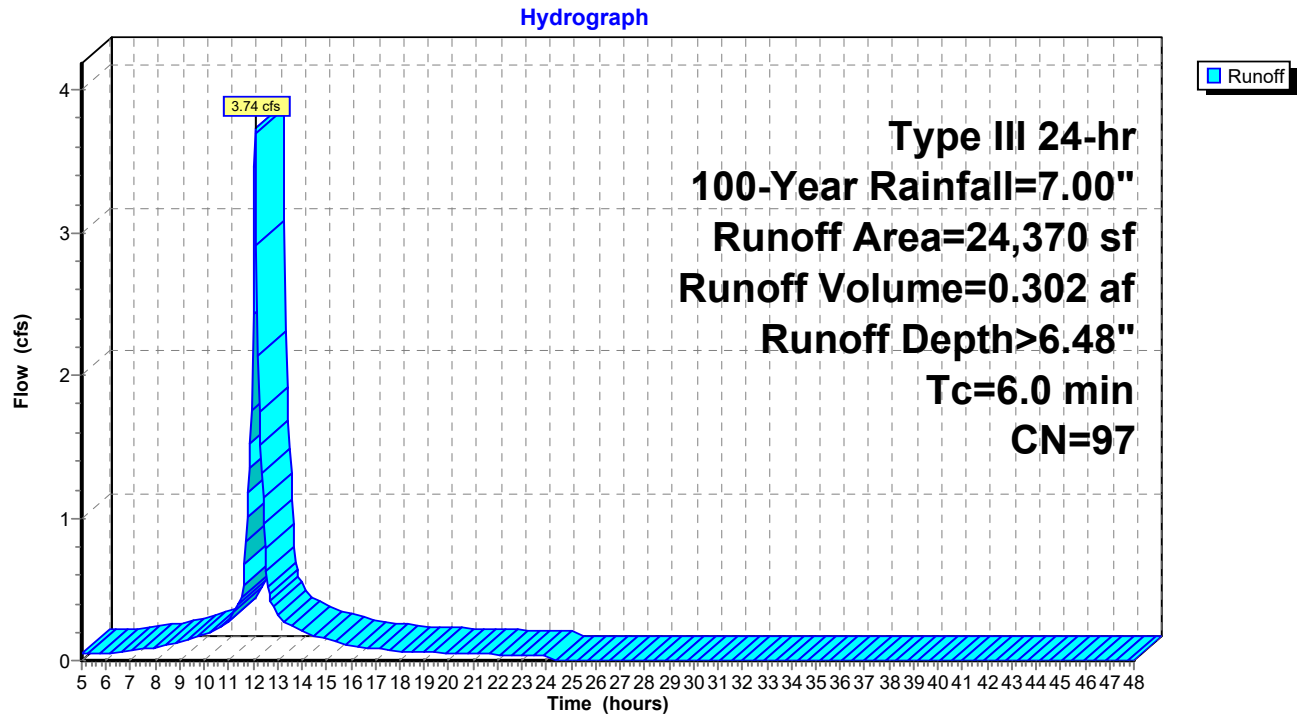
Runoff = 3.74 cfs @ 12.09 hrs, Volume= 0.302 af, Depth> 6.48"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
1,060	74	>75% Grass cover, Good, HSG C
23,275	98	Paved parking, HSG C
35	70	Woods, Good, HSG C
24,370	97	Weighted Average
1,095		4.49% Pervious Area
23,275		95.51% Impervious Area

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

Subcatchment 2S: PARKING AREA



Summary for Subcatchment 3S: SOUTHEAST PARKING AREA

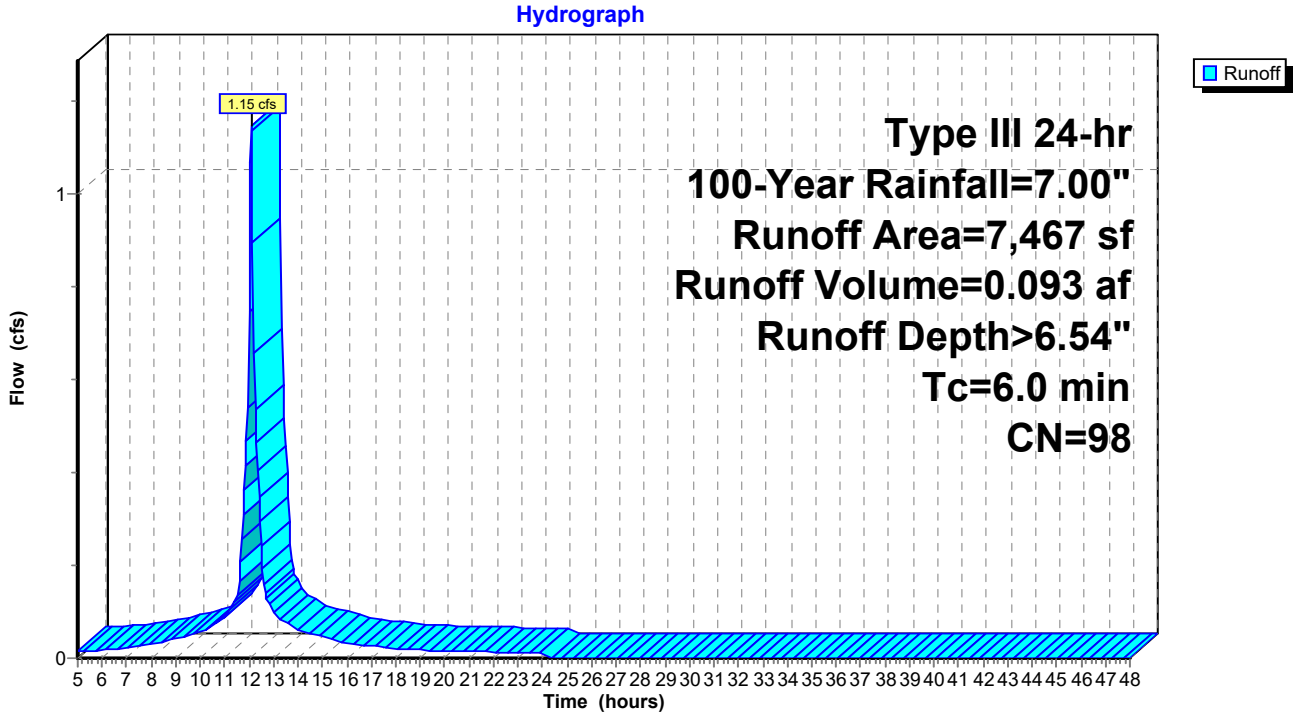
Runoff = 1.15 cfs @ 12.09 hrs, Volume= 0.093 af, Depth> 6.54"
Routed to Reach DP-3 : SOUTHEAST PROP. LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
22	74	>75% Grass cover, Good, HSG C
7,445	98	Paved parking, HSG C
7,467	98	Weighted Average
22		0.29% Pervious Area
7,445		99.71% Impervious Area

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

Subcatchment 3S: SOUTHEAST PARKING AREA



Summary for Subcatchment 5S: CENTRAL SITE

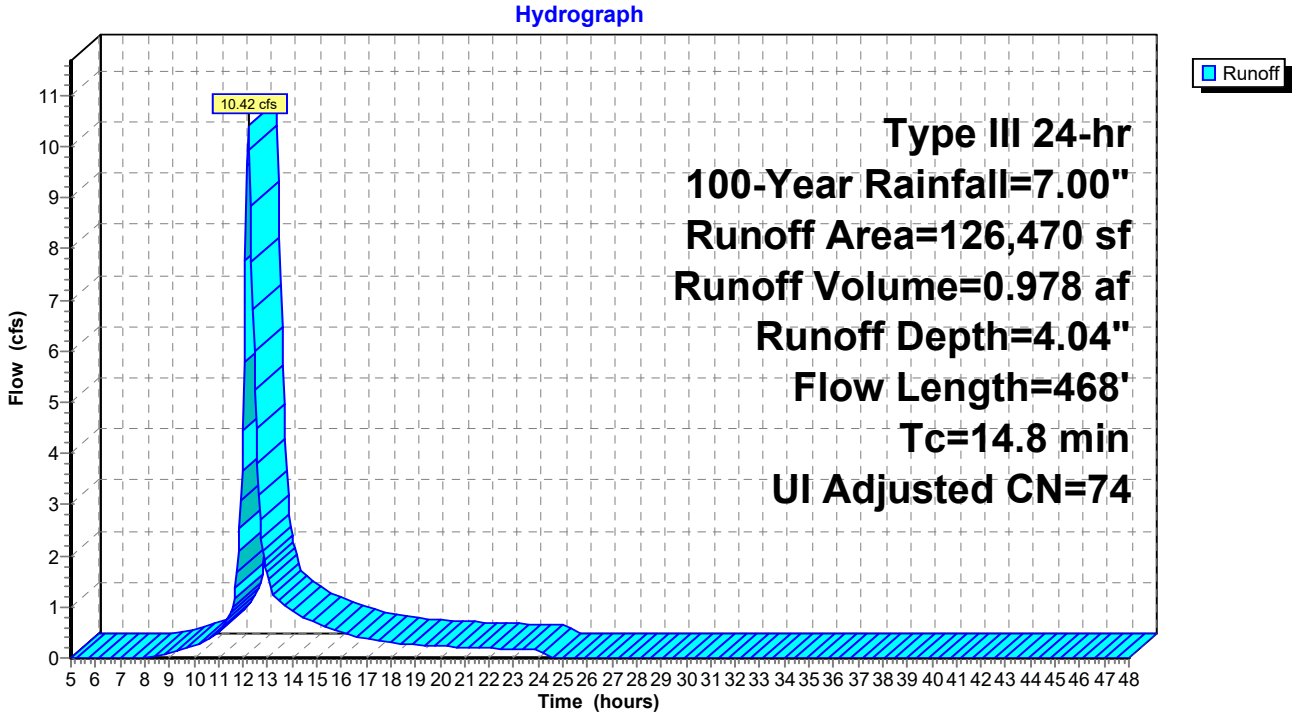
Runoff = 10.42 cfs @ 12.21 hrs, Volume= 0.978 af, Depth= 4.04"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Adj	Description
1,986	98		Unconnected pavement, HSG C
66,648	70		Woods, Good, HSG C
57,836	79		50-75% Grass cover, Fair, HSG C
126,470	75	74	Weighted Average, UI Adjusted
124,484			98.43% Pervious Area
1,986			1.57% Impervious Area
1,986			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.20"
7.7	418	0.0330	0.91		**Shallow Concentrated Flow, SHALLOW CONC.** Woodland Kv= 5.0 fps
14.8	468	Total			

Subcatchment 5S: CENTRAL SITE



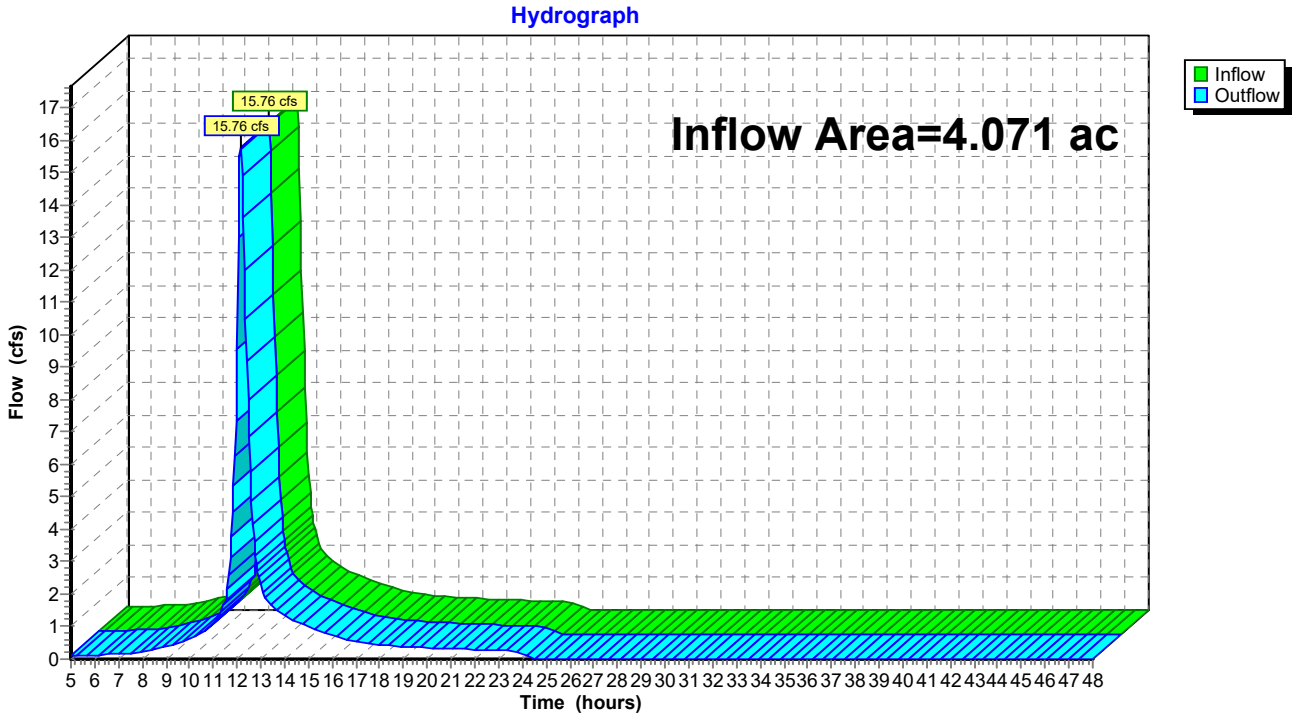
Summary for Reach DP-1: WETLAND

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.071 ac, 29.18% Impervious, Inflow Depth > 4.75" for 100-Year event
Inflow = 15.76 cfs @ 12.14 hrs, Volume= 1.611 af
Outflow = 15.76 cfs @ 12.14 hrs, Volume= 1.611 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: WETLAND



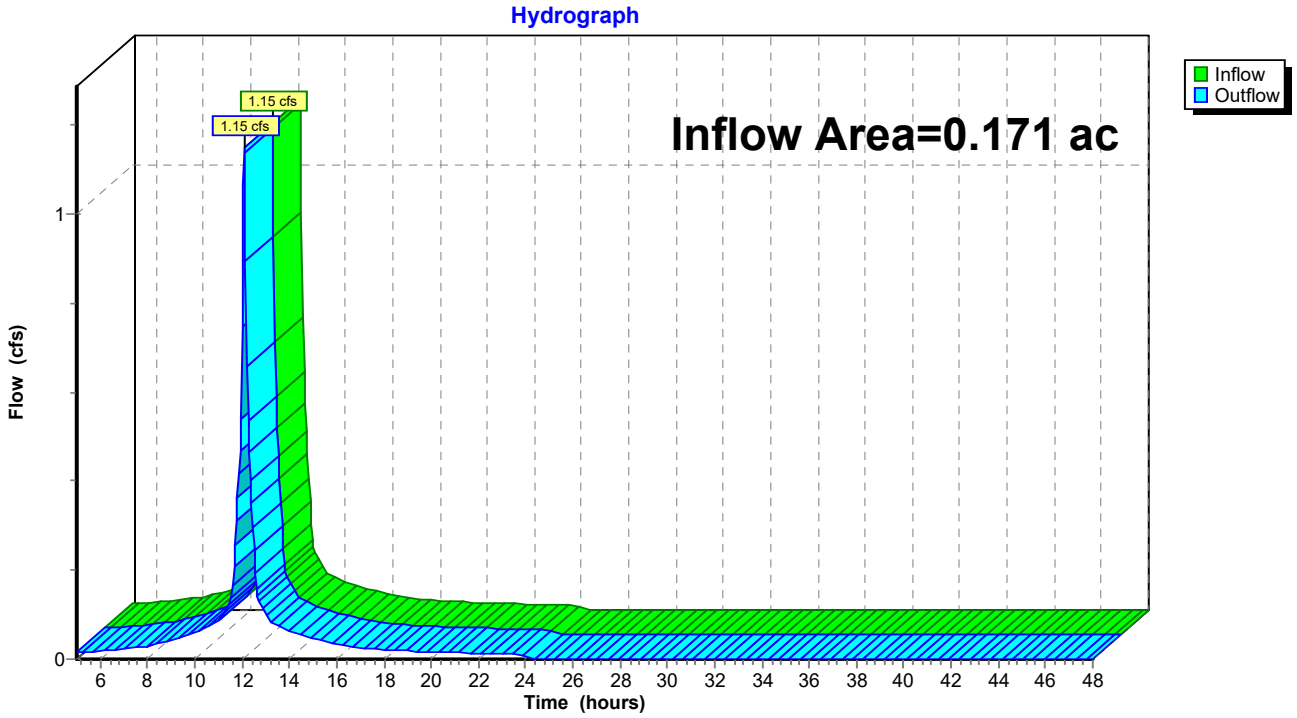
Summary for Reach DP-3: SOUTHEAST PROP. LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.171 ac, 99.71% Impervious, Inflow Depth > 6.54" for 100-Year event
Inflow = 1.15 cfs @ 12.09 hrs, Volume= 0.093 af
Outflow = 1.15 cfs @ 12.09 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.0 min

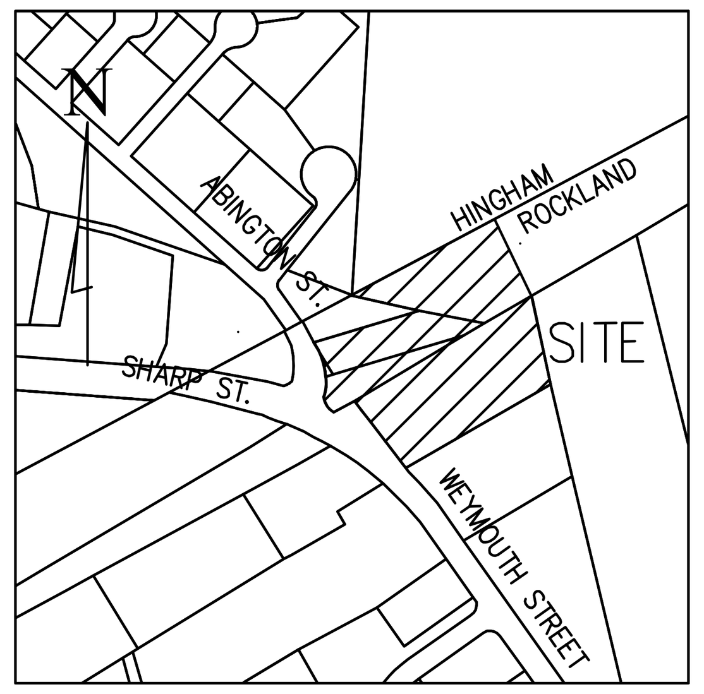
Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-3: SOUTHEAST PROP. LINE



A P P E N D I X B

Post-Development Condition



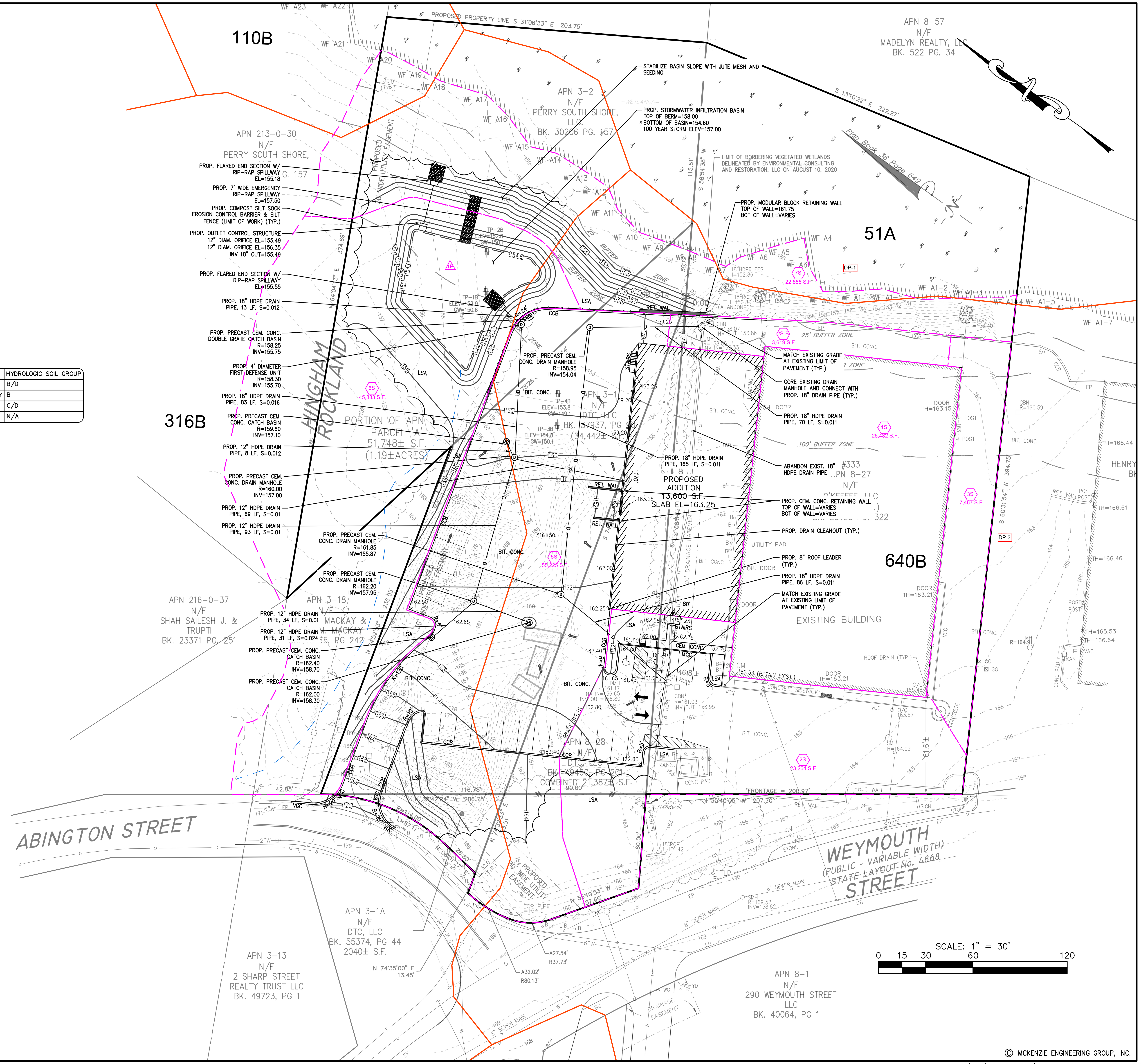
LOCUS MAP
Not to Scale

SOIL KEY

SOIL CLASSIFICATION	DESCRIPTION	HYDROLOGIC SOIL GROUP
51A	SWANSEA MUCK, 0-1% SLOPES	B/D
110B	CANTON-CHATFIELD-ROCK OUTCROP COMPLEX, 0-8% SLOPES, VERY STONEY	B
316B	SCITUATE GRAVELLY SANDY LOAM, 3-8% SLOPES, VERY STONY	C/D
640B	URBAN LAND, TILL SUBSTRATUM, 0-8% SLOPES	N/A

LEGEND

- LIMIT OF WATERSHED
- TIME OF CONCENTRATION FLOW PATH
- LIMIT OF NRCS SOIL MAPPING



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REV	DATE	DESCRIPTION	BY	APP
1	9/19/22	BUILDING ADDITION	ESS	BCM
2	11/30/22	DRAINAGE REVISION	ESS	BCM

MEG
MCKENZIE ENGINEERING GROUP
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150 Longwater Drive, Suite 101
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F: 781.792.0333
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SITE DEVELOPMENT PLANS

(FORMERLY APN'S 3-1, 3-1A, PORTION OF 3-2, 8-27 & 8-28)
343 & 333 WEYMOUTH STREET
ROCKLAND, MASSACHUSETTS

PROFESSIONAL ENGINEER:

PERMIT PLAN SET

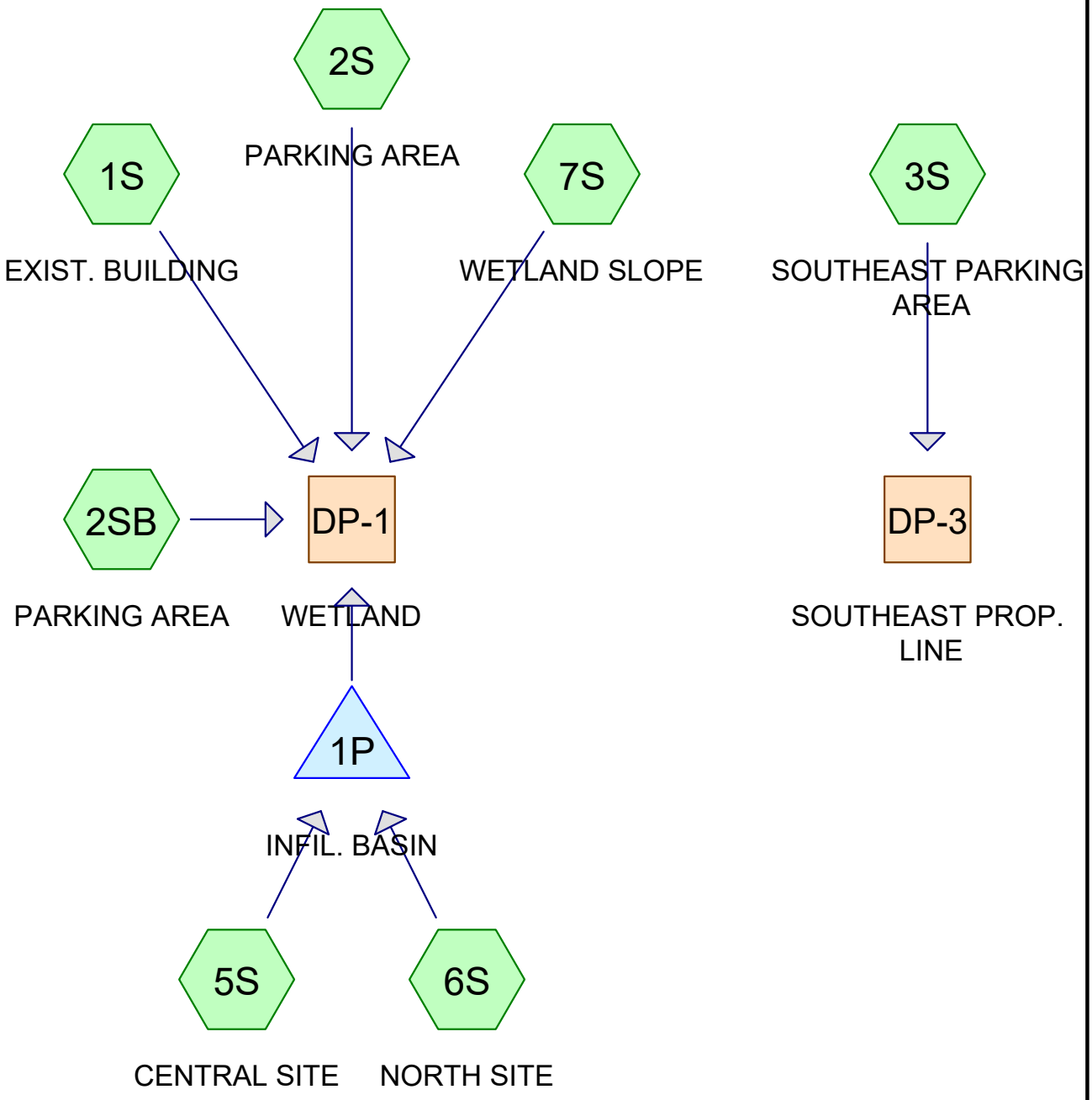
APPLICANT:
DTC, LLC
333 WEYMOUTH ST.
ROCKLAND, MA 02370

DRAWN BY:	ESS
DESIGNED BY:	ESS
CHECKED BY:	BCM
APPROVED BY:	BCM
DATE:	JUNE 13, 2022
SCALE:	1"=30'
PROJECT NO.:	218-102

DWG. TITLE:
POST DEV. WATERSHED PLAN

DWG. NO:
WS-2

M:\MEG\2018 PROJECTS\218-102 DTC, LLC - WEYMOUTH STREET\DWGS\218-102 MAIN17_BASIN.DWG



Subcat Reach Pond Link

Routing Diagram for 218-102 POST DEVELOPMENT4_rev
Prepared by McKenzie Engineering Group, Inc., Printed 11/23/2022
HydroCAD® 10.10-7a s/n 00452 © 2021 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.20	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.70	2
3	25-Year	Type III 24-hr		Default	24.00	1	5.50	2
4	100-Year	Type III 24-hr		Default	24.00	1	7.00	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.896	74	>75% Grass cover, Good, HSG C (2S, 3S, 5S, 6S, 7S)
0.621	98	Paved parking, HSG C (2S, 2SB, 3S)
0.920	98	Roofs, HSG C (1S, 5S)
0.741	98	Unconnected pavement, HSG C (5S, 7S)
0.018	98	Unconnected roofs, HSG C (6S)
0.086	73	Woods, Fair, HSG C (2S)
0.960	70	Woods, Good, HSG C (5S, 6S, 7S)
4.242	**86**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
4.242	HSG C	1S, 2S, 2SB, 3S, 5S, 6S, 7S
0.000	HSG D	
0.000	Other	
4.242		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.896	0.000	0.000	0.896	>75% Grass cover, Good	2S, 3S, 5S, 6S, 7S
0.000	0.000	0.621	0.000	0.000	0.621	Paved parking	2S, 2SB, 3S
0.000	0.000	0.920	0.000	0.000	0.920	Roofs	1S, 5S
0.000	0.000	0.741	0.000	0.000	0.741	Unconnected pavement	5S, 7S
0.000	0.000	0.018	0.000	0.000	0.018	Unconnected roofs	6S
0.000	0.000	0.086	0.000	0.000	0.086	Woods, Fair	2S
0.000	0.000	0.960	0.000	0.000	0.960	Woods, Good	5S, 6S, 7S
0.000	**0.000**	**4.242**	**0.000**	**0.000**	**4.242**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	1P	155.49	155.18	25.0	0.0124	0.013	0.0	18.0	0.0

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: EXIST. BUILDING Runoff Area=26,482 sf 100.00% Impervious Runoff Depth>2.91"
Tc=6.0 min CN=98 Runoff=1.84 cfs 0.148 af

Subcatchment2S: PARKING AREA Runoff Area=23,264 sf 68.80% Impervious Runoff Depth=2.17"
Tc=6.0 min CN=90 Runoff=1.31 cfs 0.097 af

Subcatchment2SB: PARKING AREA Runoff Area=3,619 sf 100.00% Impervious Runoff Depth>2.91"
Tc=6.0 min CN=98 Runoff=0.25 cfs 0.020 af

Subcatchment3S: SOUTHEAST PARKING Runoff Area=7,467 sf 99.71% Impervious Runoff Depth>2.91"
Tc=6.0 min CN=98 Runoff=0.52 cfs 0.042 af

Subcatchment5S: CENTRAL SITE Runoff Area=55,225 sf 82.88% Impervious Runoff Depth>2.54"
Tc=6.0 min CN=94 Runoff=3.54 cfs 0.268 af

Subcatchment6S: NORTH SITE Runoff Area=45,883 sf 1.75% Impervious Runoff Depth=0.93"
Flow Length=315' Tc=8.5 min CN=72 Runoff=0.95 cfs 0.082 af

Subcatchment7S: WETLAND SLOPE Runoff Area=22,855 sf 0.37% Impervious Runoff Depth=0.88"
Tc=6.0 min UI Adjusted CN=71 Runoff=0.48 cfs 0.038 af

Reach DP-1: WETLAND Inflow=3.88 cfs 0.426 af
Outflow=3.88 cfs 0.426 af

Reach DP-3: SOUTHEAST PROP. LINE Inflow=0.52 cfs 0.042 af
Outflow=0.52 cfs 0.042 af

Pond 1P: INFIL. BASIN Peak Elev=155.93' Storage=6,124 cf Inflow=4.42 cfs 0.350 af
Discarded=0.12 cfs 0.226 af Primary=0.94 cfs 0.124 af Outflow=1.06 cfs 0.350 af

Total Runoff Area = 4.242 ac Runoff Volume = 0.694 af Average Runoff Depth = 1.96"
45.77% Pervious = 1.942 ac 54.23% Impervious = 2.301 ac

Summary for Subcatchment 1S: EXIST. BUILDING

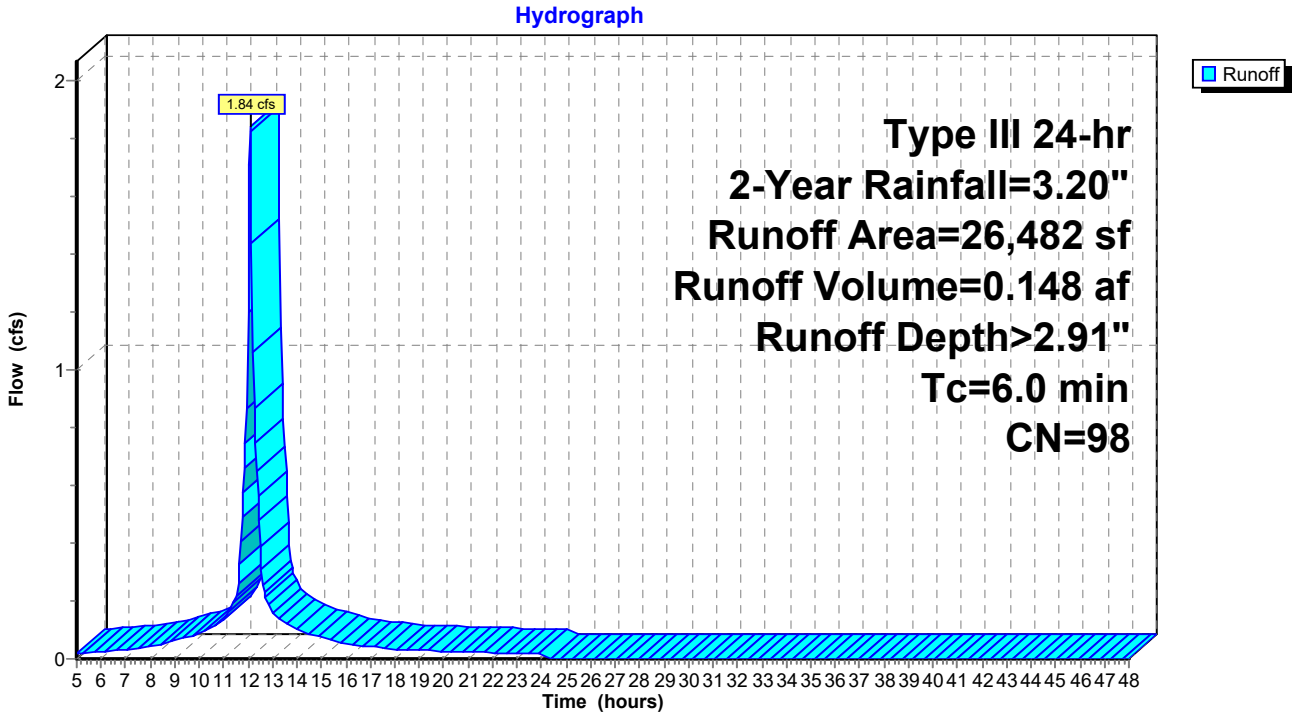
Runoff = 1.84 cfs @ 12.09 hrs, Volume= 0.148 af, Depth> 2.91"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
26,482	98	Roofs, HSG C
26,482		100.00% Impervious Area

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

Subcatchment 1S: EXIST. BUILDING



Summary for Subcatchment 2S: PARKING AREA

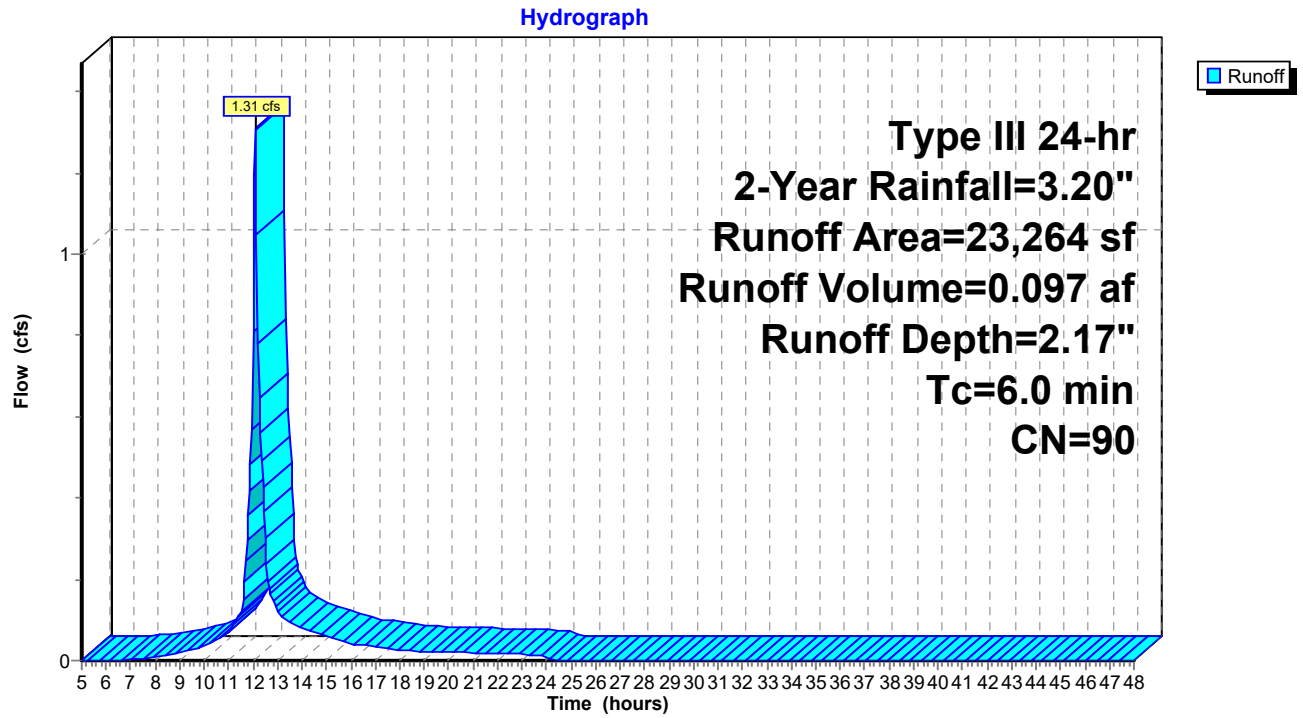
Runoff = 1.31 cfs @ 12.09 hrs, Volume= 0.097 af, Depth= 2.17"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
3,511	74	>75% Grass cover, Good, HSG C
16,005	98	Paved parking, HSG C
3,748	73	Woods, Fair, HSG C
23,264	90	Weighted Average
7,259		31.20% Pervious Area
16,005		68.80% Impervious Area

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

Subcatchment 2S: PARKING AREA



Summary for Subcatchment 2SB: PARKING AREA

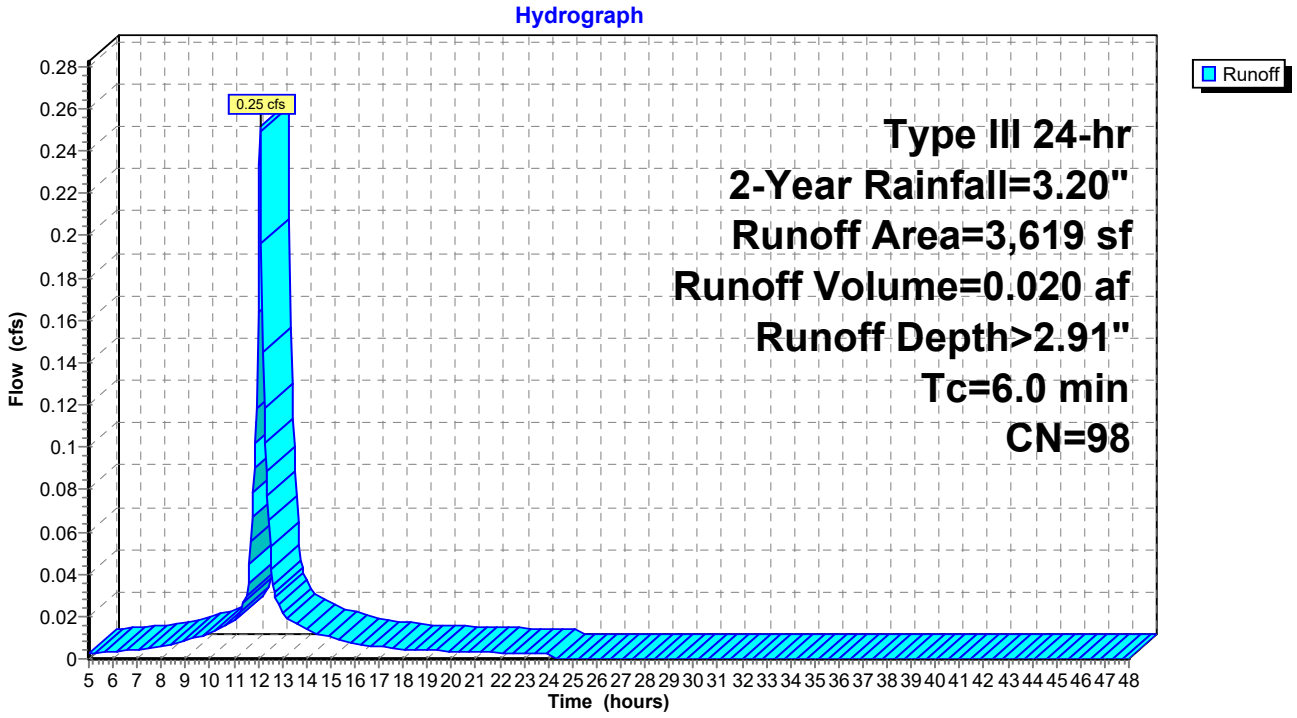
Runoff = 0.25 cfs @ 12.09 hrs, Volume= 0.020 af, Depth> 2.91"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
3,619	98	Paved parking, HSG C
3,619		100.00% Impervious Area

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

Subcatchment 2SB: PARKING AREA



Summary for Subcatchment 3S: SOUTHEAST PARKING AREA

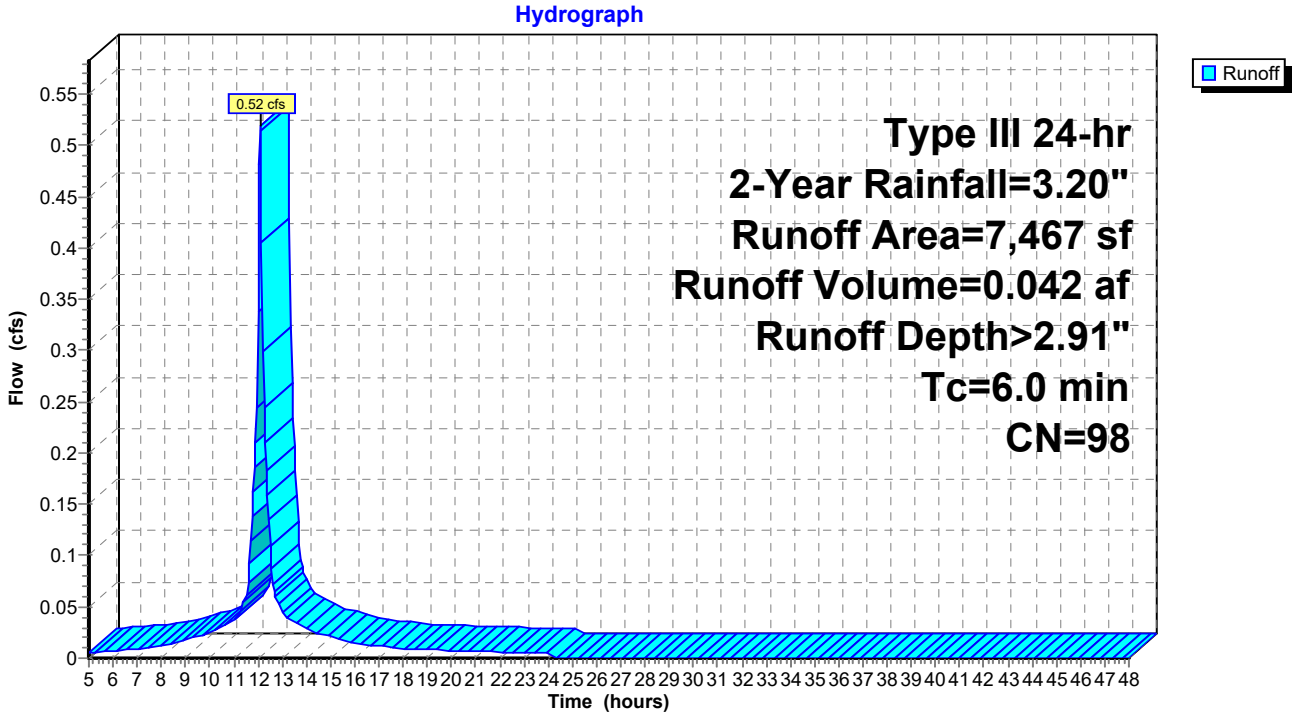
Runoff = 0.52 cfs @ 12.09 hrs, Volume= 0.042 af, Depth> 2.91"
Routed to Reach DP-3 : SOUTHEAST PROP. LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
22	74	>75% Grass cover, Good, HSG C
7,445	98	Paved parking, HSG C
7,467	98	Weighted Average
22		0.29% Pervious Area
7,445		99.71% Impervious Area

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

Subcatchment 3S: SOUTHEAST PARKING AREA



Summary for Subcatchment 5S: CENTRAL SITE

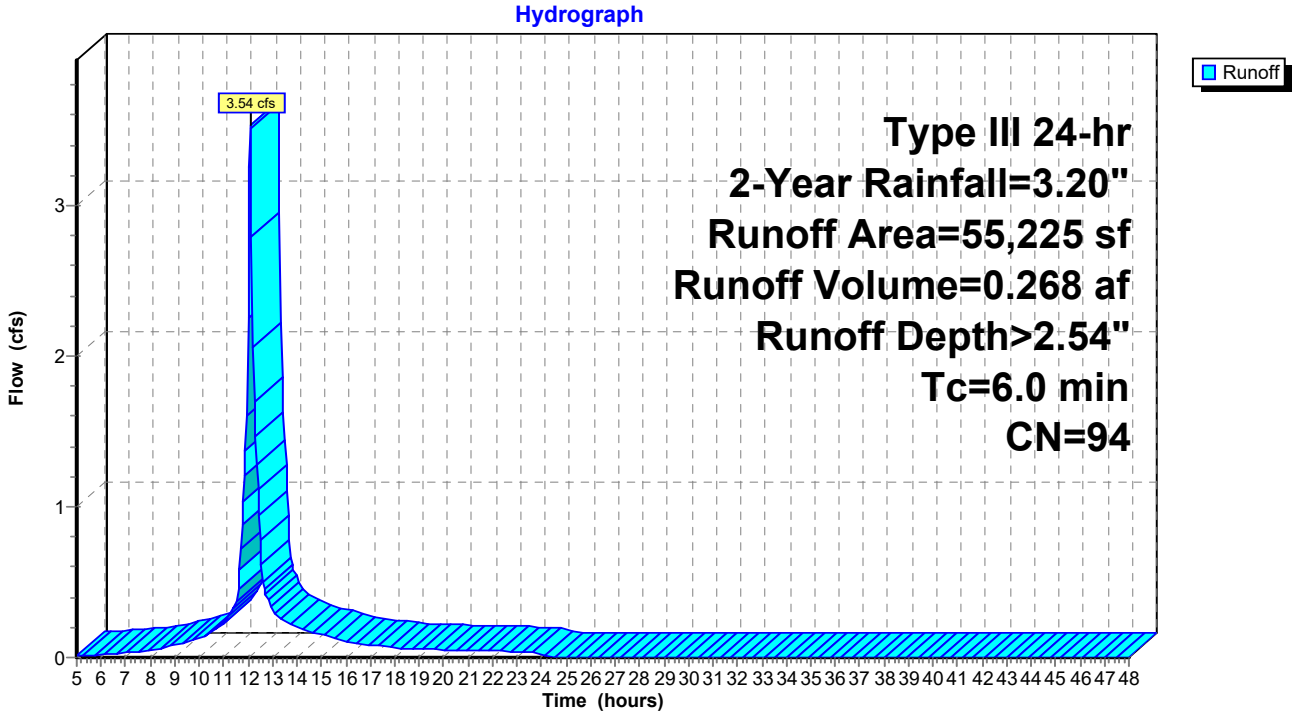
Runoff = 3.54 cfs @ 12.09 hrs, Volume= 0.268 af, Depth> 2.54"
Routed to Pond 1P : INFIL. BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
5,465	74	>75% Grass cover, Good, HSG C
3,987	70	Woods, Good, HSG C
32,173	98	Unconnected pavement, HSG C
13,600	98	Roofs, HSG C
55,225	94	Weighted Average
9,452		17.12% Pervious Area
45,773		82.88% Impervious Area
32,173		70.29% Unconnected

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

Subcatchment 5S: CENTRAL SITE



Summary for Subcatchment 6S: NORTH SITE

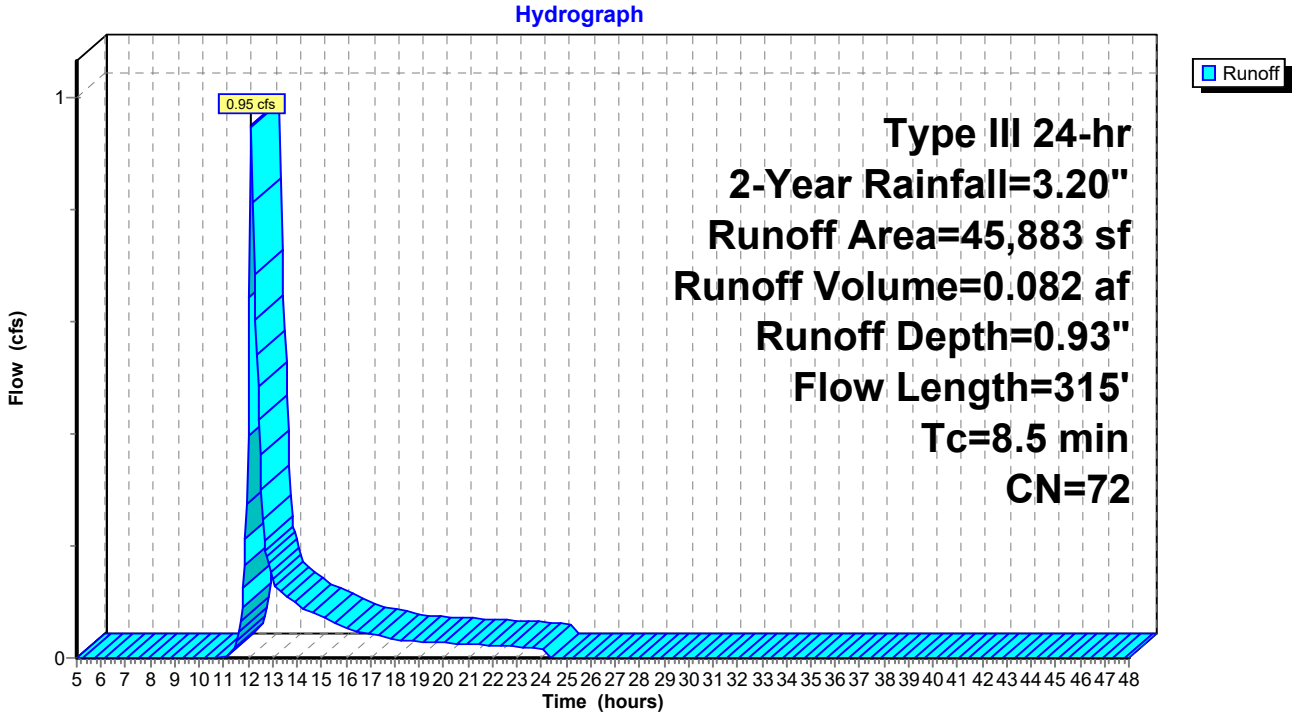
Runoff = 0.95 cfs @ 12.14 hrs, Volume= 0.082 af, Depth= 0.93"
Routed to Pond 1P : INFIL. BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
23,206	70	Woods, Good, HSG C
21,873	74	>75% Grass cover, Good, HSG C
804	98	Unconnected roofs, HSG C
45,883	72	Weighted Average
45,079		98.25% Pervious Area
804		1.75% Impervious Area
804		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	265	0.0400	3.22		**Shallow Concentrated Flow, SHALLOW CONC.** Unpaved Kv= 16.1 fps
8.5	315	Total			

Subcatchment 6S: NORTH SITE



Summary for Subcatchment 7S: WETLAND SLOPE

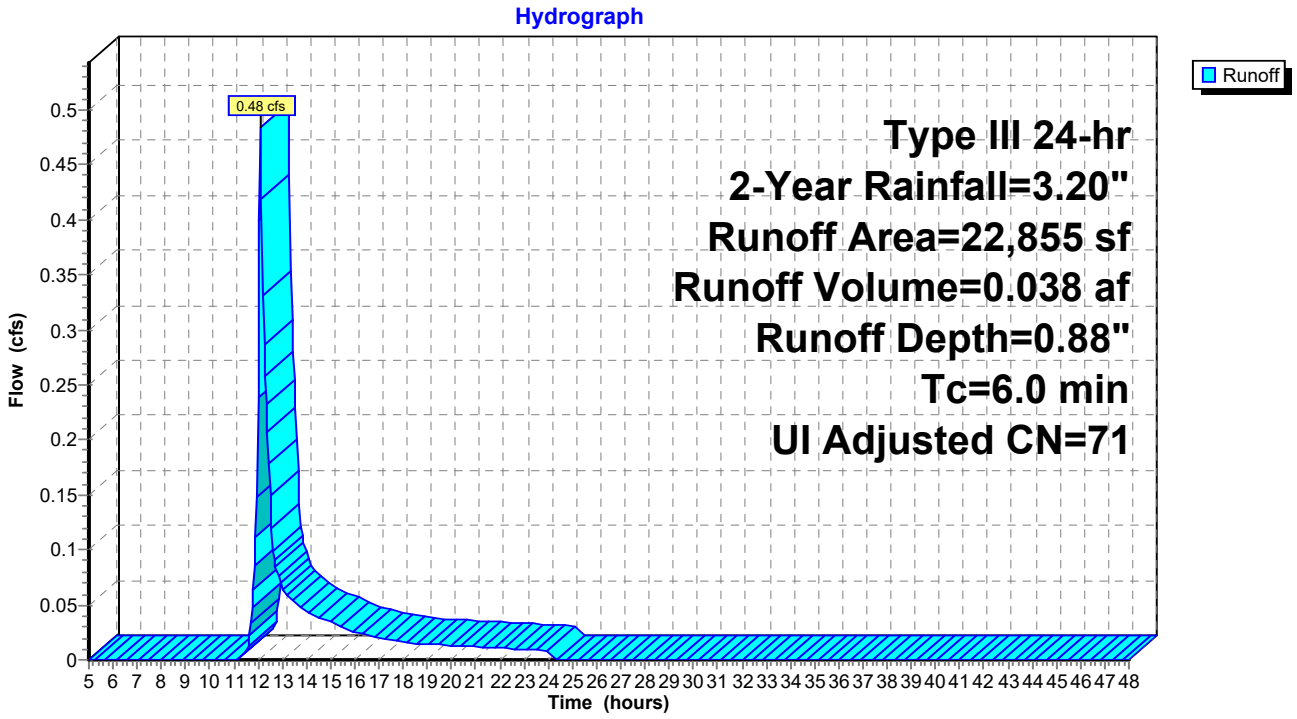
Runoff = 0.48 cfs @ 12.10 hrs, Volume= 0.038 af, Depth= 0.88"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Adj	Description
14,631	70		Woods, Good, HSG C
8,140	74		>75% Grass cover, Good, HSG C
84	98		Unconnected pavement, HSG C
22,855	72	71	Weighted Average, UI Adjusted
22,771			99.63% Pervious Area
84			0.37% Impervious Area
84			100.00% Unconnected

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

Subcatchment 7S: WETLAND SLOPE



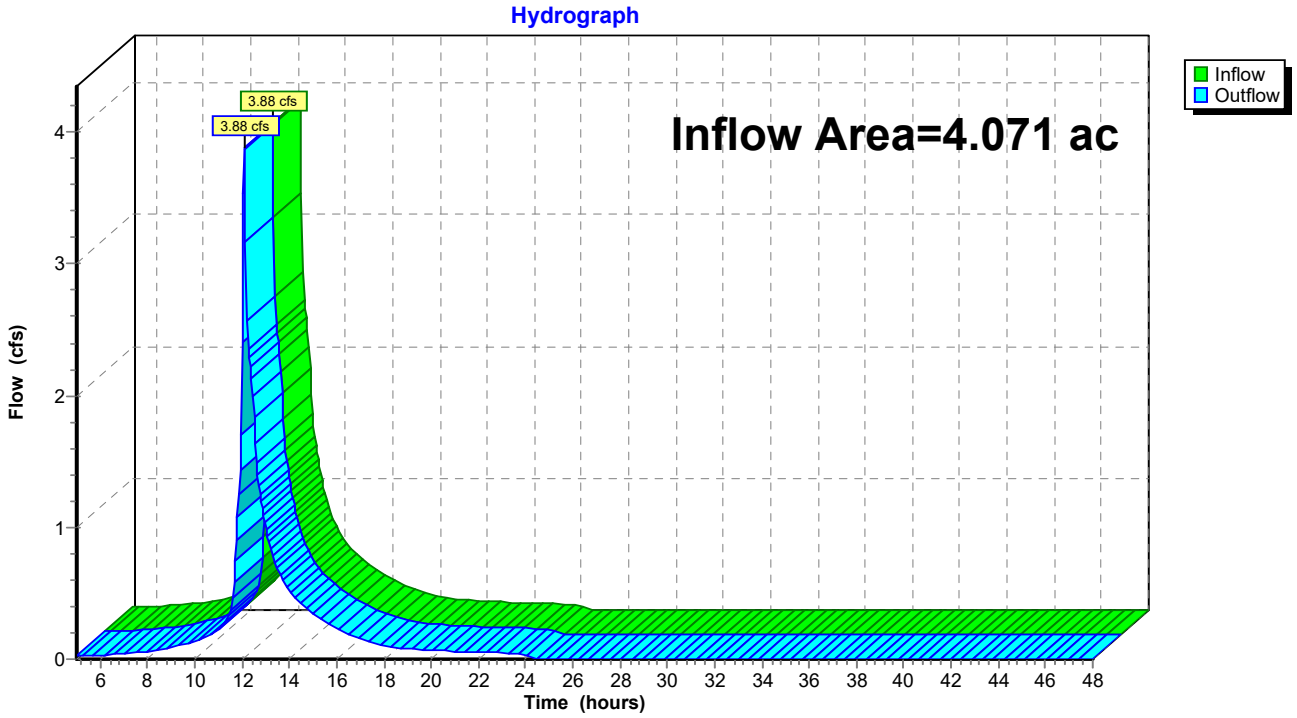
Summary for Reach DP-1: WETLAND

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.071 ac, 52.31% Impervious, Inflow Depth > 1.26" for 2-Year event
Inflow = 3.88 cfs @ 12.09 hrs, Volume= 0.426 af
Outflow = 3.88 cfs @ 12.09 hrs, Volume= 0.426 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: WETLAND



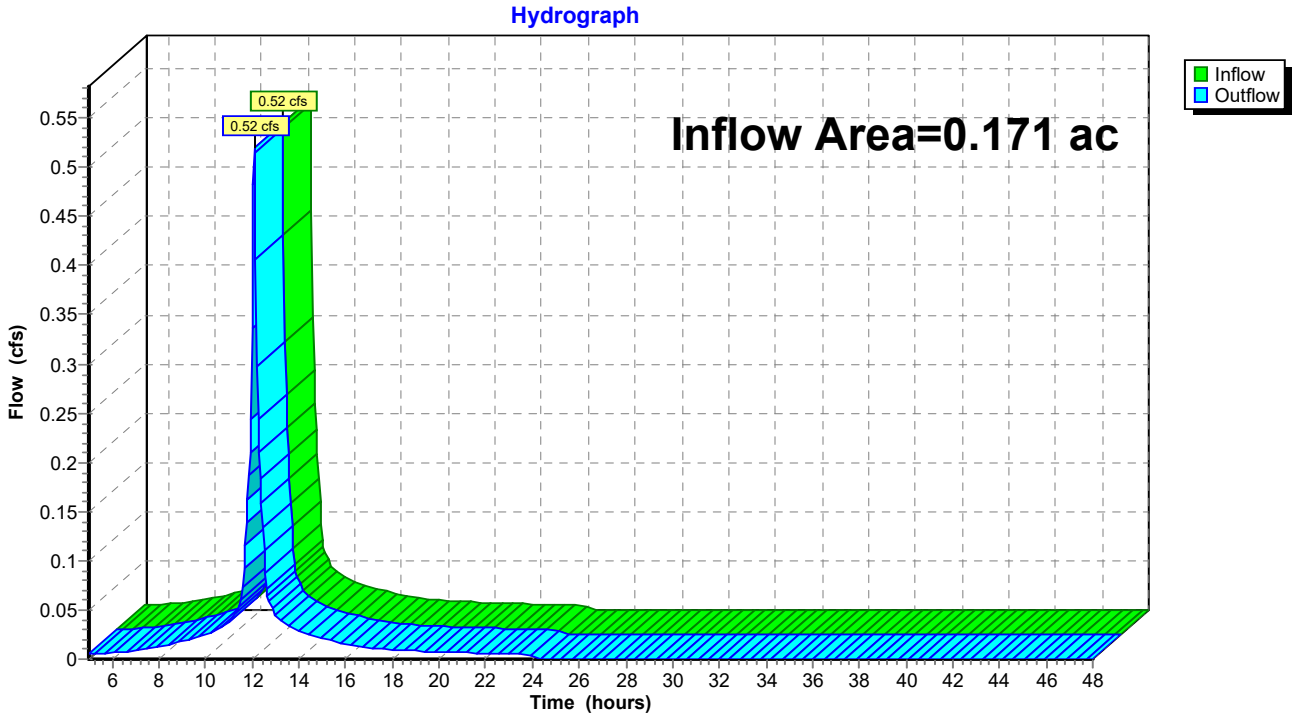
Summary for Reach DP-3: SOUTHEAST PROP. LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.171 ac, 99.71% Impervious, Inflow Depth > 2.91" for 2-Year event
Inflow = 0.52 cfs @ 12.09 hrs, Volume= 0.042 af
Outflow = 0.52 cfs @ 12.09 hrs, Volume= 0.042 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-3: SOUTHEAST PROP. LINE



Summary for Pond 1P: INFIL. BASIN

[82] Warning: Early inflow requires earlier time span

Inflow Area = 2.321 ac, 46.07% Impervious, Inflow Depth > 1.81" for 2-Year event
Inflow = 4.42 cfs @ 12.10 hrs, Volume= 0.350 af
Outflow = 1.06 cfs @ 12.52 hrs, Volume= 0.350 af, Atten= 76%, Lag= 25.3 min
Discarded = 0.12 cfs @ 12.52 hrs, Volume= 0.226 af
Primary = 0.94 cfs @ 12.52 hrs, Volume= 0.124 af
Routed to Reach DP-1 : WETLAND

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 155.93' @ 12.52 hrs Surf.Area= 5,189 sf Storage= 6,124 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 267.9 min (1,075.1 - 807.2)

Volume	Invert	Avail.Storage	Storage Description
#1	154.60'	18,830 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

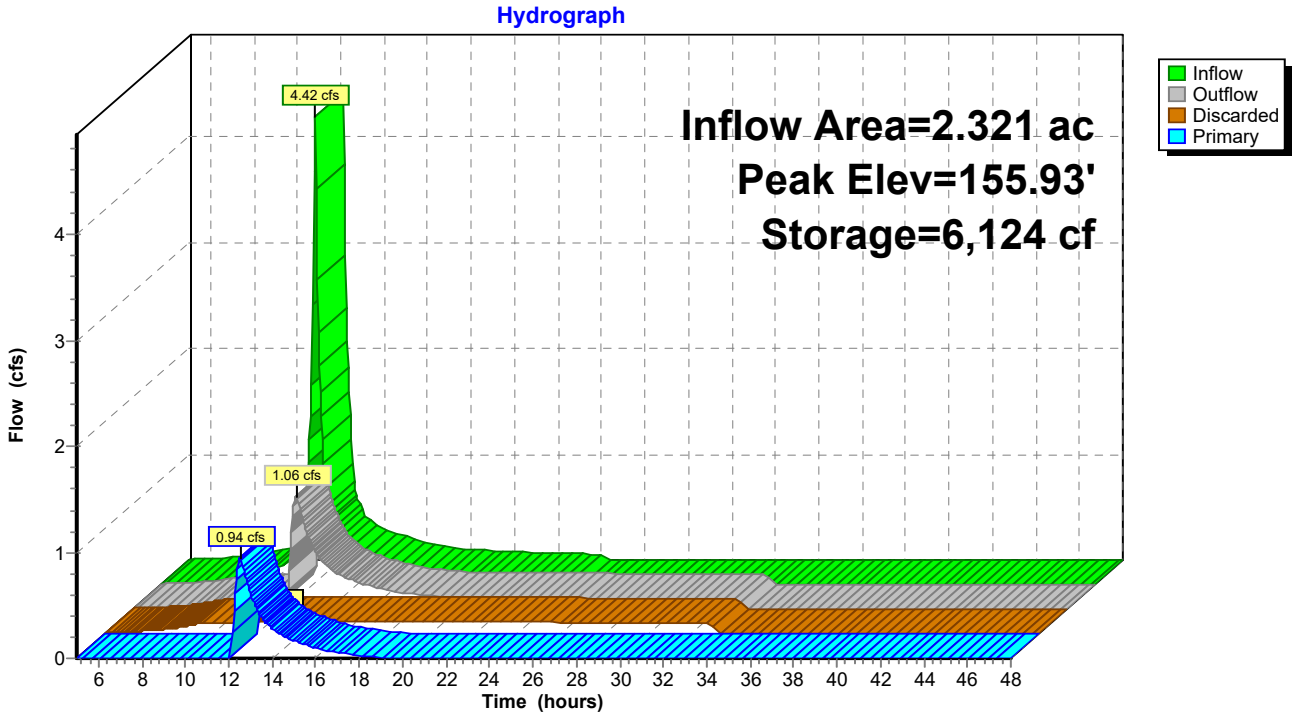
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
154.60	4,050	0	0
155.00	4,350	1,680	1,680
156.00	5,250	4,800	6,480
157.00	6,150	5,700	12,180
158.00	7,150	6,650	18,830

Device	Routing	Invert	Outlet Devices
#1	Primary	155.49'	**18.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 155.49' / 155.18' S= 0.0124 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	155.49'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	156.35'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Discarded	154.60'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.12 cfs @ 12.52 hrs HW=155.93' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=0.94 cfs @ 12.52 hrs HW=155.93' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.94 cfs @ 3.24 fps)
├**2=Orifice/Grate** (Passes 0.94 cfs of 2.51 cfs potential flow)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: INFIL. BASIN



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: EXIST. BUILDING Runoff Area=26,482 sf 100.00% Impervious Runoff Depth>4.35"
Tc=6.0 min CN=98 Runoff=2.73 cfs 0.220 af

Subcatchment2S: PARKING AREA Runoff Area=23,264 sf 68.80% Impervious Runoff Depth>3.59"
Tc=6.0 min CN=90 Runoff=2.13 cfs 0.160 af

Subcatchment2SB: PARKING AREA Runoff Area=3,619 sf 100.00% Impervious Runoff Depth>4.35"
Tc=6.0 min CN=98 Runoff=0.37 cfs 0.030 af

Subcatchment3S: SOUTHEAST PARKING Runoff Area=7,467 sf 99.71% Impervious Runoff Depth>4.35"
Tc=6.0 min CN=98 Runoff=0.77 cfs 0.062 af

Subcatchment5S: CENTRAL SITE Runoff Area=55,225 sf 82.88% Impervious Runoff Depth>3.99"
Tc=6.0 min CN=94 Runoff=5.44 cfs 0.422 af

Subcatchment6S: NORTH SITE Runoff Area=45,883 sf 1.75% Impervious Runoff Depth=1.97"
Flow Length=315' Tc=8.5 min CN=72 Runoff=2.15 cfs 0.173 af

Subcatchment7S: WETLAND SLOPE Runoff Area=22,855 sf 0.37% Impervious Runoff Depth=1.89"
Tc=6.0 min UI Adjusted CN=71 Runoff=1.12 cfs 0.083 af

Reach DP-1: WETLAND Inflow=8.08 cfs 0.832 af
Outflow=8.08 cfs 0.832 af

Reach DP-3: SOUTHEAST PROP. LINE Inflow=0.77 cfs 0.062 af
Outflow=0.77 cfs 0.062 af

Pond 1P: INFIL. BASIN Peak Elev=156.41' Storage=8,701 cf Inflow=7.48 cfs 0.594 af
Discarded=0.13 cfs 0.255 af Primary=3.31 cfs 0.340 af Outflow=3.44 cfs 0.595 af

Total Runoff Area = 4.242 ac Runoff Volume = 1.149 af Average Runoff Depth = 3.25"
45.77% Pervious = 1.942 ac 54.23% Impervious = 2.301 ac

Summary for Subcatchment 1S: EXIST. BUILDING

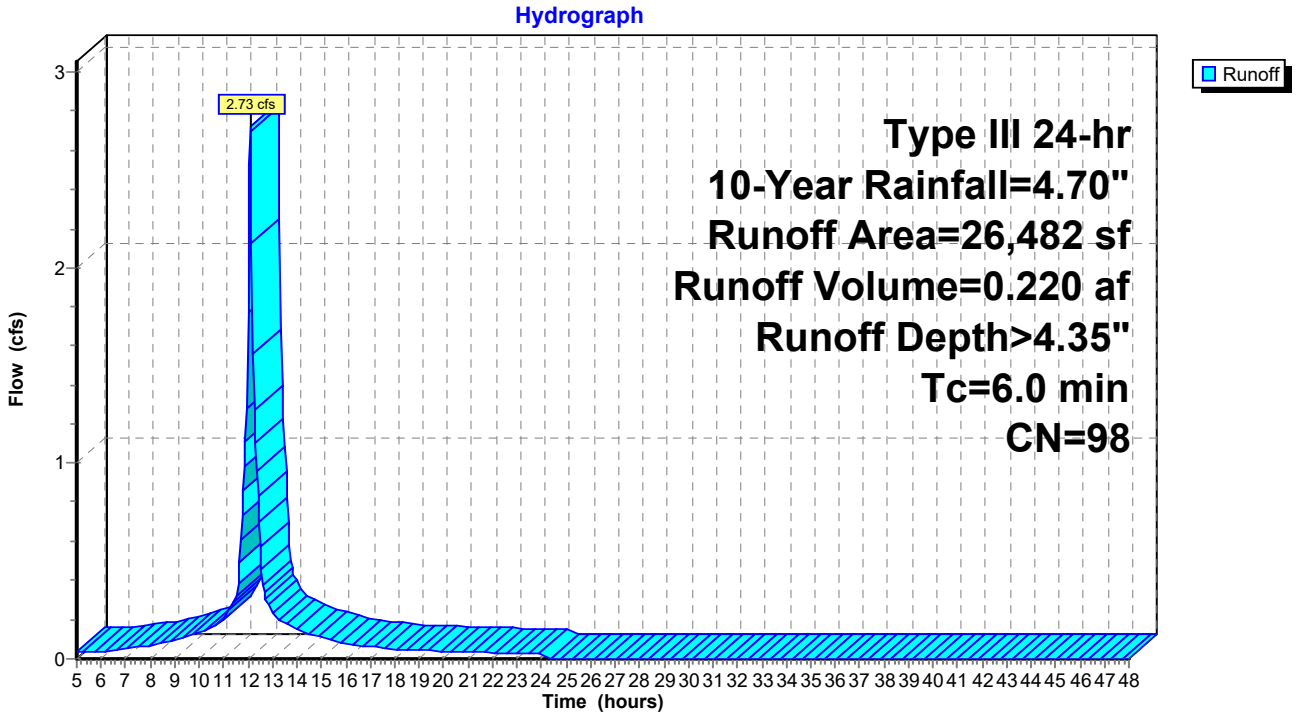
Runoff = 2.73 cfs @ 12.09 hrs, Volume= 0.220 af, Depth> 4.35"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
26,482	98	Roofs, HSG C
26,482		100.00% Impervious Area

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

Subcatchment 1S: EXIST. BUILDING



Summary for Subcatchment 2S: PARKING AREA

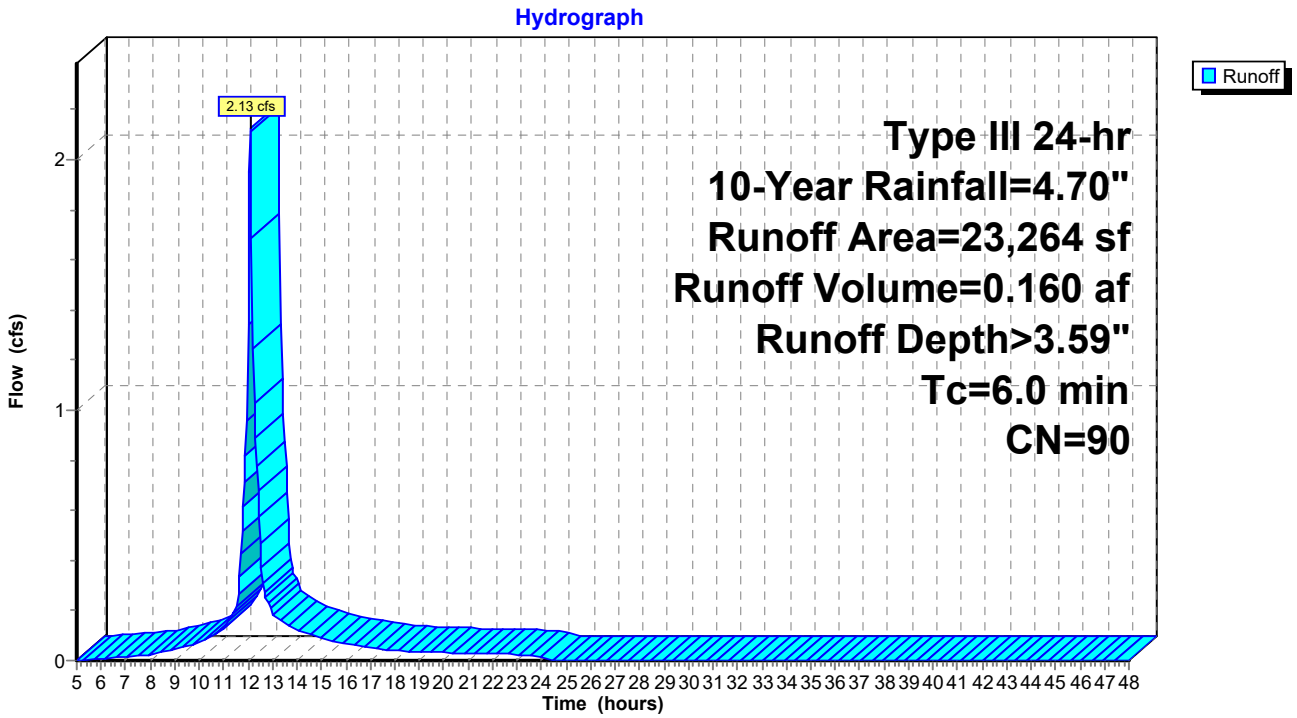
Runoff = 2.13 cfs @ 12.09 hrs, Volume= 0.160 af, Depth> 3.59"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
3,511	74	>75% Grass cover, Good, HSG C
16,005	98	Paved parking, HSG C
3,748	73	Woods, Fair, HSG C
23,264	90	Weighted Average
7,259		31.20% Pervious Area
16,005		68.80% Impervious Area

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

Subcatchment 2S: PARKING AREA



Summary for Subcatchment 2SB: PARKING AREA

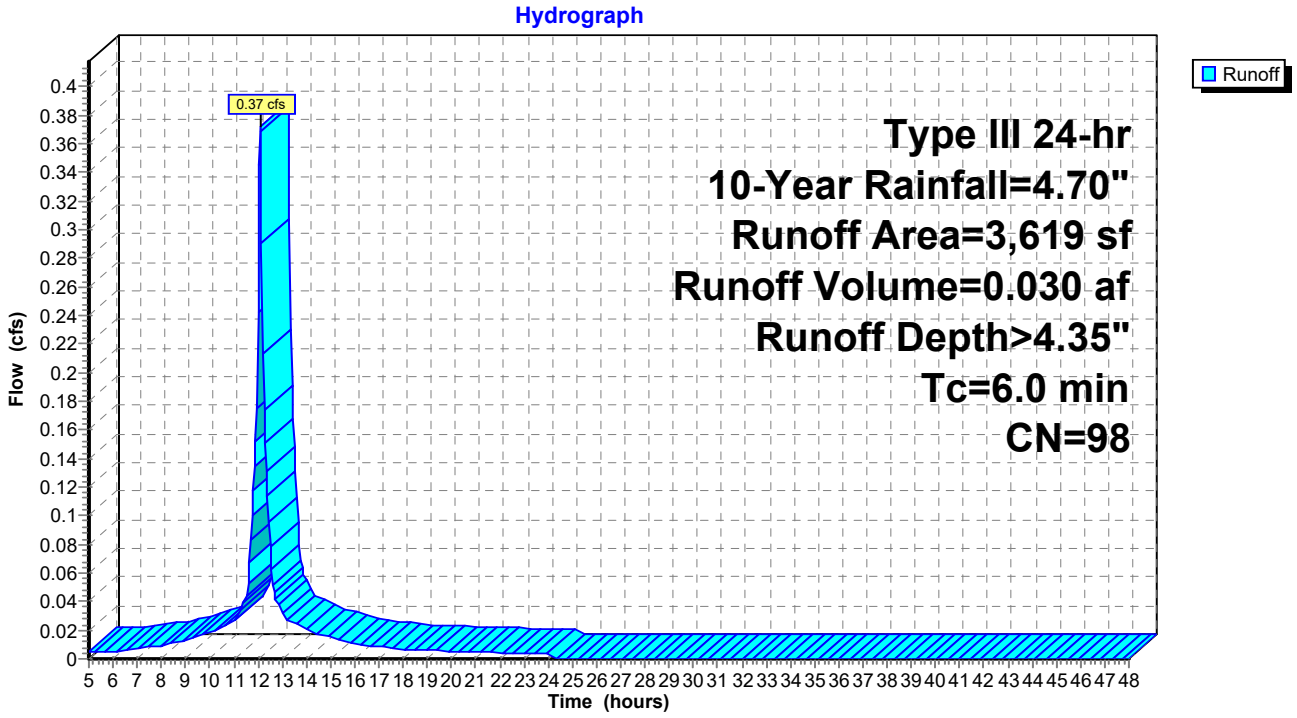
Runoff = 0.37 cfs @ 12.09 hrs, Volume= 0.030 af, Depth> 4.35"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
3,619	98	Paved parking, HSG C
3,619		100.00% Impervious Area

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

Subcatchment 2SB: PARKING AREA



Summary for Subcatchment 3S: SOUTHEAST PARKING AREA

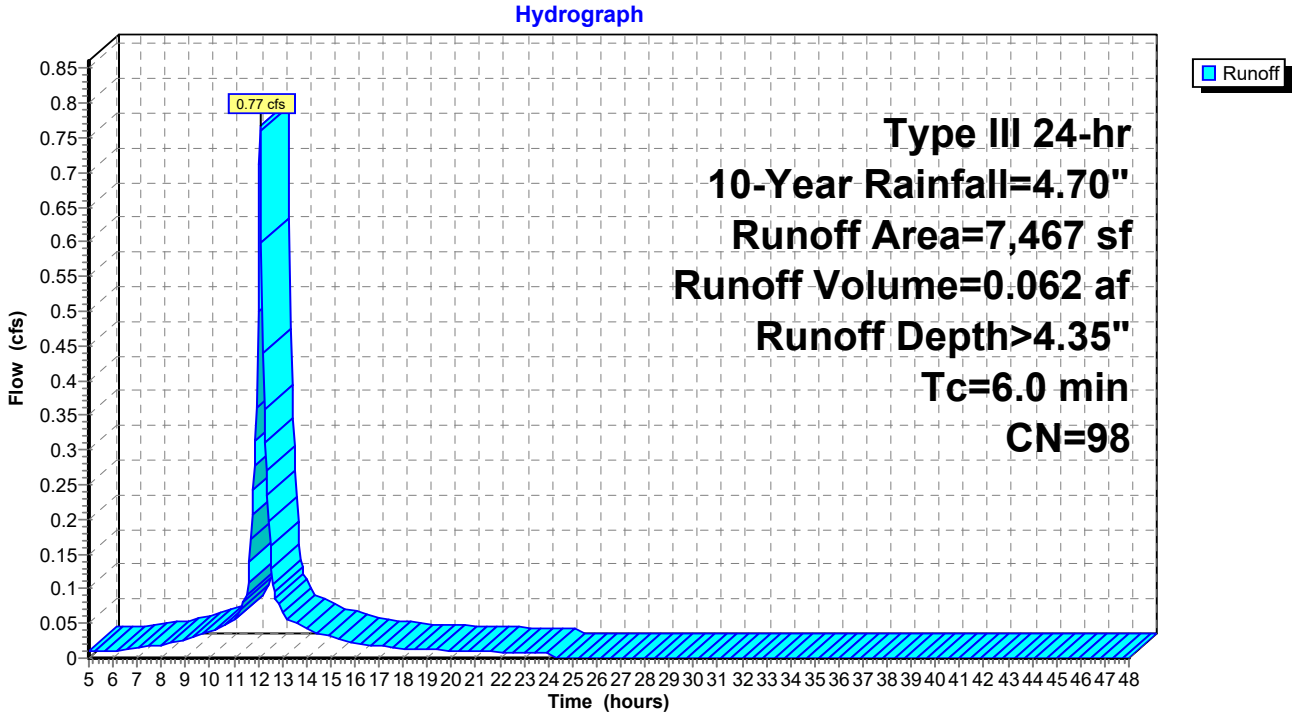
Runoff = 0.77 cfs @ 12.09 hrs, Volume= 0.062 af, Depth> 4.35"
Routed to Reach DP-3 : SOUTHEAST PROP. LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
22	74	>75% Grass cover, Good, HSG C
7,445	98	Paved parking, HSG C
7,467	98	Weighted Average
22		0.29% Pervious Area
7,445		99.71% Impervious Area

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

Subcatchment 3S: SOUTHEAST PARKING AREA



Summary for Subcatchment 5S: CENTRAL SITE

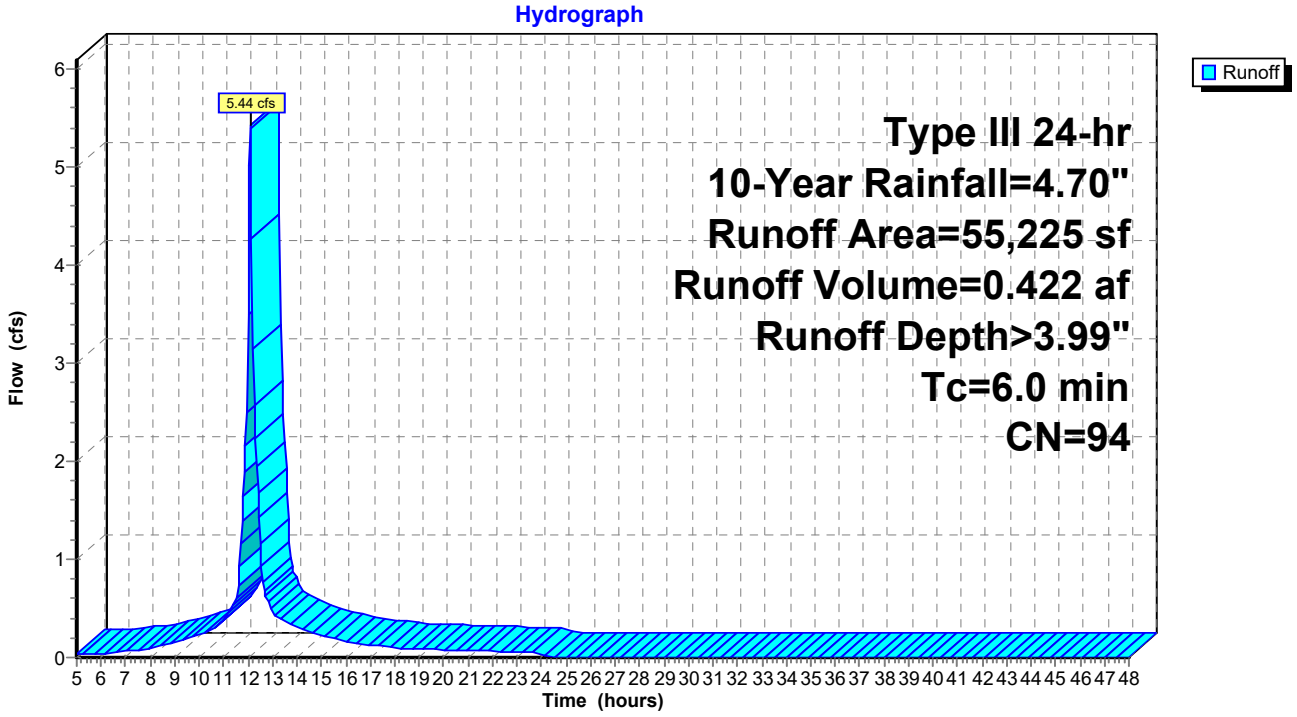
Runoff = 5.44 cfs @ 12.09 hrs, Volume= 0.422 af, Depth> 3.99"
Routed to Pond 1P : INFIL. BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
5,465	74	>75% Grass cover, Good, HSG C
3,987	70	Woods, Good, HSG C
32,173	98	Unconnected pavement, HSG C
13,600	98	Roofs, HSG C
55,225	94	Weighted Average
9,452		17.12% Pervious Area
45,773		82.88% Impervious Area
32,173		70.29% Unconnected

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

Subcatchment 5S: CENTRAL SITE



Summary for Subcatchment 6S: NORTH SITE

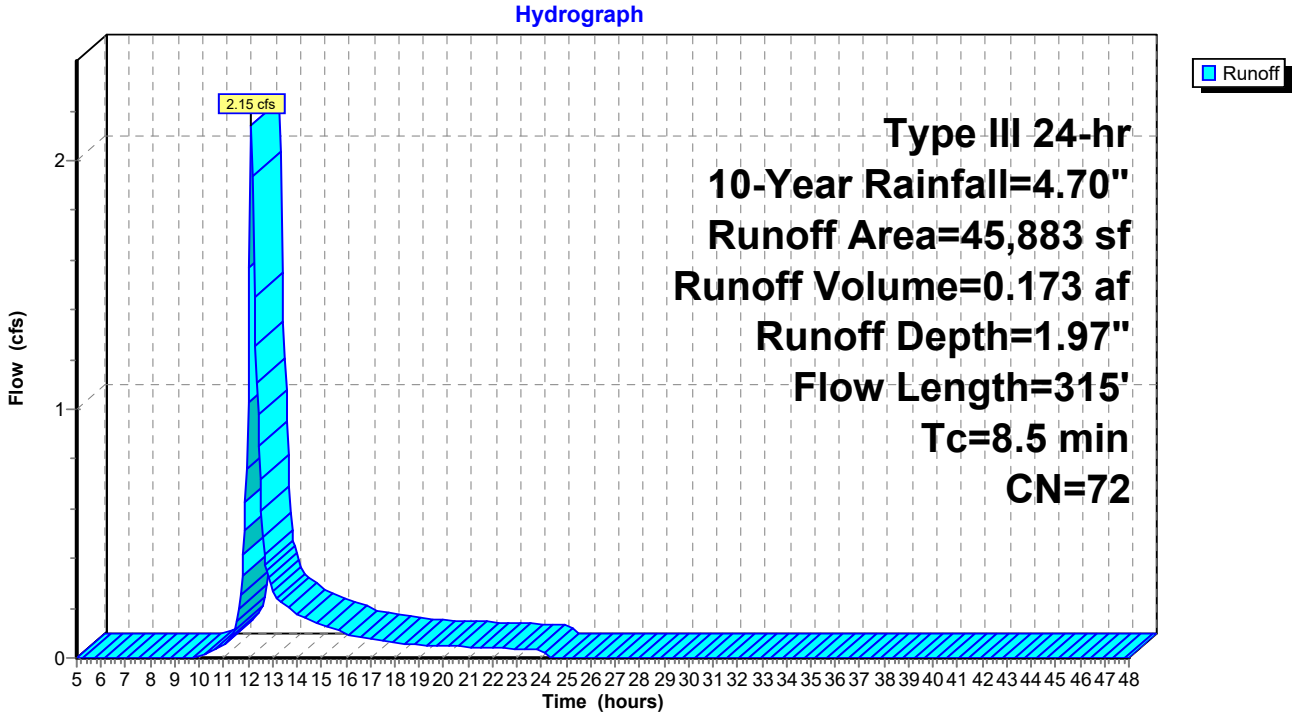
Runoff = 2.15 cfs @ 12.13 hrs, Volume= 0.173 af, Depth= 1.97"
Routed to Pond 1P : INFIL. BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
23,206	70	Woods, Good, HSG C
21,873	74	>75% Grass cover, Good, HSG C
804	98	Unconnected roofs, HSG C
45,883	72	Weighted Average
45,079		98.25% Pervious Area
804		1.75% Impervious Area
804		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	265	0.0400	3.22		**Shallow Concentrated Flow, SHALLOW CONC.** Unpaved Kv= 16.1 fps
8.5	315	Total			

Subcatchment 6S: NORTH SITE



Summary for Subcatchment 7S: WETLAND SLOPE

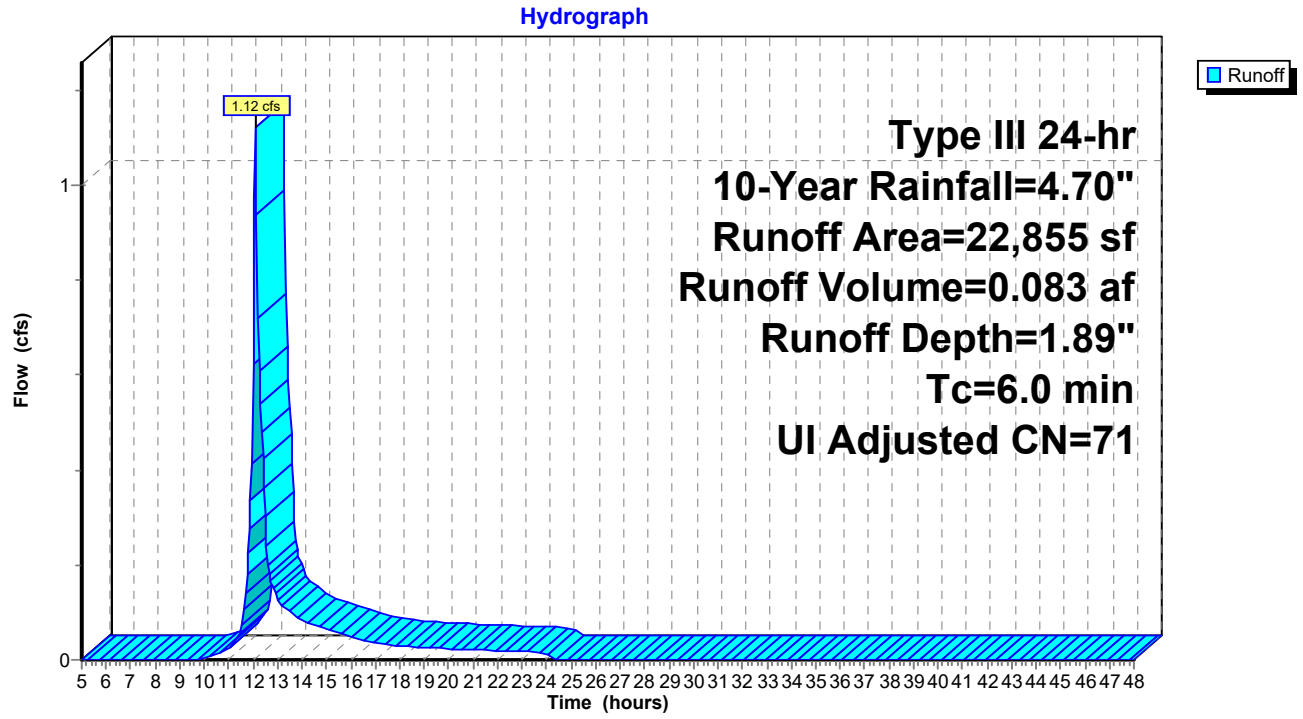
Runoff = 1.12 cfs @ 12.10 hrs, Volume= 0.083 af, Depth= 1.89"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Adj	Description
14,631	70		Woods, Good, HSG C
8,140	74		>75% Grass cover, Good, HSG C
84	98		Unconnected pavement, HSG C
22,855	72	71	Weighted Average, UI Adjusted
22,771			99.63% Pervious Area
84			0.37% Impervious Area
84			100.00% Unconnected

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

Subcatchment 7S: WETLAND SLOPE



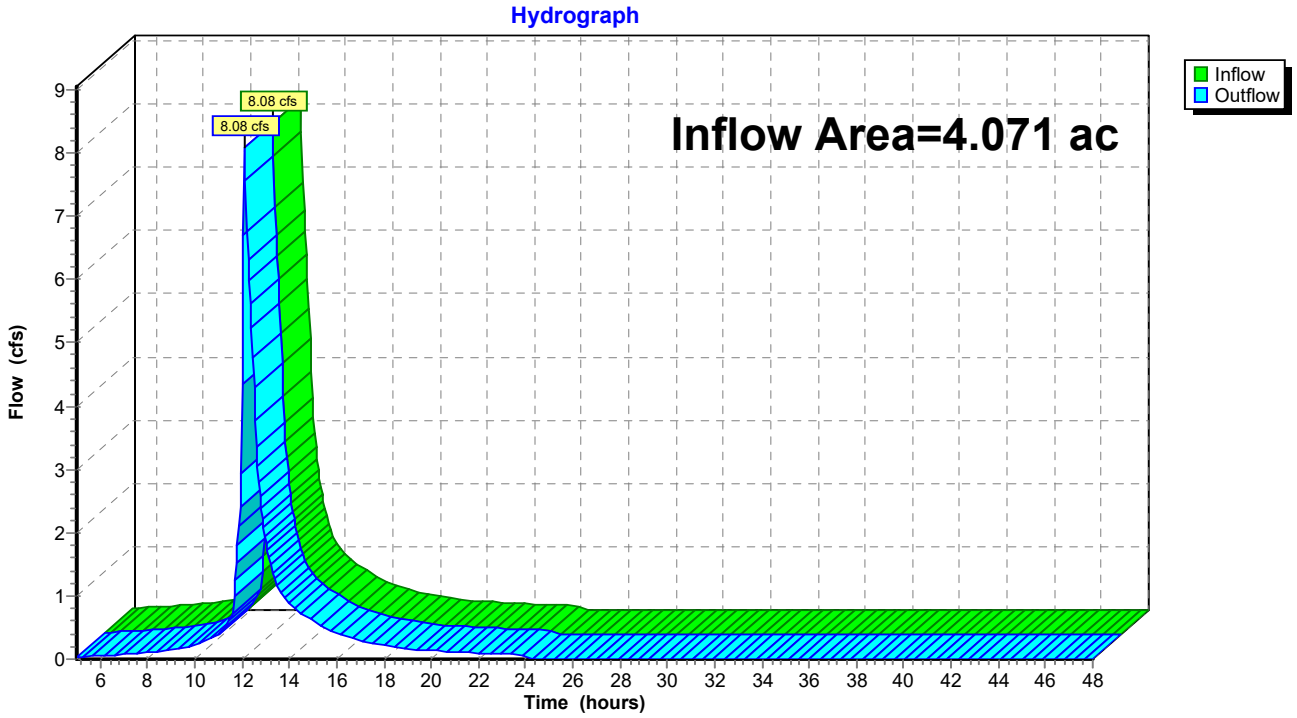
Summary for Reach DP-1: WETLAND

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.071 ac, 52.31% Impervious, Inflow Depth > 2.45" for 10-Year event
Inflow = 8.08 cfs @ 12.11 hrs, Volume= 0.832 af
Outflow = 8.08 cfs @ 12.11 hrs, Volume= 0.832 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: WETLAND



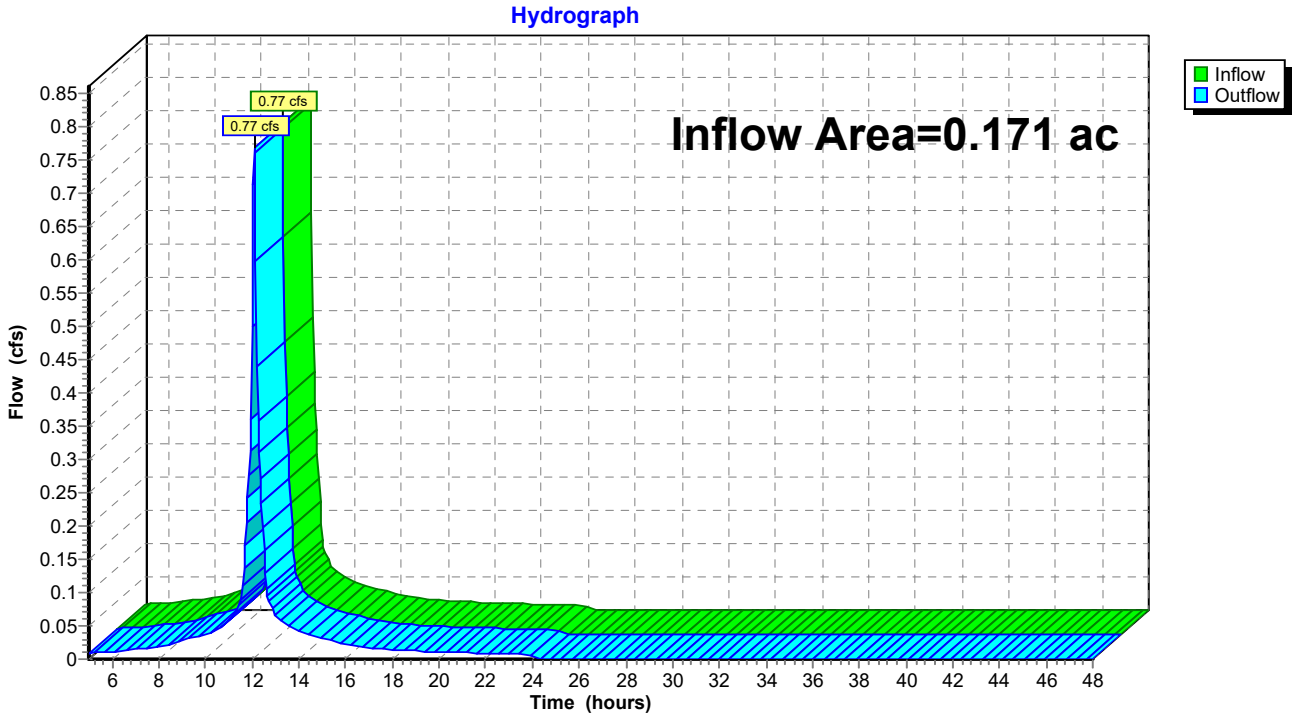
Summary for Reach DP-3: SOUTHEAST PROP. LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.171 ac, 99.71% Impervious, Inflow Depth > 4.35" for 10-Year event
Inflow = 0.77 cfs @ 12.09 hrs, Volume= 0.062 af
Outflow = 0.77 cfs @ 12.09 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-3: SOUTHEAST PROP. LINE



Summary for Pond 1P: INFIL. BASIN

[82] Warning: Early inflow requires earlier time span

Inflow Area = 2.321 ac, 46.07% Impervious, Inflow Depth > 3.07" for 10-Year event
Inflow = 7.48 cfs @ 12.10 hrs, Volume= 0.594 af
Outflow = 3.44 cfs @ 12.31 hrs, Volume= 0.595 af, Atten= 54%, Lag= 12.7 min
Discarded = 0.13 cfs @ 12.31 hrs, Volume= 0.255 af
Primary = 3.31 cfs @ 12.31 hrs, Volume= 0.340 af
Routed to Reach DP-1 : WETLAND

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 156.41' @ 12.31 hrs Surf.Area= 5,618 sf Storage= 8,701 cf

Plug-Flow detention time= 191.4 min calculated for 0.594 af (100% of inflow)
Center-of-Mass det. time= 192.1 min (990.6 - 798.5)

Volume	Invert	Avail.Storage	Storage Description
#1	154.60'	18,830 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

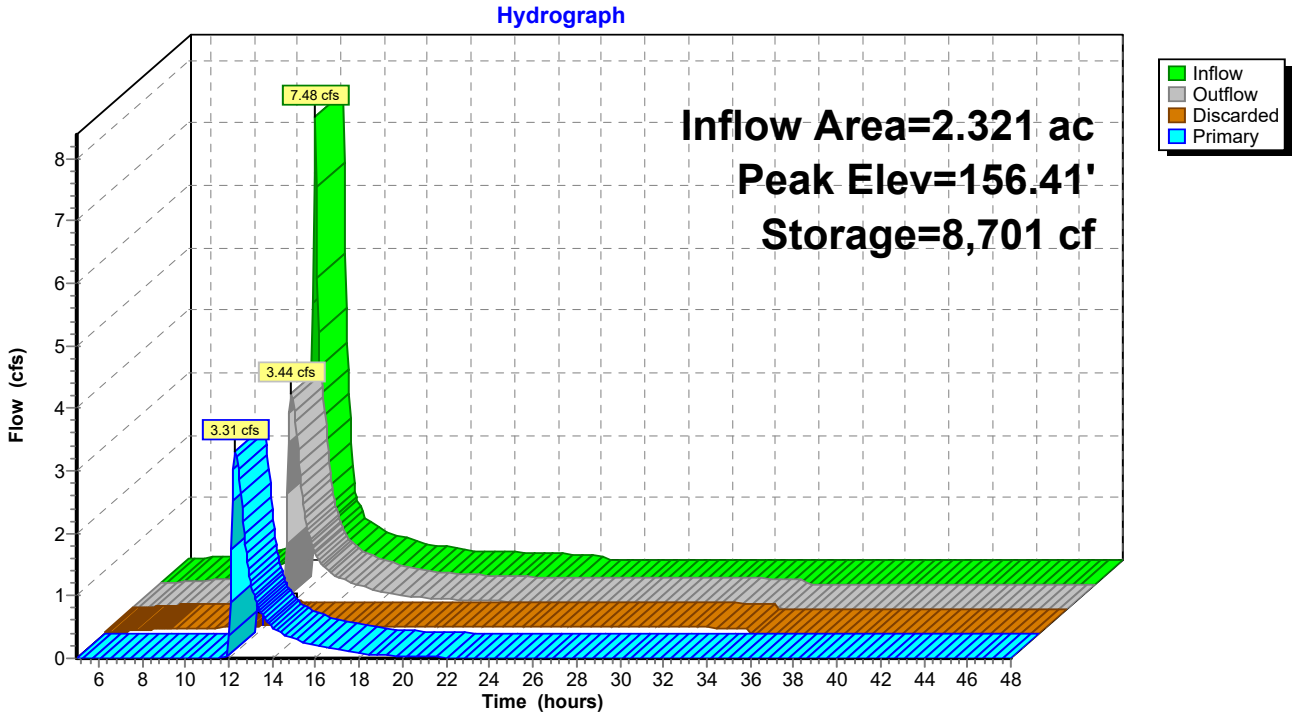
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
154.60	4,050	0	0
155.00	4,350	1,680	1,680
156.00	5,250	4,800	6,480
157.00	6,150	5,700	12,180
158.00	7,150	6,650	18,830

Device	Routing	Invert	Outlet Devices
#1	Primary	155.49'	**18.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 155.49' / 155.18' S= 0.0124 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	155.49'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	156.35'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Discarded	154.60'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.13 cfs @ 12.31 hrs HW=156.41' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=3.30 cfs @ 12.31 hrs HW=156.41' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 3.30 cfs @ 4.17 fps)
├**2=Orifice/Grate** (Passes < 3.62 cfs potential flow)
└**3=Orifice/Grate** (Passes < 0.14 cfs potential flow)

Pond 1P: INFIL. BASIN



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: EXIST. BUILDING Runoff Area=26,482 sf 100.00% Impervious Runoff Depth>5.12"
Tc=6.0 min CN=98 Runoff=3.20 cfs 0.259 af

Subcatchment2S: PARKING AREA Runoff Area=23,264 sf 68.80% Impervious Runoff Depth>4.35"
Tc=6.0 min CN=90 Runoff=2.56 cfs 0.194 af

Subcatchment2SB: PARKING AREA Runoff Area=3,619 sf 100.00% Impervious Runoff Depth>5.12"
Tc=6.0 min CN=98 Runoff=0.44 cfs 0.035 af

Subcatchment3S: SOUTHEAST PARKING Runoff Area=7,467 sf 99.71% Impervious Runoff Depth>5.12"
Tc=6.0 min CN=98 Runoff=0.90 cfs 0.073 af

Subcatchment5S: CENTRAL SITE Runoff Area=55,225 sf 82.88% Impervious Runoff Depth>4.76"
Tc=6.0 min CN=94 Runoff=6.44 cfs 0.503 af

Subcatchment6S: NORTH SITE Runoff Area=45,883 sf 1.75% Impervious Runoff Depth=2.59"
Flow Length=315' Tc=8.5 min CN=72 Runoff=2.88 cfs 0.227 af

Subcatchment7S: WETLAND SLOPE Runoff Area=22,855 sf 0.37% Impervious Runoff Depth=2.50"
Tc=6.0 min UI Adjusted CN=71 Runoff=1.50 cfs 0.109 af

Reach DP-1: WETLAND Inflow=10.85 cfs 1.065 af
Outflow=10.85 cfs 1.065 af

Reach DP-3: SOUTHEAST PROP. LINE Inflow=0.90 cfs 0.073 af
Outflow=0.90 cfs 0.073 af

Pond 1P: INFIL. BASIN Peak Elev=156.64' Storage=10,002 cf Inflow=9.18 cfs 0.731 af
Discarded=0.14 cfs 0.264 af Primary=4.70 cfs 0.467 af Outflow=4.83 cfs 0.731 af

Total Runoff Area = 4.242 ac Runoff Volume = 1.401 af Average Runoff Depth = 3.96"
45.77% Pervious = 1.942 ac 54.23% Impervious = 2.301 ac

Summary for Subcatchment 1S: EXIST. BUILDING

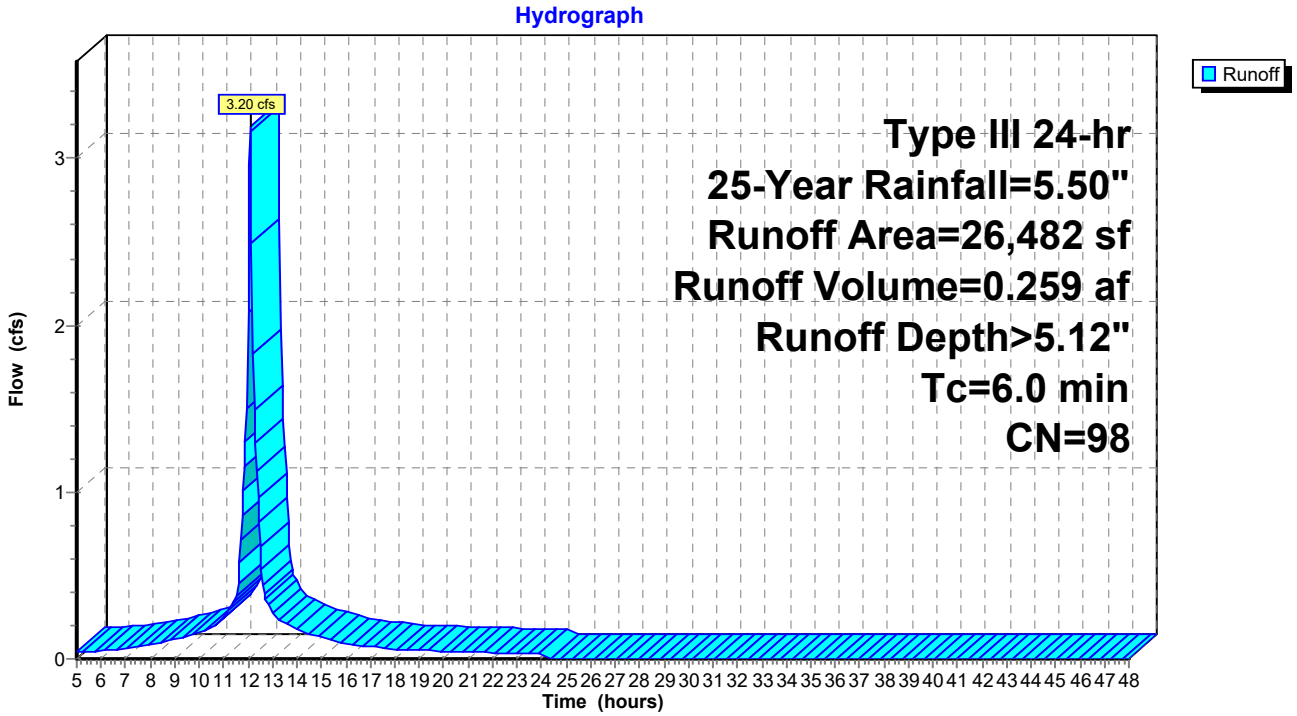
Runoff = 3.20 cfs @ 12.09 hrs, Volume= 0.259 af, Depth> 5.12"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
26,482	98	Roofs, HSG C
26,482		100.00% Impervious Area

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

Subcatchment 1S: EXIST. BUILDING



Summary for Subcatchment 2S: PARKING AREA

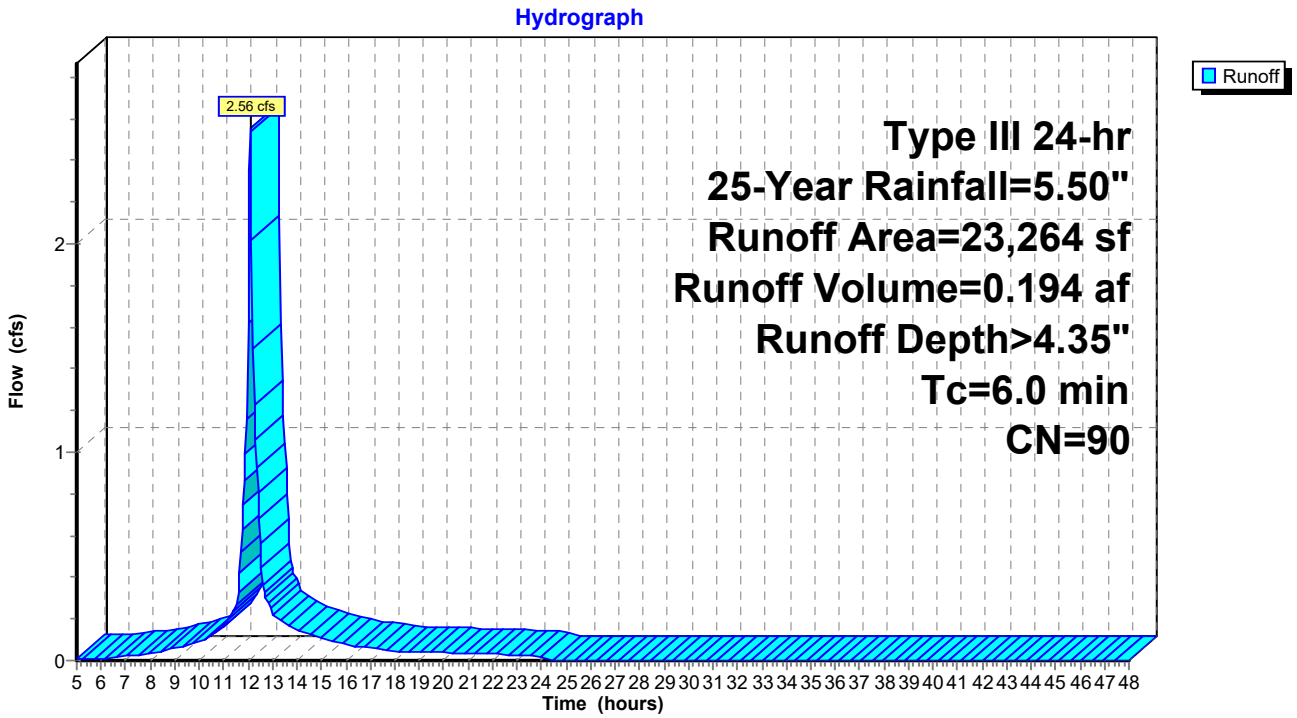
Runoff = 2.56 cfs @ 12.09 hrs, Volume= 0.194 af, Depth> 4.35"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
3,511	74	>75% Grass cover, Good, HSG C
16,005	98	Paved parking, HSG C
3,748	73	Woods, Fair, HSG C
23,264	90	Weighted Average
7,259		31.20% Pervious Area
16,005		68.80% Impervious Area

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

Subcatchment 2S: PARKING AREA



Summary for Subcatchment 2SB: PARKING AREA

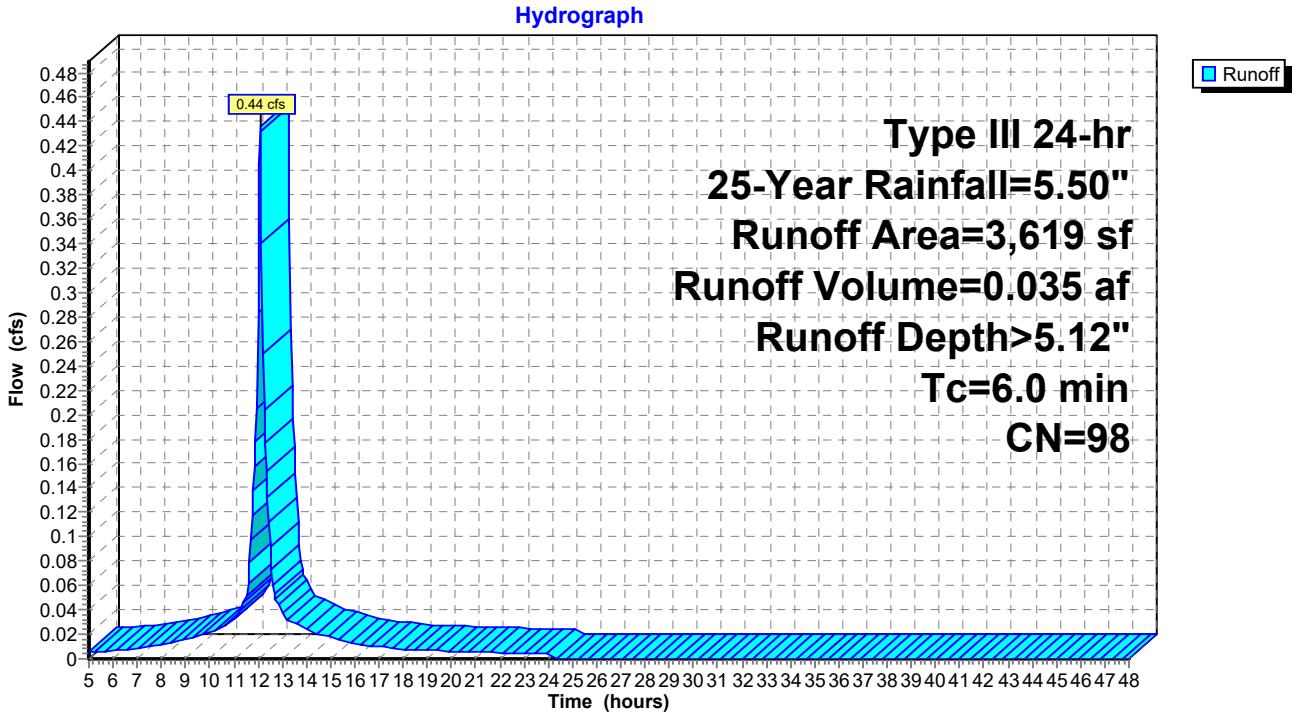
Runoff = 0.44 cfs @ 12.09 hrs, Volume= 0.035 af, Depth> 5.12"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
3,619	98	Paved parking, HSG C
3,619		100.00% Impervious Area

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

Subcatchment 2SB: PARKING AREA



Summary for Subcatchment 3S: SOUTHEAST PARKING AREA

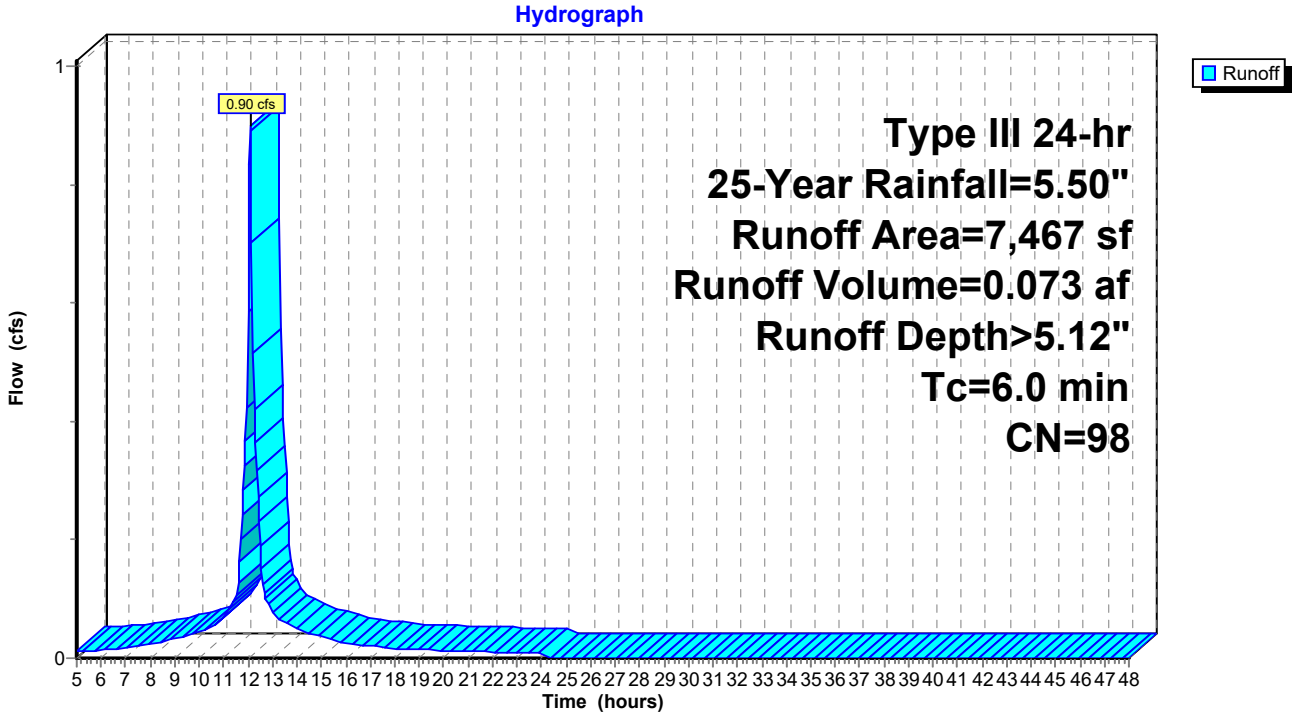
Runoff = 0.90 cfs @ 12.09 hrs, Volume= 0.073 af, Depth> 5.12"
Routed to Reach DP-3 : SOUTHEAST PROP. LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
22	74	>75% Grass cover, Good, HSG C
7,445	98	Paved parking, HSG C
7,467	98	Weighted Average
22		0.29% Pervious Area
7,445		99.71% Impervious Area

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

Subcatchment 3S: SOUTHEAST PARKING AREA



Summary for Subcatchment 5S: CENTRAL SITE

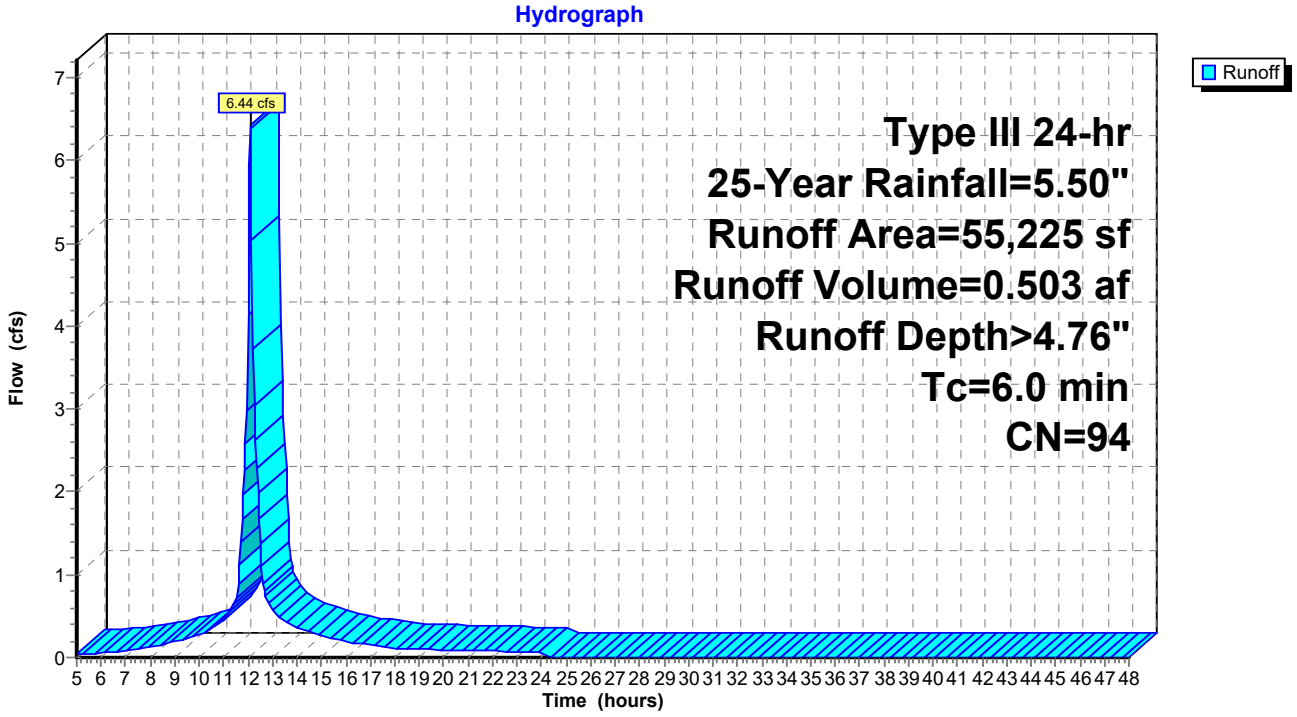
Runoff = 6.44 cfs @ 12.09 hrs, Volume= 0.503 af, Depth> 4.76"
Routed to Pond 1P : INFIL. BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
5,465	74	>75% Grass cover, Good, HSG C
3,987	70	Woods, Good, HSG C
32,173	98	Unconnected pavement, HSG C
13,600	98	Roofs, HSG C
55,225	94	Weighted Average
9,452		17.12% Pervious Area
45,773		82.88% Impervious Area
32,173		70.29% Unconnected

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

Subcatchment 5S: CENTRAL SITE



Summary for Subcatchment 6S: NORTH SITE

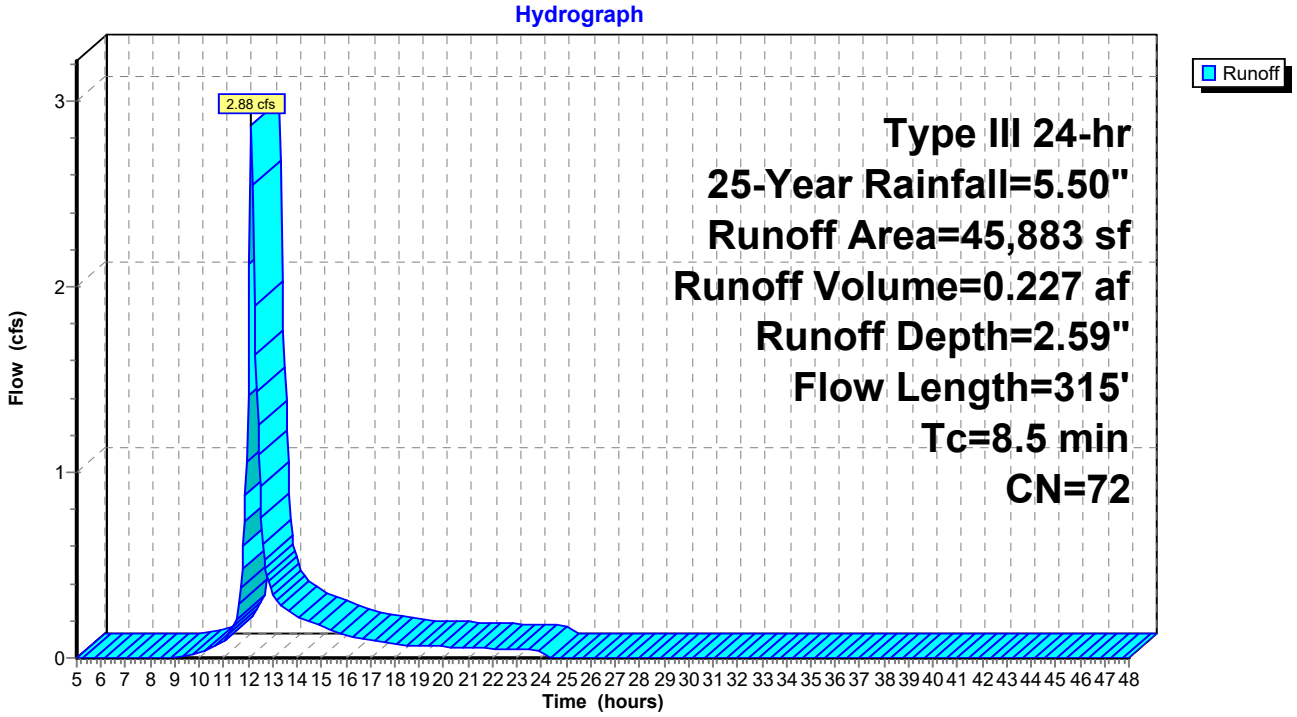
Runoff = 2.88 cfs @ 12.12 hrs, Volume= 0.227 af, Depth= 2.59"
Routed to Pond 1P : INFIL. BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
23,206	70	Woods, Good, HSG C
21,873	74	>75% Grass cover, Good, HSG C
804	98	Unconnected roofs, HSG C
45,883	72	Weighted Average
45,079		98.25% Pervious Area
804		1.75% Impervious Area
804		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	265	0.0400	3.22		**Shallow Concentrated Flow, SHALLOW CONC.** Unpaved Kv= 16.1 fps
8.5	315	Total			

Subcatchment 6S: NORTH SITE



Summary for Subcatchment 7S: WETLAND SLOPE

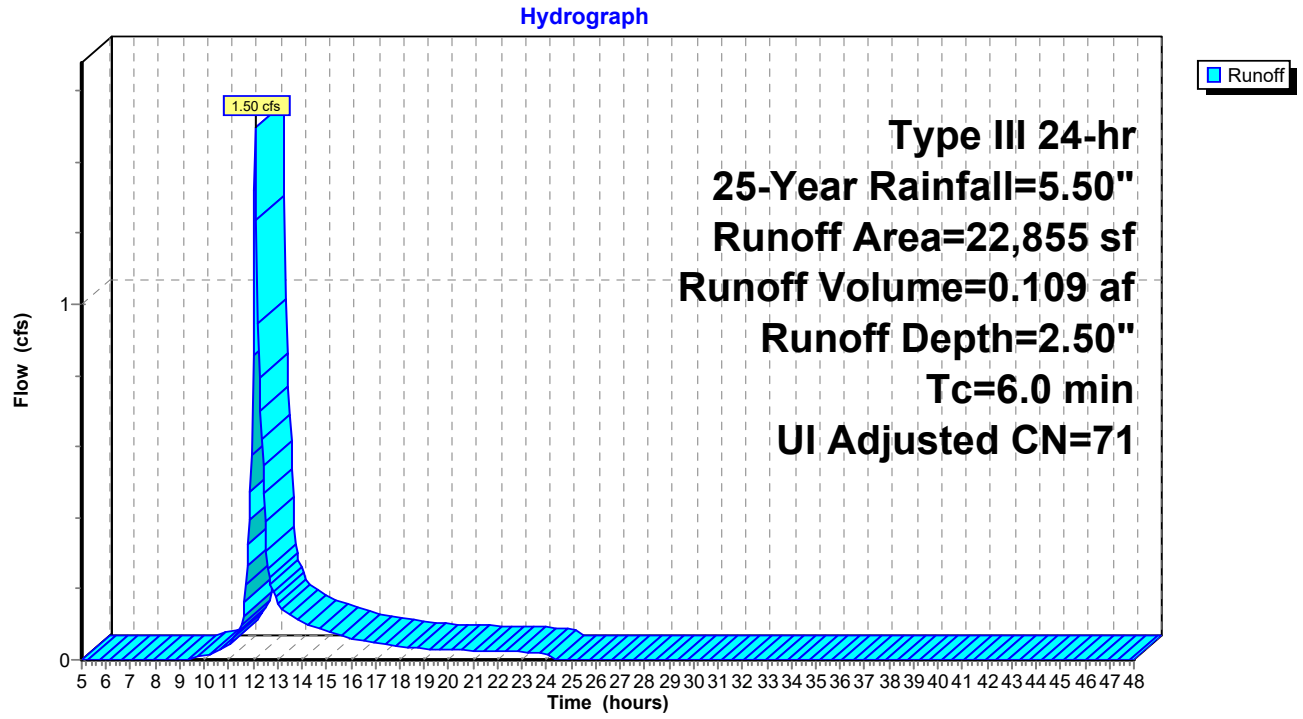
Runoff = 1.50 cfs @ 12.10 hrs, Volume= 0.109 af, Depth= 2.50"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Adj	Description
14,631	70		Woods, Good, HSG C
8,140	74		>75% Grass cover, Good, HSG C
84	98		Unconnected pavement, HSG C
22,855	72	71	Weighted Average, UI Adjusted
22,771			99.63% Pervious Area
84			0.37% Impervious Area
84			100.00% Unconnected

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

Subcatchment 7S: WETLAND SLOPE



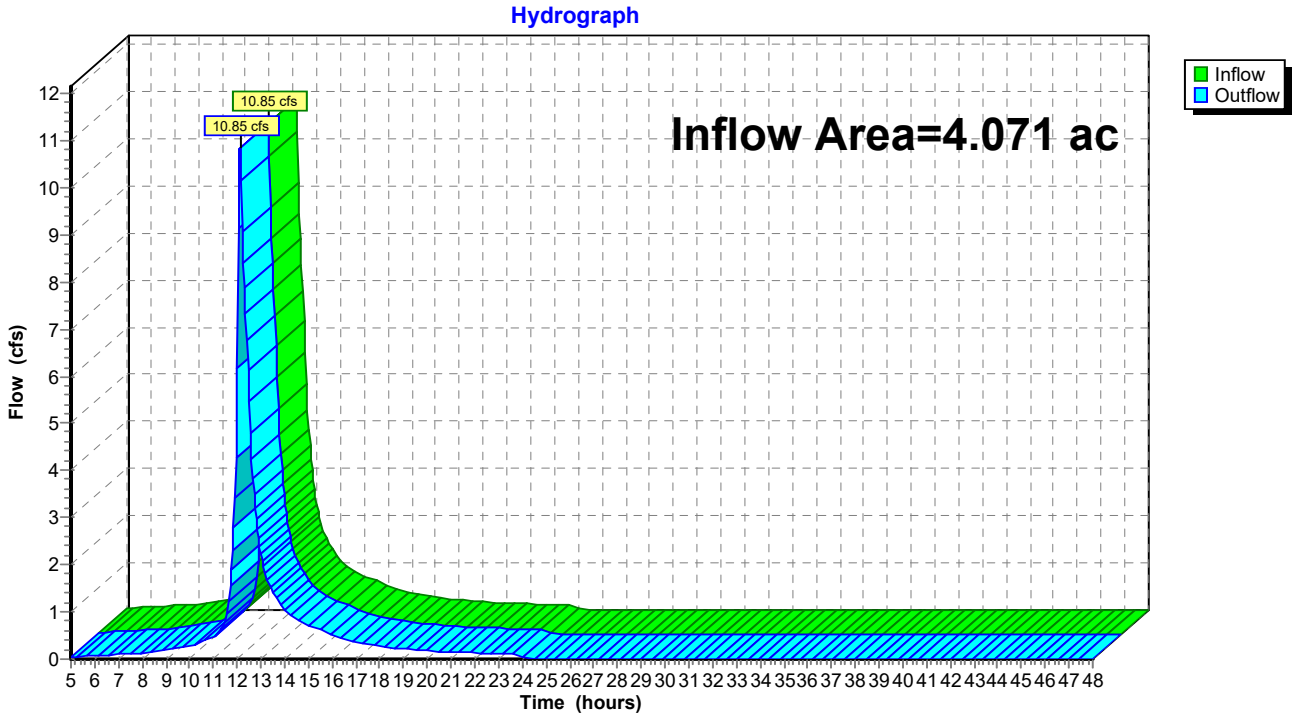
Summary for Reach DP-1: WETLAND

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.071 ac, 52.31% Impervious, Inflow Depth > 3.14" for 25-Year event
Inflow = 10.85 cfs @ 12.11 hrs, Volume= 1.065 af
Outflow = 10.85 cfs @ 12.11 hrs, Volume= 1.065 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: WETLAND



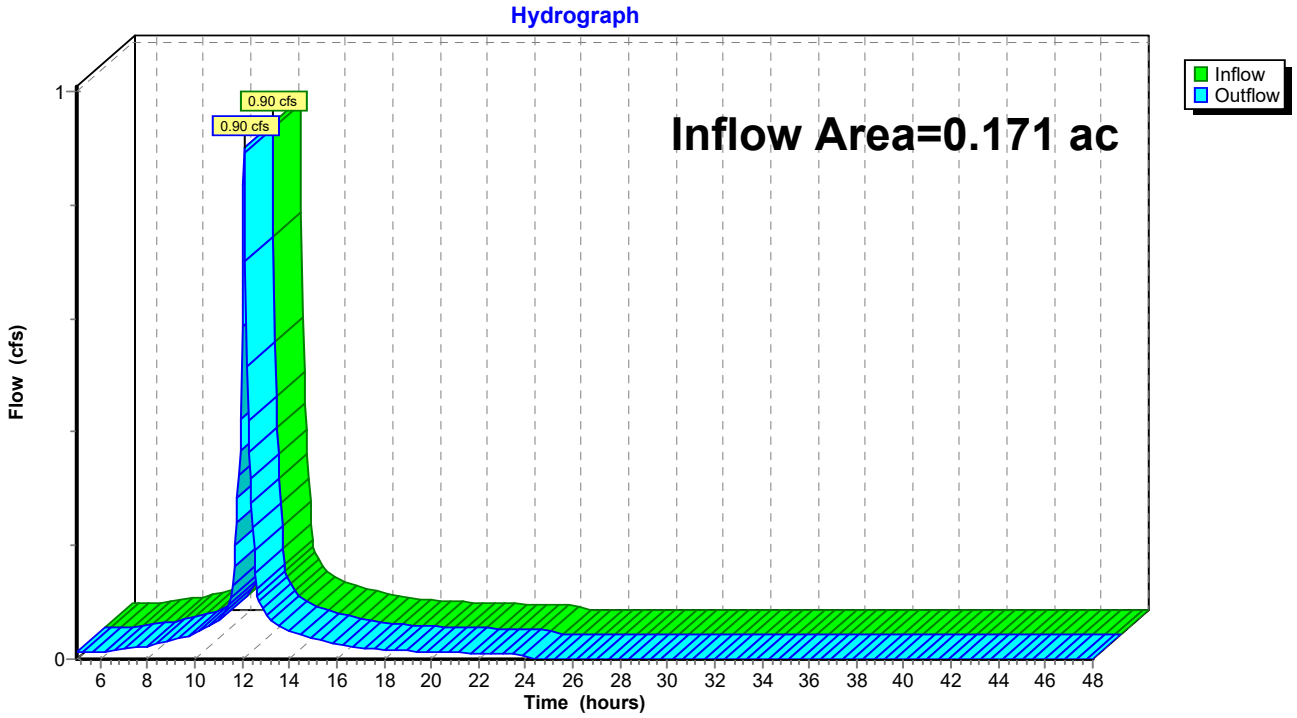
Summary for Reach DP-3: SOUTHEAST PROP. LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.171 ac, 99.71% Impervious, Inflow Depth > 5.12" for 25-Year event
Inflow = 0.90 cfs @ 12.09 hrs, Volume= 0.073 af
Outflow = 0.90 cfs @ 12.09 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-3: SOUTHEAST PROP. LINE



Summary for Pond 1P: INFIL. BASIN

[82] Warning: Early inflow requires earlier time span

Inflow Area = 2.321 ac, 46.07% Impervious, Inflow Depth > 3.78" for 25-Year event
Inflow = 9.18 cfs @ 12.10 hrs, Volume= 0.731 af
Outflow = 4.83 cfs @ 12.26 hrs, Volume= 0.731 af, Atten= 47%, Lag= 10.0 min
Discarded = 0.14 cfs @ 12.26 hrs, Volume= 0.264 af
Primary = 4.70 cfs @ 12.26 hrs, Volume= 0.467 af
Routed to Reach DP-1 : WETLAND

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 156.64' @ 12.26 hrs Surf.Area= 5,823 sf Storage= 10,002 cf

Plug-Flow detention time= 166.5 min calculated for 0.730 af (100% of inflow)
Center-of-Mass det. time= 167.1 min (962.3 - 795.2)

Volume	Invert	Avail.Storage	Storage Description
#1	154.60'	18,830 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

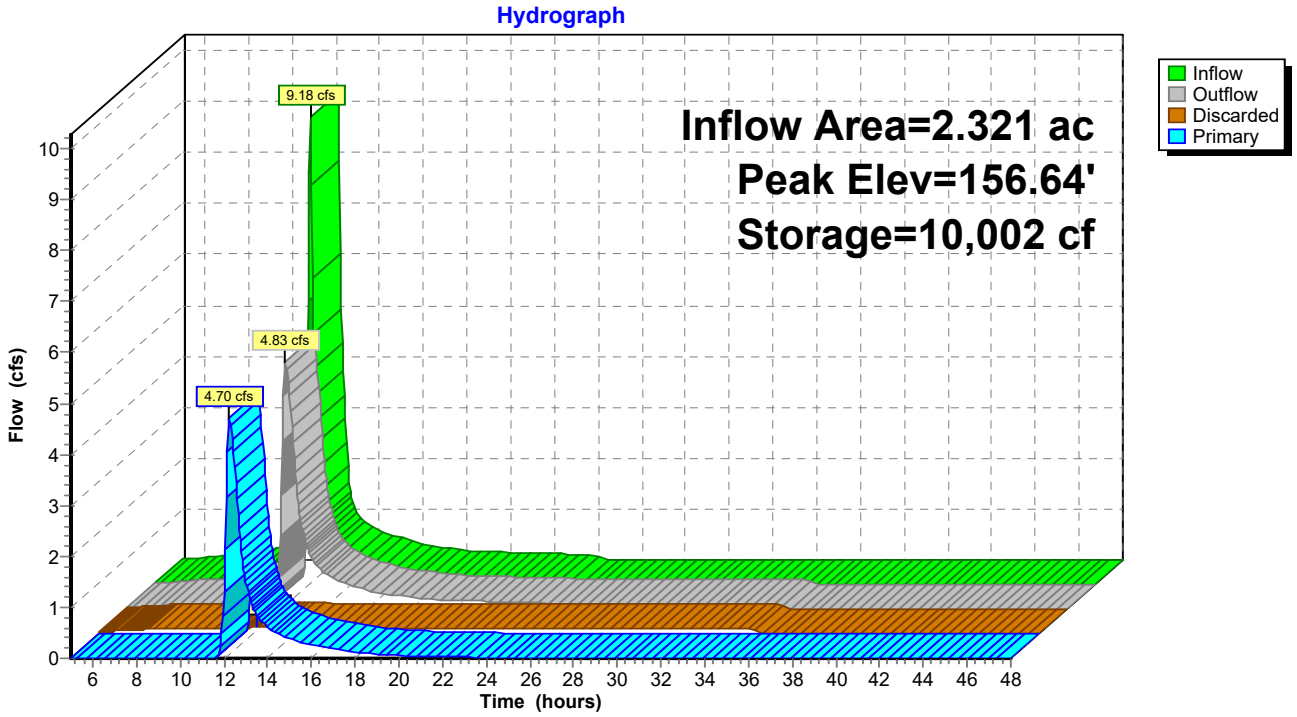
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
154.60	4,050	0	0
155.00	4,350	1,680	1,680
156.00	5,250	4,800	6,480
157.00	6,150	5,700	12,180
158.00	7,150	6,650	18,830

Device	Routing	Invert	Outlet Devices
#1	Primary	155.49'	**18.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 155.49' / 155.18' S= 0.0124 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	155.49'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	156.35'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Discarded	154.60'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.14 cfs @ 12.26 hrs HW=156.63' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=4.68 cfs @ 12.26 hrs HW=156.63' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 4.68 cfs @ 4.48 fps)
├**2=Orifice/Grate** (Passes < 4.04 cfs potential flow)
└**3=Orifice/Grate** (Passes < 1.55 cfs potential flow)

Pond 1P: INFIL. BASIN



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: EXIST. BUILDING Runoff Area=26,482 sf 100.00% Impervious Runoff Depth>6.54"
Tc=6.0 min CN=98 Runoff=4.08 cfs 0.332 af

Subcatchment2S: PARKING AREA Runoff Area=23,264 sf 68.80% Impervious Runoff Depth>5.80"
Tc=6.0 min CN=90 Runoff=3.36 cfs 0.258 af

Subcatchment2SB: PARKING AREA Runoff Area=3,619 sf 100.00% Impervious Runoff Depth>6.54"
Tc=6.0 min CN=98 Runoff=0.56 cfs 0.045 af

Subcatchment3S: SOUTHEAST PARKING Runoff Area=7,467 sf 99.71% Impervious Runoff Depth>6.54"
Tc=6.0 min CN=98 Runoff=1.15 cfs 0.093 af

Subcatchment5S: CENTRAL SITE Runoff Area=55,225 sf 82.88% Impervious Runoff Depth>6.21"
Tc=6.0 min CN=94 Runoff=8.31 cfs 0.657 af

Subcatchment6S: NORTH SITE Runoff Area=45,883 sf 1.75% Impervious Runoff Depth=3.83"
Flow Length=315' Tc=8.5 min CN=72 Runoff=4.28 cfs 0.336 af

Subcatchment7S: WETLAND SLOPE Runoff Area=22,855 sf 0.37% Impervious Runoff Depth=3.72"
Tc=6.0 min UI Adjusted CN=71 Runoff=2.25 cfs 0.163 af

Reach DP-1: WETLAND Inflow=15.64 cfs 1.516 af
Outflow=15.64 cfs 1.516 af

Reach DP-3: SOUTHEAST PROP. LINE Inflow=1.15 cfs 0.093 af
Outflow=1.15 cfs 0.093 af

Pond 1P: INFIL. BASIN Peak Elev=157.00' Storage=12,186 cf Inflow=12.41 cfs 0.993 af
Discarded=0.15 cfs 0.275 af Primary=7.00 cfs 0.718 af Outflow=7.14 cfs 0.993 af

Total Runoff Area = 4.242 ac Runoff Volume = 1.884 af Average Runoff Depth = 5.33"
45.77% Pervious = 1.942 ac 54.23% Impervious = 2.301 ac

Summary for Subcatchment 1S: EXIST. BUILDING

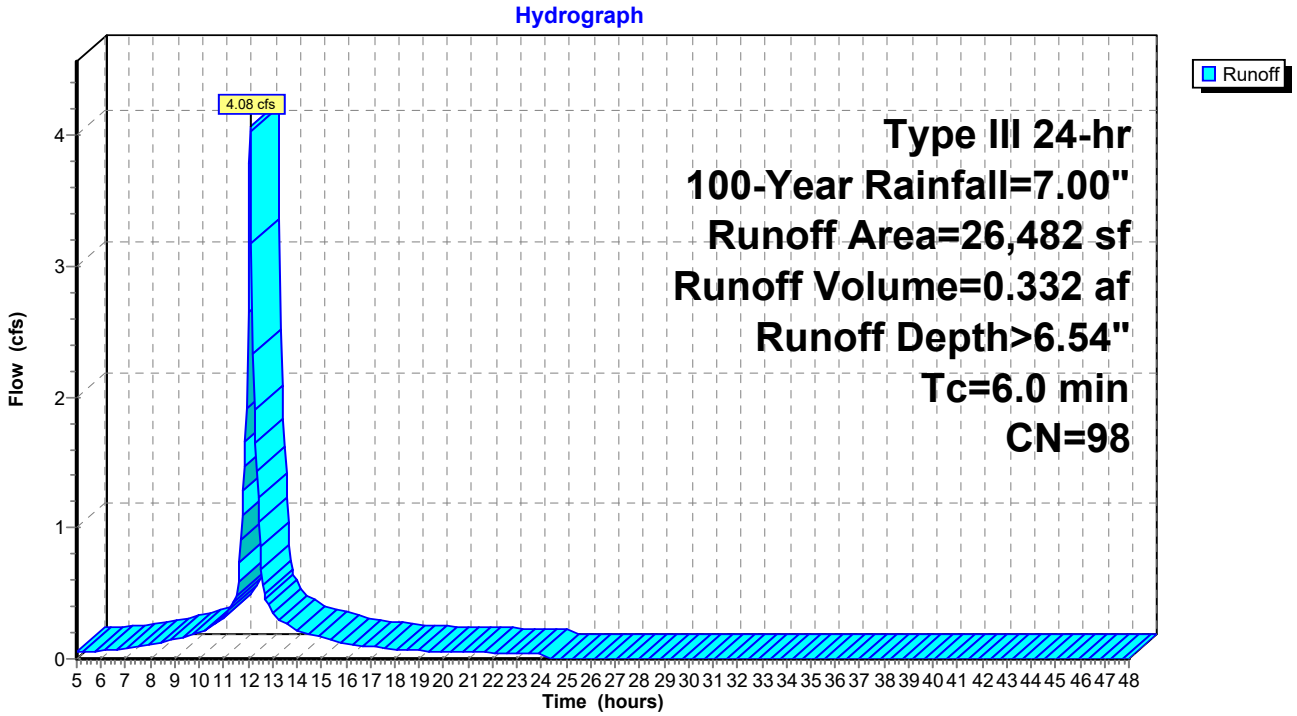
Runoff = 4.08 cfs @ 12.09 hrs, Volume= 0.332 af, Depth> 6.54"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
26,482	98	Roofs, HSG C
26,482		100.00% Impervious Area

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

Subcatchment 1S: EXIST. BUILDING



Summary for Subcatchment 2S: PARKING AREA

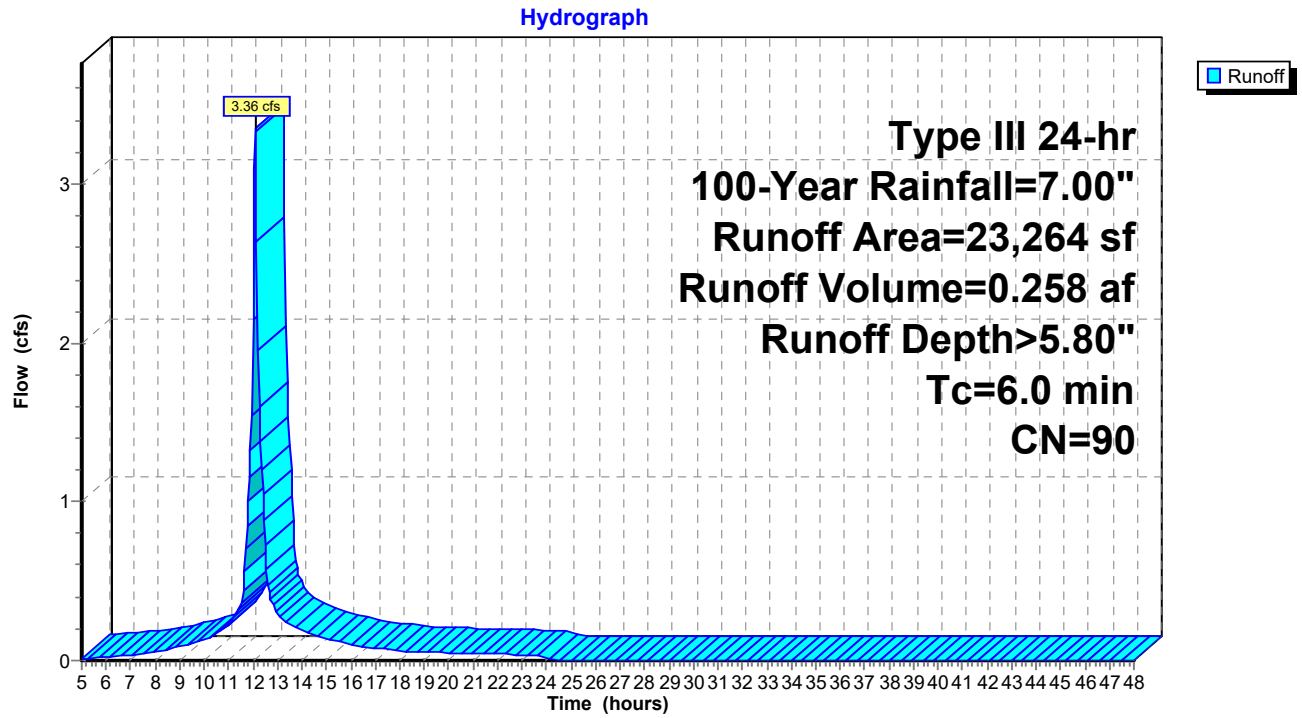
Runoff = 3.36 cfs @ 12.09 hrs, Volume= 0.258 af, Depth> 5.80"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
3,511	74	>75% Grass cover, Good, HSG C
16,005	98	Paved parking, HSG C
3,748	73	Woods, Fair, HSG C
23,264	90	Weighted Average
7,259		31.20% Pervious Area
16,005		68.80% Impervious Area

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

Subcatchment 2S: PARKING AREA



Summary for Subcatchment 2SB: PARKING AREA

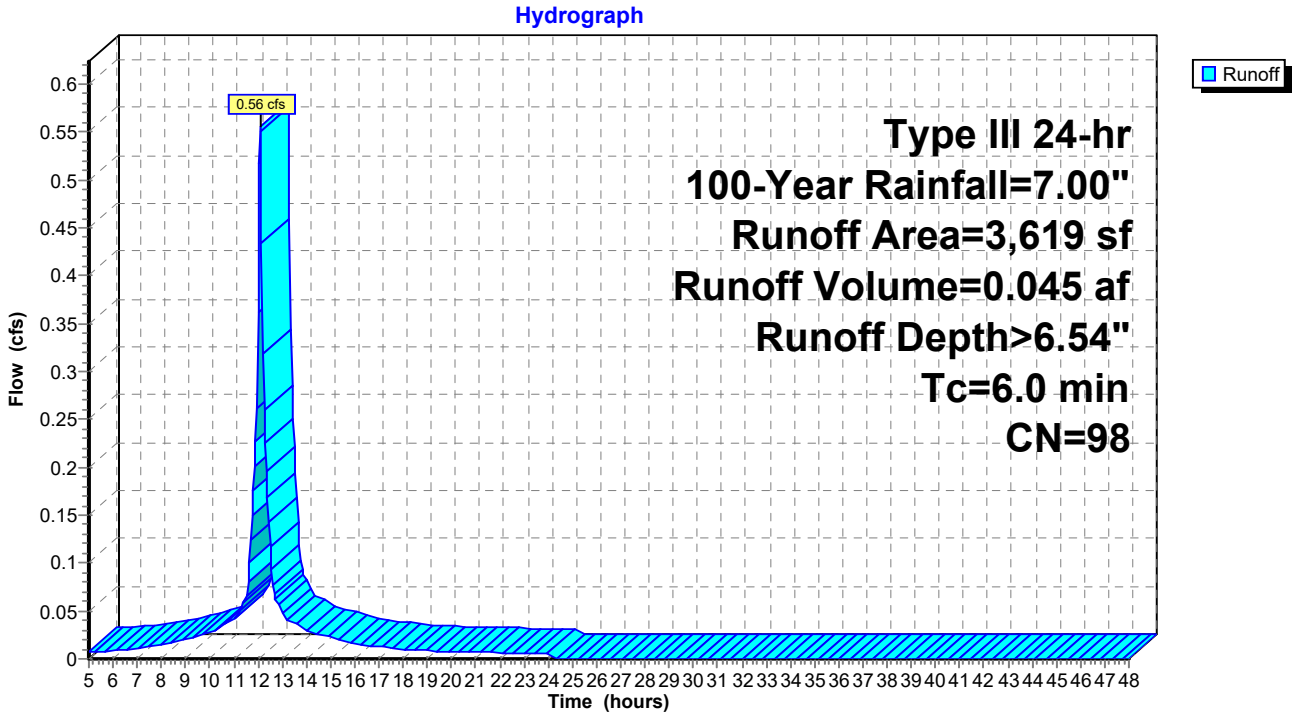
Runoff = 0.56 cfs @ 12.09 hrs, Volume= 0.045 af, Depth> 6.54"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
3,619	98	Paved parking, HSG C
3,619		100.00% Impervious Area

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

Subcatchment 2SB: PARKING AREA



Summary for Subcatchment 3S: SOUTHEAST PARKING AREA

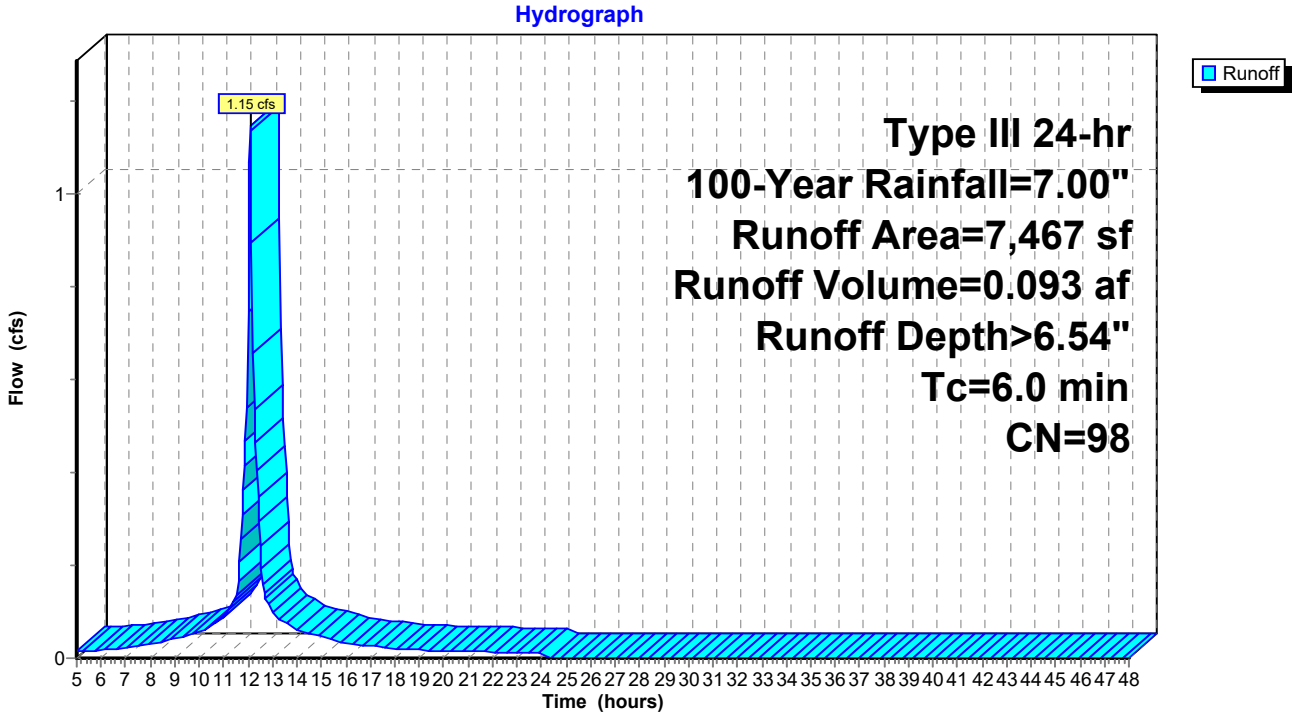
Runoff = 1.15 cfs @ 12.09 hrs, Volume= 0.093 af, Depth> 6.54"
Routed to Reach DP-3 : SOUTHEAST PROP. LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
22	74	>75% Grass cover, Good, HSG C
7,445	98	Paved parking, HSG C
7,467	98	Weighted Average
22		0.29% Pervious Area
7,445		99.71% Impervious Area

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

Subcatchment 3S: SOUTHEAST PARKING AREA



Summary for Subcatchment 5S: CENTRAL SITE

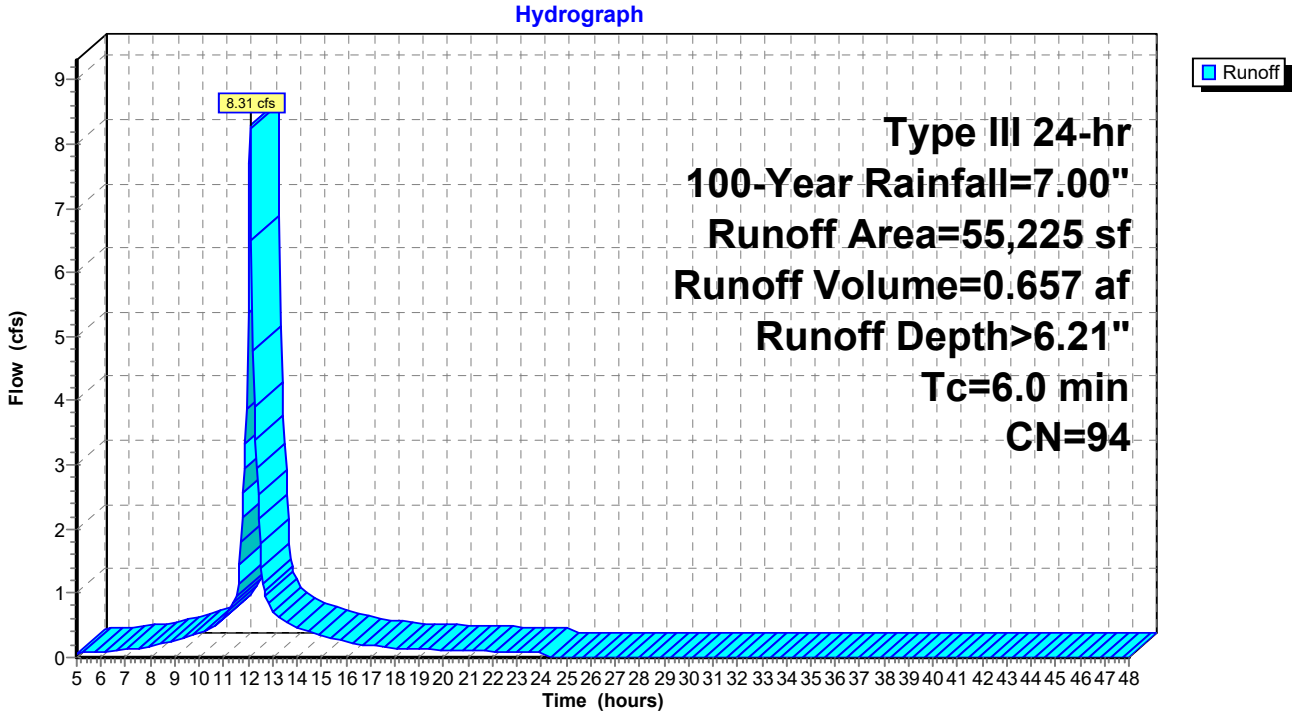
Runoff = 8.31 cfs @ 12.09 hrs, Volume= 0.657 af, Depth> 6.21"
Routed to Pond 1P : INFIL. BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
5,465	74	>75% Grass cover, Good, HSG C
3,987	70	Woods, Good, HSG C
32,173	98	Unconnected pavement, HSG C
13,600	98	Roofs, HSG C
55,225	94	Weighted Average
9,452		17.12% Pervious Area
45,773		82.88% Impervious Area
32,173		70.29% Unconnected

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

Subcatchment 5S: CENTRAL SITE



Summary for Subcatchment 6S: NORTH SITE

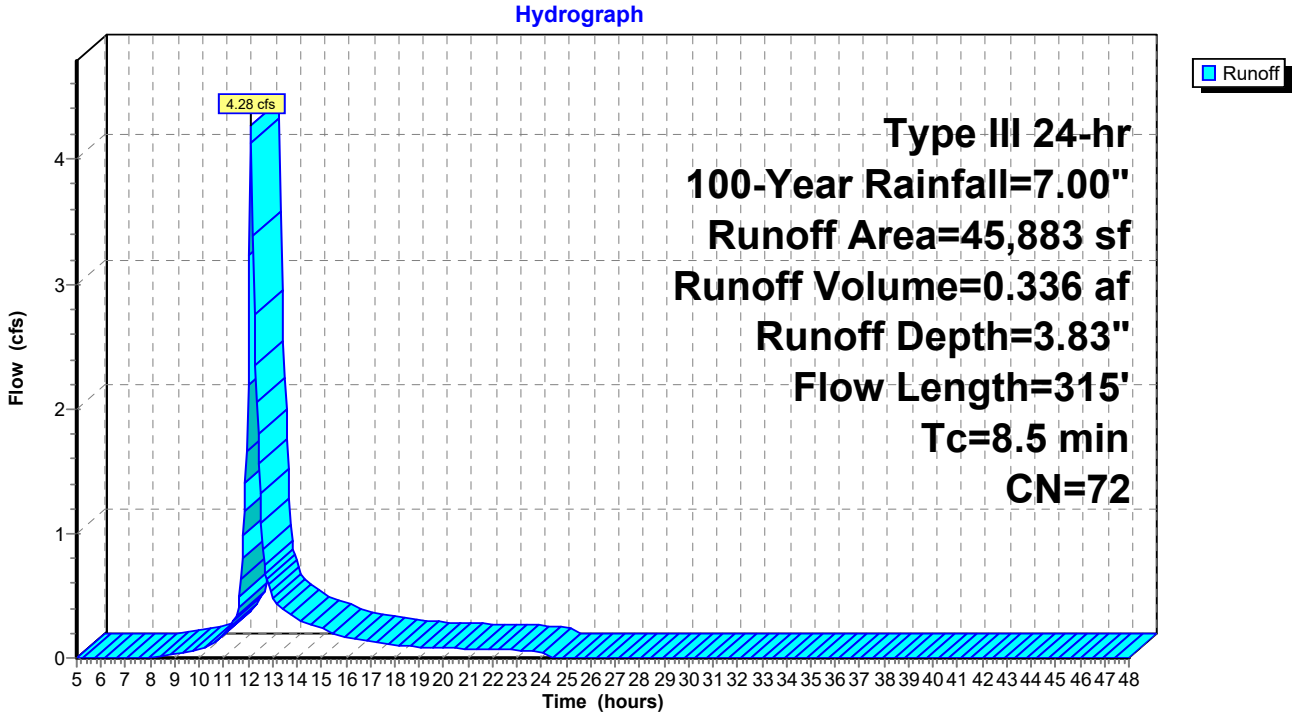
Runoff = 4.28 cfs @ 12.12 hrs, Volume= 0.336 af, Depth= 3.83"
Routed to Pond 1P : INFIL. BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
23,206	70	Woods, Good, HSG C
21,873	74	>75% Grass cover, Good, HSG C
804	98	Unconnected roofs, HSG C
45,883	72	Weighted Average
45,079		98.25% Pervious Area
804		1.75% Impervious Area
804		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	265	0.0400	3.22		**Shallow Concentrated Flow, SHALLOW CONC.** Unpaved Kv= 16.1 fps
8.5	315	Total			

Subcatchment 6S: NORTH SITE



Summary for Subcatchment 7S: WETLAND SLOPE

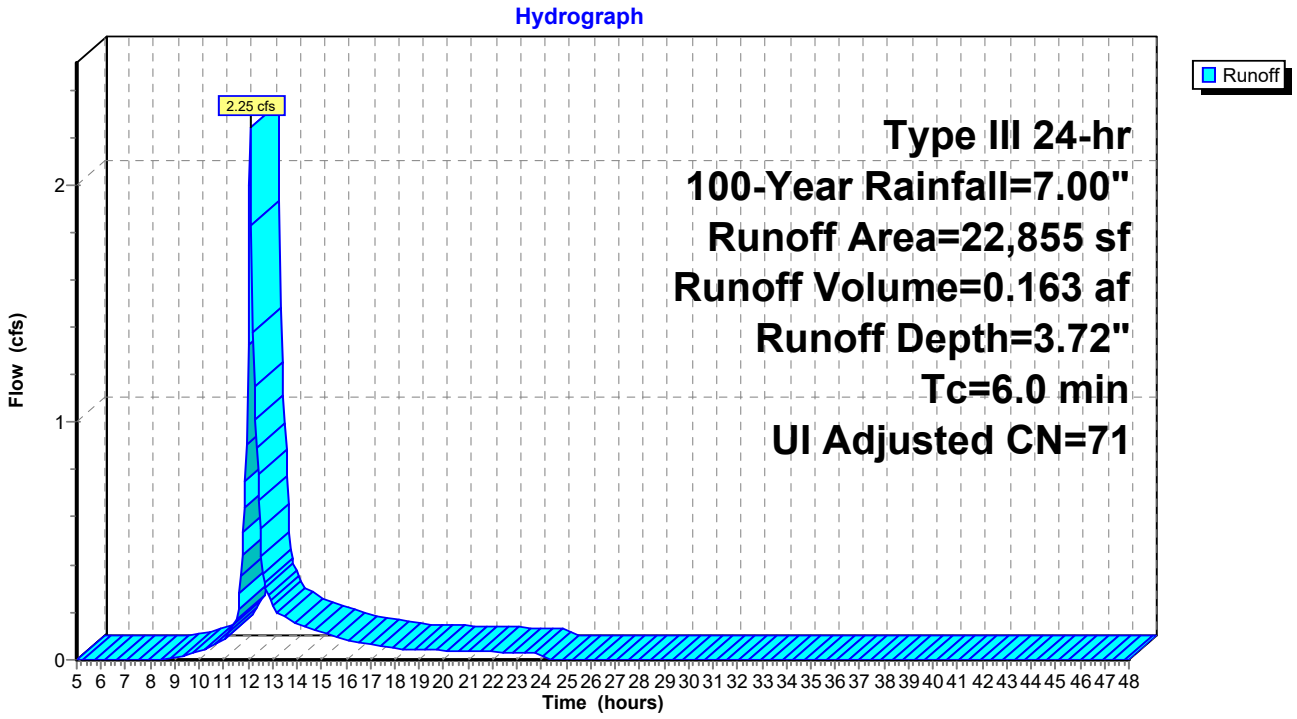
Runoff = 2.25 cfs @ 12.09 hrs, Volume= 0.163 af, Depth= 3.72"
Routed to Reach DP-1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Adj	Description
14,631	70		Woods, Good, HSG C
8,140	74		>75% Grass cover, Good, HSG C
84	98		Unconnected pavement, HSG C
22,855	72	71	Weighted Average, UI Adjusted
22,771			99.63% Pervious Area
84			0.37% Impervious Area
84			100.00% Unconnected

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

Subcatchment 7S: WETLAND SLOPE



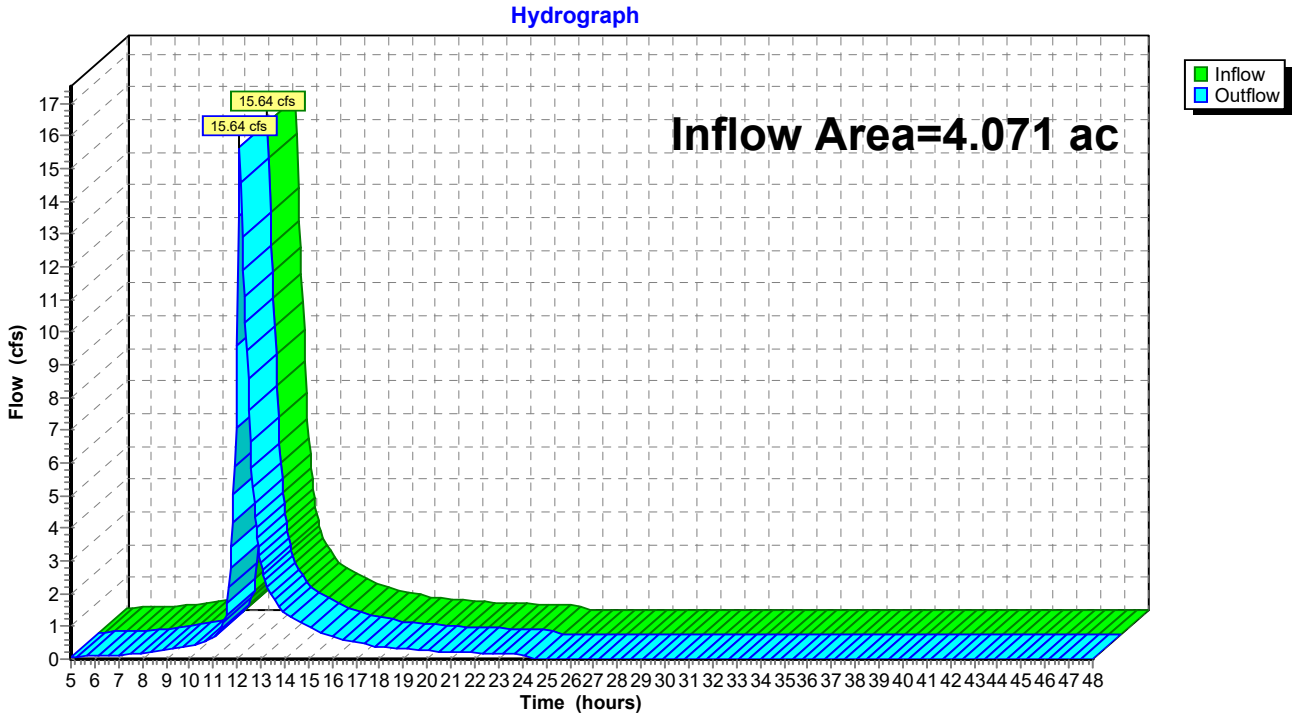
Summary for Reach DP-1: WETLAND

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.071 ac, 52.31% Impervious, Inflow Depth > 4.47" for 100-Year event
Inflow = 15.64 cfs @ 12.11 hrs, Volume= 1.516 af
Outflow = 15.64 cfs @ 12.11 hrs, Volume= 1.516 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: WETLAND



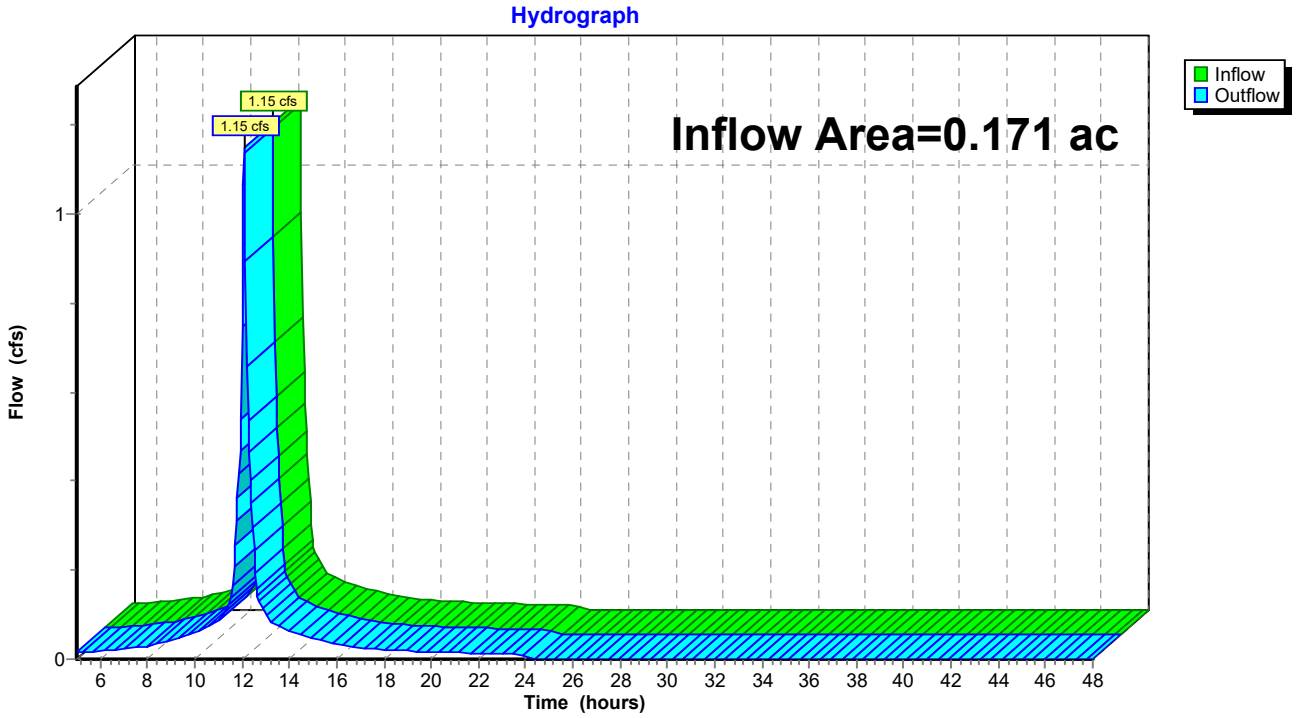
Summary for Reach DP-3: SOUTHEAST PROP. LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.171 ac, 99.71% Impervious, Inflow Depth > 6.54" for 100-Year event
Inflow = 1.15 cfs @ 12.09 hrs, Volume= 0.093 af
Outflow = 1.15 cfs @ 12.09 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-3: SOUTHEAST PROP. LINE



Summary for Pond 1P: INFIL. BASIN

[82] Warning: Early inflow requires earlier time span

Inflow Area = 2.321 ac, 46.07% Impervious, Inflow Depth > 5.13" for 100-Year event
Inflow = 12.41 cfs @ 12.10 hrs, Volume= 0.993 af
Outflow = 7.14 cfs @ 12.24 hrs, Volume= 0.993 af, Atten= 42%, Lag= 8.4 min
Discarded = 0.15 cfs @ 12.24 hrs, Volume= 0.275 af
Primary = 7.00 cfs @ 12.24 hrs, Volume= 0.718 af
Routed to Reach DP-1 : WETLAND

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 157.00' @ 12.24 hrs Surf.Area= 6,151 sf Storage= 12,186 cf

Plug-Flow detention time= 135.7 min calculated for 0.992 af (100% of inflow)
Center-of-Mass det. time= 136.3 min (926.8 - 790.5)

Volume	Invert	Avail.Storage	Storage Description
#1	154.60'	18,830 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

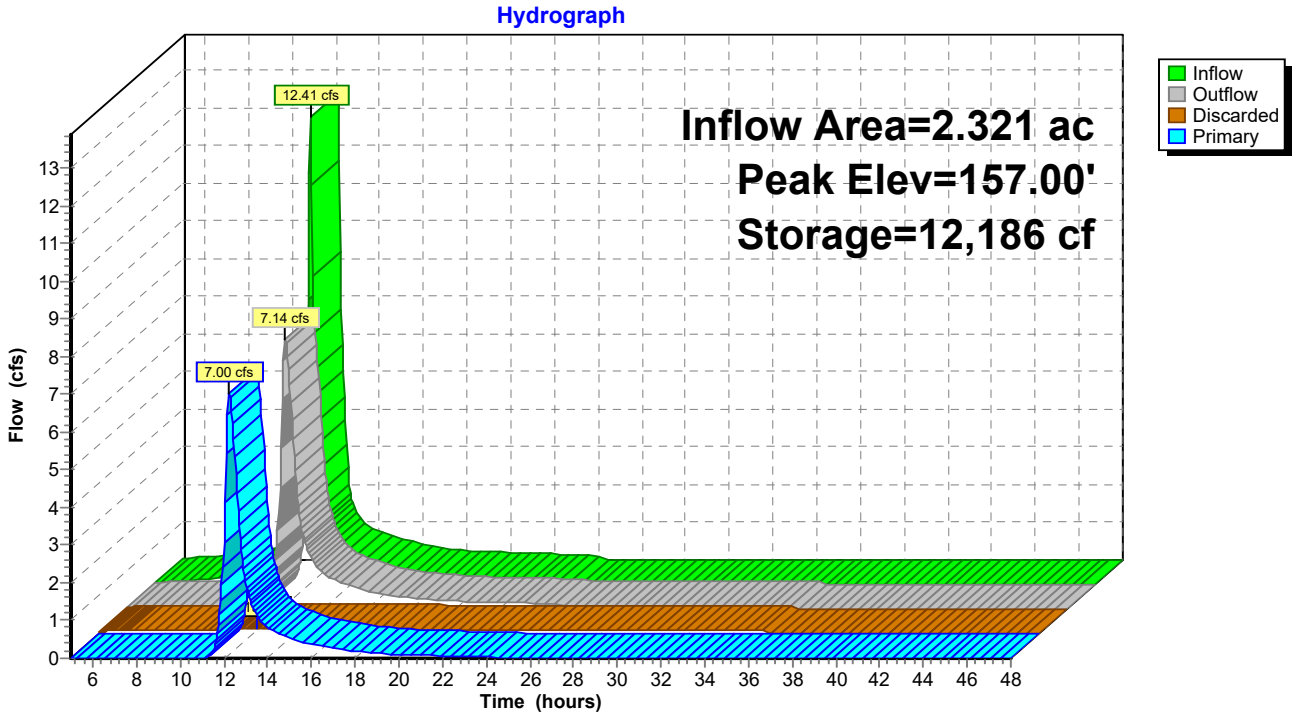
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
154.60	4,050	0	0
155.00	4,350	1,680	1,680
156.00	5,250	4,800	6,480
157.00	6,150	5,700	12,180
158.00	7,150	6,650	18,830

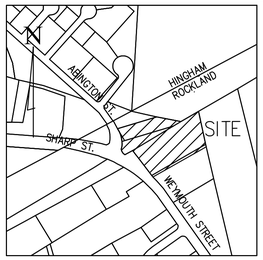
Device	Routing	Invert	Outlet Devices
#1	Primary	155.49'	**18.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 155.49' / 155.18' S= 0.0124 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	155.49'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	156.35'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Discarded	154.60'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.15 cfs @ 12.24 hrs HW=157.00' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=6.98 cfs @ 12.24 hrs HW=157.00' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 6.98 cfs @ 4.88 fps)
├**2=Orifice/Grate** (Passes < 4.64 cfs potential flow)
└**3=Orifice/Grate** (Passes < 3.04 cfs potential flow)

Pond 1P: INFIL. BASIN





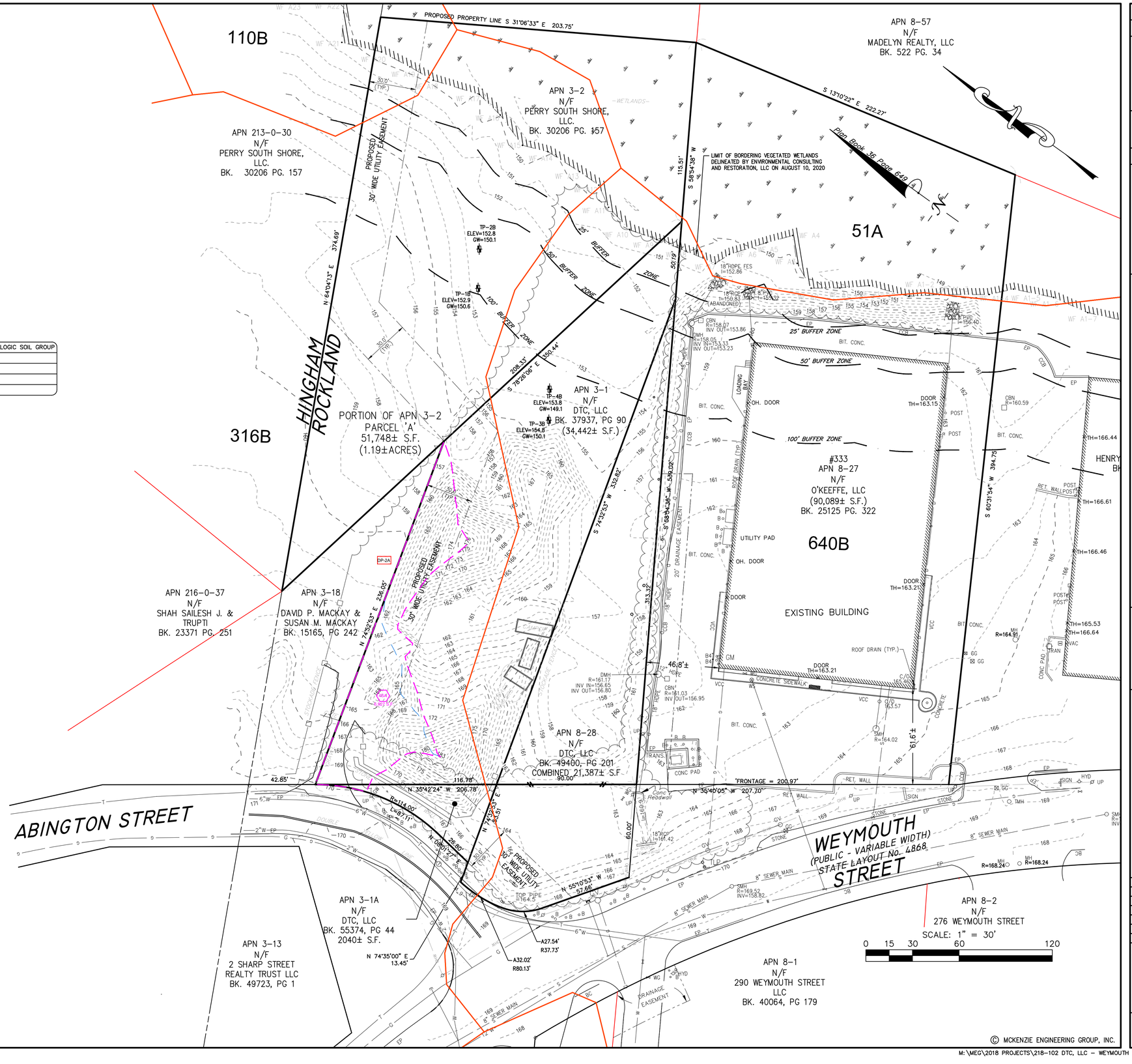
LOCUS MAP
Not to Scale

SOIL KEY

SOIL CLASSIFICATION	DESCRIPTION	HYDROLOGIC SOIL GROUP
51A	SWANSEA MUCK, 0–1% SLOPES	B/D
110B	CANTON–CHATFIELD–ROCK OUTCROP COMPLEX, 0–8% SLOPES, VERY STONEY	B
316B	SCITUATE GRAVELLY SANDY LOAM, 3–8% SLOPES, VERY STONY	C/D
640B	URBAN LAND, TILL SUBSTRATUM, 0–8% SLOPES	N/A

LEGEND

- LIMIT OF WATERSHED
- TIME OF CONCENTRATION FLOW PATH
- LIMIT OF NRCS SOIL MAPPING



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REV	DATE	DESCRIPTION	BY	APP
-	-	-	-	-

MCKENZIE ENGINEERING GROUP
Assinippi Office Park
150 Longwater Drive, Suite 101
Norwell, MA 02061
781.792.3900
www.mckeng.com

SITE DEVELOPMENT PLAN

(APNS 3-1, 3-1A, PORTION OF 3-2, 8-27 & 8-28)
343 & 333 WEYMOUTH STREET
ROCKLAND, MASSACHUSETTS

PROFESSIONAL ENGINEER:

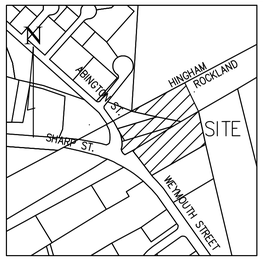
APPLICANT:
DTC, LLC
333 WEYMOUTH ST.
ROCKLAND, MA 02370

DRAWN BY:	ESS
DESIGNED BY:	ESS
CHECKED BY:	BCM
APPROVED BY:	BCM
DATE:	OCTOBER 4, 2021
SCALE:	1"=30'
PROJECT NO.:	218–102

DWG. TITLE:
PRE-DEV. WATERSHED PLAN

DWG. NO:
WS-1A

M:\MEG\2018 PROJECTS\218-102 DTC, LLC - WEYMOUTH STREET\DWGS\218-102 WS-1_REV.DWG



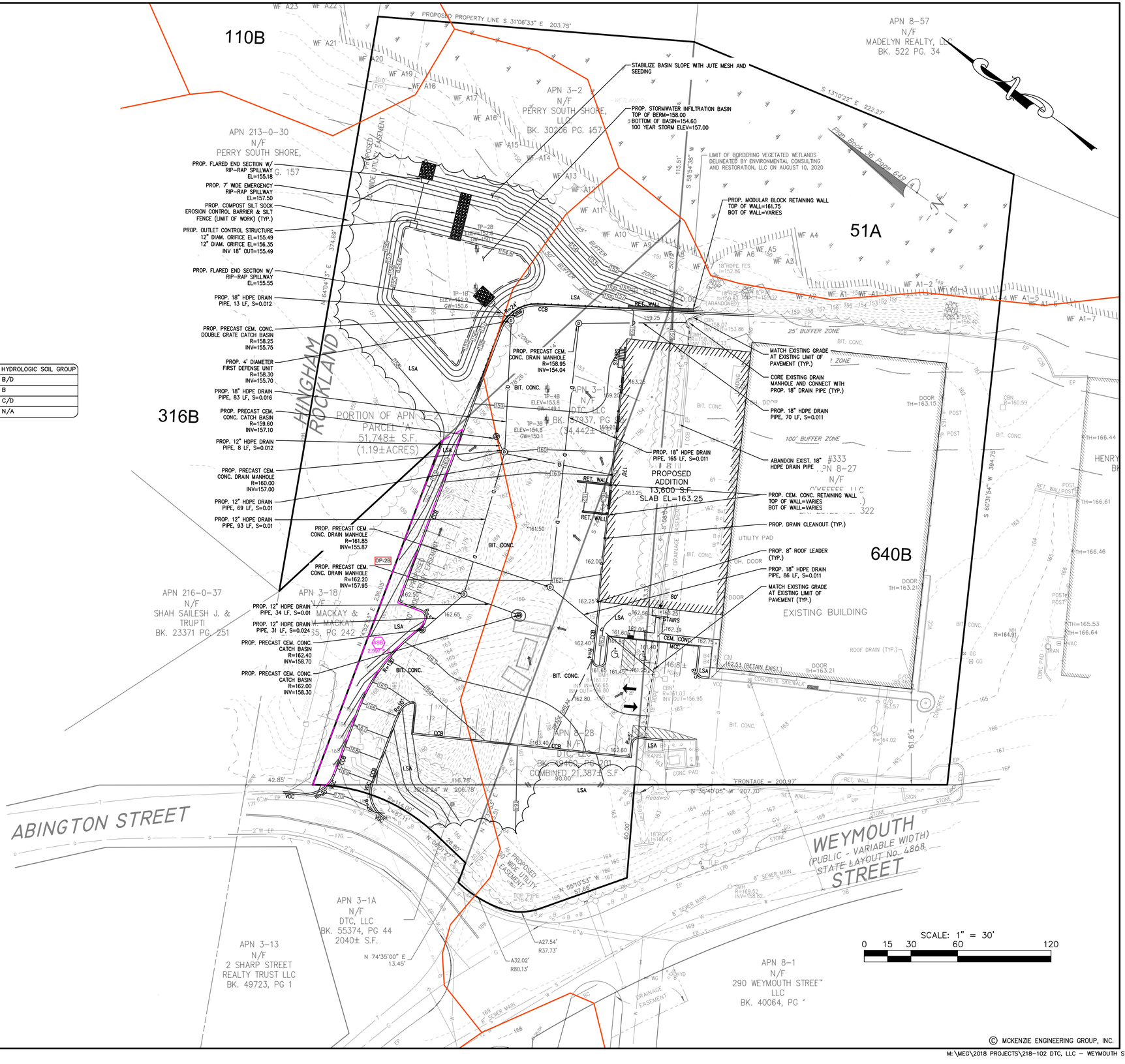
LOCUS MAP
Not to Scale

SOIL KEY

SOIL CLASSIFICATION	DESCRIPTION	HYDROLOGIC SOIL GROUP
51A	SWANSEA MUCK, 0–1% SLOPES	B/D
110B	CANTON–CHATFIELD–ROCK OUTCROP COMPLEX, 0–8% SLOPES, VERY STONEY	B
316B	SCITUATE GRAVELLY SANDY LOAM, 3–8% SLOPES, VERY STONY	C/D
640B	URBAN LAND, TILL SUBSTRATUM, 0–8% SLOPES	N/A

LEGEND

- LIMIT OF WATERSHED
- TIME OF CONCENTRATION FLOW PATH
- LIMIT OF NRCS SOIL MAPPING



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REV	DATE	DESCRIPTION	BY	APP
1	9/19/22	BUILDING ADDITION	ESS	BCM
2	11/30/22	DRAINAGE REVISION	ESS	BCM

MCKENZIE ENGINEERING GROUP
Assinippi Office Park
150 Longwater Drive, Suite 101
Norwell, MA 02061
P: 781.792.3900
F: 781.792.0333
www.mckeng.com

SITE DEVELOPMENT PLANS

(FORMERLY APN'S 3-1, 3-1A, PORTION OF 3-2, 8-27 & 8-28)
343 & 333 WEYMOUTH STREET
ROCKLAND, MASSACHUSETTS

PROFESSIONAL ENGINEER:

APPLICANT:
DTC, LLC
333 WEYMOUTH ST.
ROCKLAND, MA 02370

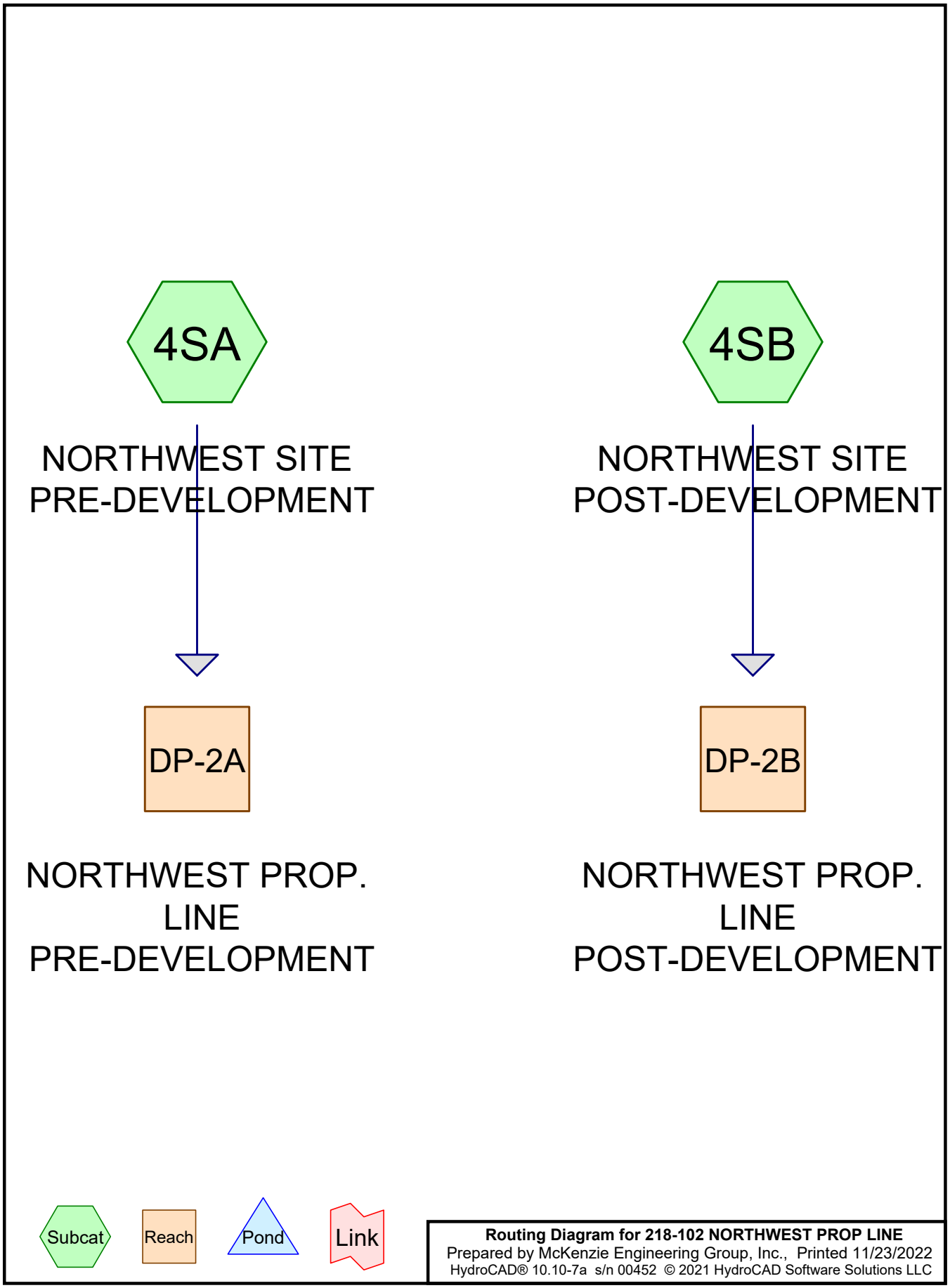
PERMIT PLAN SET

DRAWN BY:	ESS
DESIGNED BY:	ESS
CHECKED BY:	BCM
APPROVED BY:	BCM
DATE:	JUNE 13, 2022
SCALE:	1"=30'
PROJECT NO.:	218–102

DWG. TITLE:
POST DEV. WATERSHED PLAN

DWG. NO:
WS-2A

M:\MEG\2018 PROJECTS\218–102 DTC, LLC – WEYMOUTH STREET\DWGS\218–102 MAIN17_BASIN.DWG



Routing Diagram for 218-102 NORTHWEST PROP LINE
Prepared by McKenzie Engineering Group, Inc., Printed 11/23/2022
HydroCAD® 10.10-7a s/n 00452 © 2021 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.20	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.70	2
3	25-Year	Type III 24-hr		Default	24.00	1	5.50	2
4	100-Year	Type III 24-hr		Default	24.00	1	7.00	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.130	79	50-75% Grass cover, Fair, HSG C (4SA)
0.069	74	>75% Grass cover, Good, HSG C (4SB)
0.012	96	Gravel surface, HSG C (4SA)
0.001	98	Unconnected pavement, HSG C (4SA)
0.015	70	Woods, Good, HSG C (4SA)
0.228	**78**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.228	HSG C	4SA, 4SB
0.000	HSG D	
0.000	Other	
0.228		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.130	0.000	0.000	0.130	50-75% Grass cover, Fair	4SA
0.000	0.000	0.069	0.000	0.000	0.069	>75% Grass cover, Good	4SB
0.000	0.000	0.012	0.000	0.000	0.012	Gravel surface	4SA
0.000	0.000	0.001	0.000	0.000	0.001	Unconnected pavement	4SA
0.000	0.000	0.015	0.000	0.000	0.015	Woods, Good	4SA
0.000	**0.000**	**0.228**	**0.000**	**0.000**	**0.228**	**TOTAL AREA**	

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment4SA: NORTHWEST SITE Runoff Area=6,927 sf 0.62% Impervious Runoff Depth=1.40"
Tc=6.0 min CN=80 Runoff=0.25 cfs 0.019 af

Subcatchment4SB: NORTHWEST SITE Runoff Area=2,992 sf 0.00% Impervious Runoff Depth=1.04"
Tc=6.0 min CN=74 Runoff=0.08 cfs 0.006 af

Reach DP-2A: NORTHWEST PROP. LINE PRE-DEVELOPMENT Inflow=0.25 cfs 0.019 af
Outflow=0.25 cfs 0.019 af

Reach DP-2B: NORTHWEST PROP. LINE POST-DEVELOPMENT Inflow=0.08 cfs 0.006 af
Outflow=0.08 cfs 0.006 af

Total Runoff Area = 0.228 ac Runoff Volume = 0.025 af Average Runoff Depth = 1.29"
99.57% Pervious = 0.227 ac 0.43% Impervious = 0.001 ac

Summary for Subcatchment 4SA: NORTHWEST SITE PRE-DEVELOPMENT

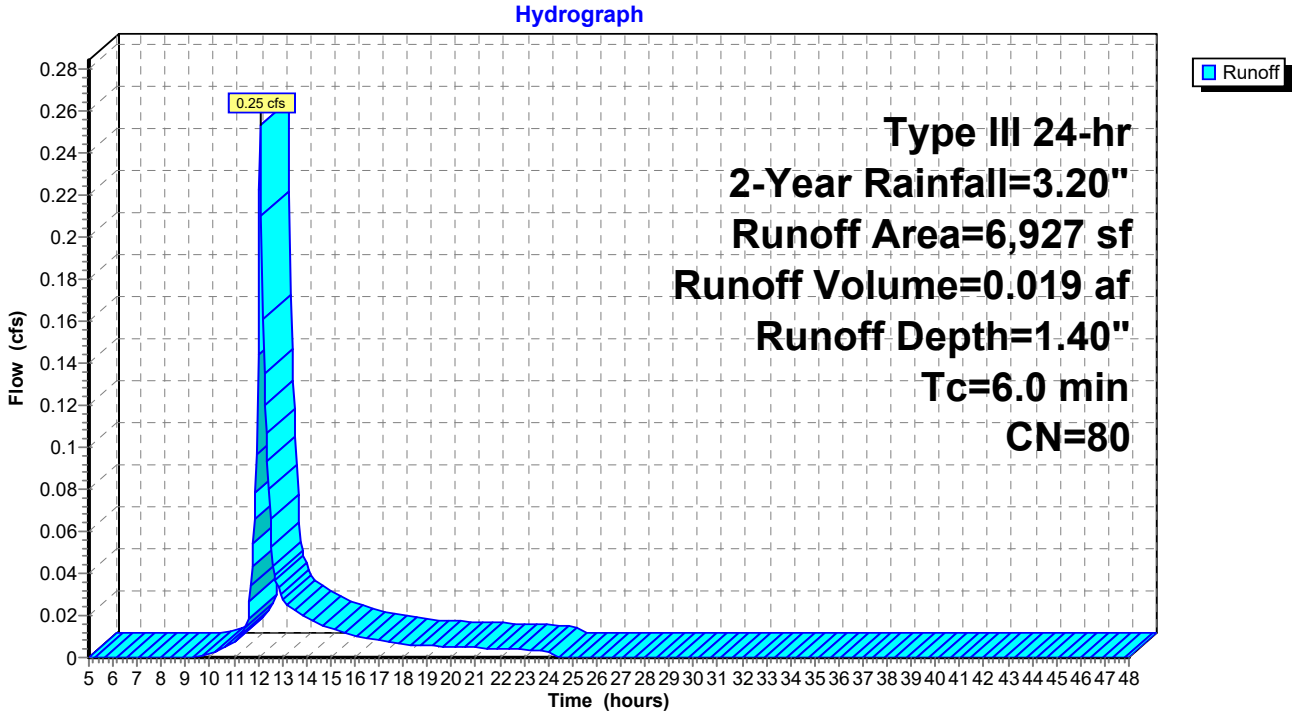
Runoff = 0.25 cfs @ 12.10 hrs, Volume= 0.019 af, Depth= 1.40"
Routed to Reach DP-2A : NORTHWEST PROP. LINE PRE-DEVELOPMENT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
666	70	Woods, Good, HSG C
43	98	Unconnected pavement, HSG C
542	96	Gravel surface, HSG C
5,676	79	50-75% Grass cover, Fair, HSG C
6,927	80	Weighted Average
6,884		99.38% Pervious Area
43		0.62% Impervious Area
43		100.00% Unconnected

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

Subcatchment 4SA: NORTHWEST SITE PRE-DEVELOPMENT



Summary for Subcatchment 4SB: NORTHWEST SITE POST-DEVELOPMENT

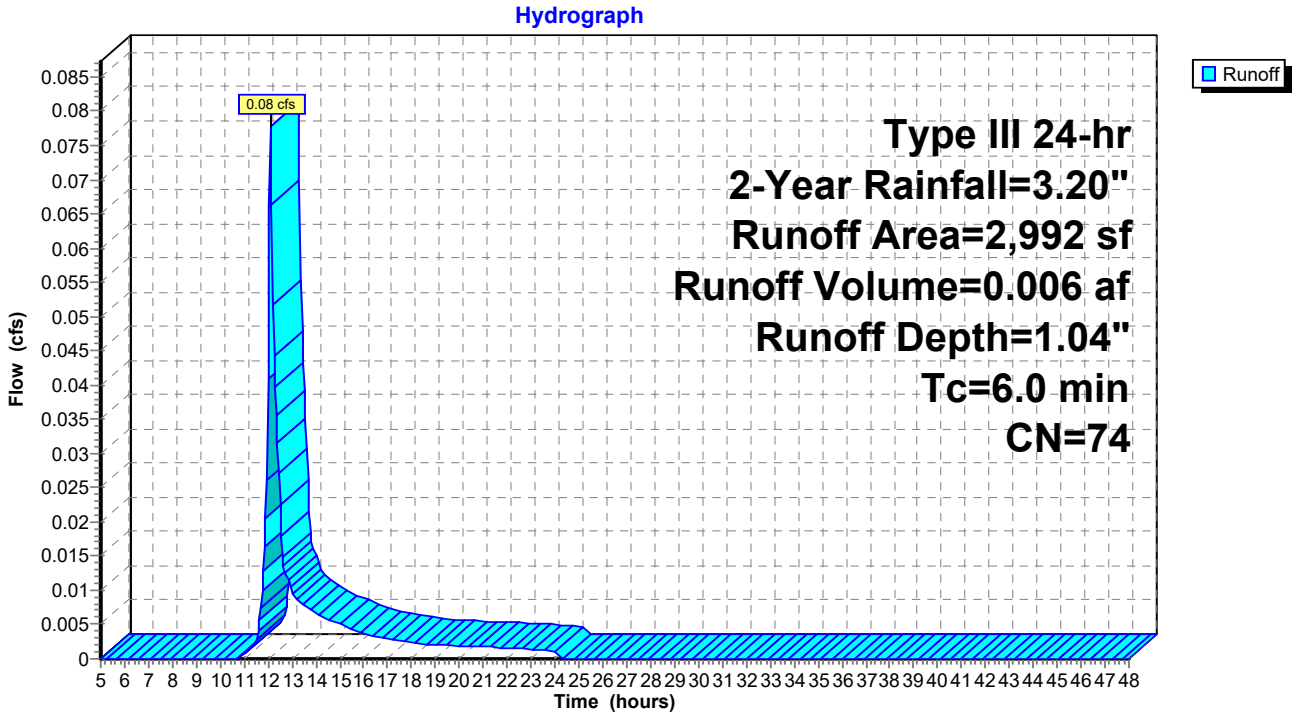
Runoff = 0.08 cfs @ 12.10 hrs, Volume= 0.006 af, Depth= 1.04"
Routed to Reach DP-2B : NORTHWEST PROP. LINE POST-DEVELOPMENT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
2,992	74	>75% Grass cover, Good, HSG C
2,992		100.00% Pervious Area

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

Subcatchment 4SB: NORTHWEST SITE POST-DEVELOPMENT



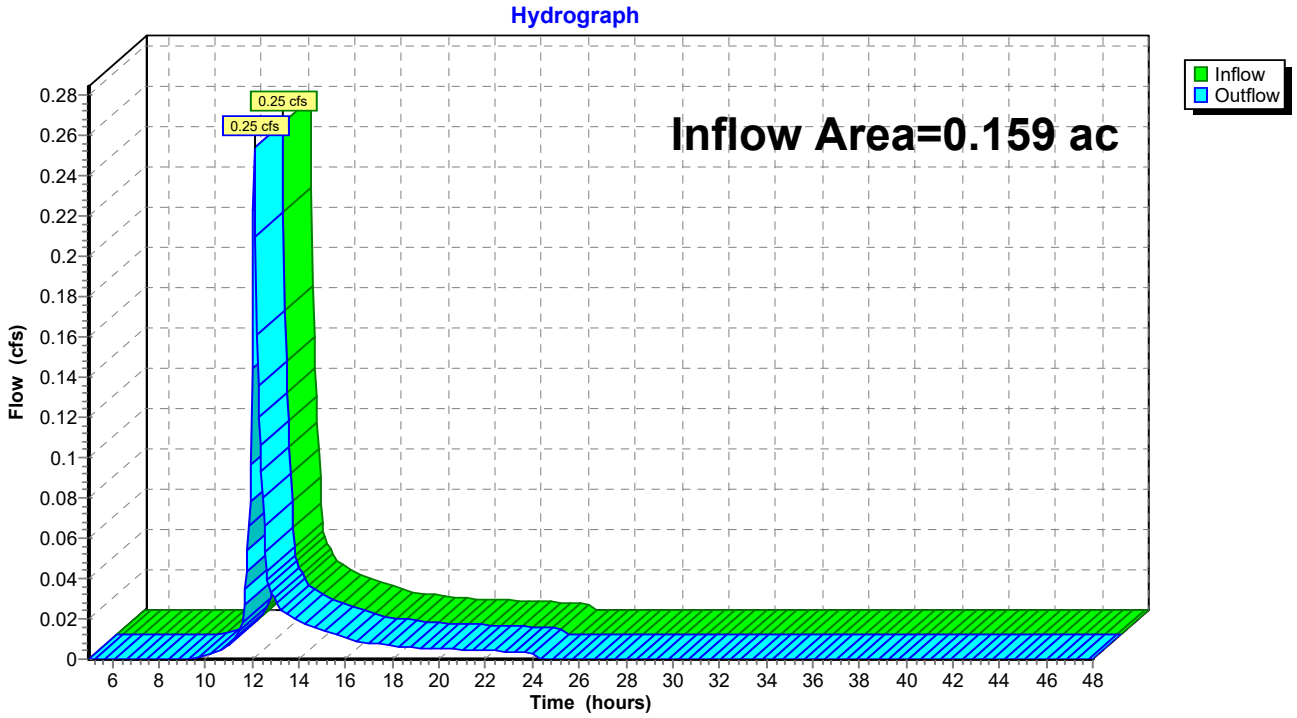
Summary for Reach DP-2A: NORTHWEST PROP. LINE PRE-DEVELOPMENT

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.159 ac, 0.62% Impervious, Inflow Depth = 1.40" for 2-Year event
Inflow = 0.25 cfs @ 12.10 hrs, Volume= 0.019 af
Outflow = 0.25 cfs @ 12.10 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-2A: NORTHWEST PROP. LINE PRE-DEVELOPMENT



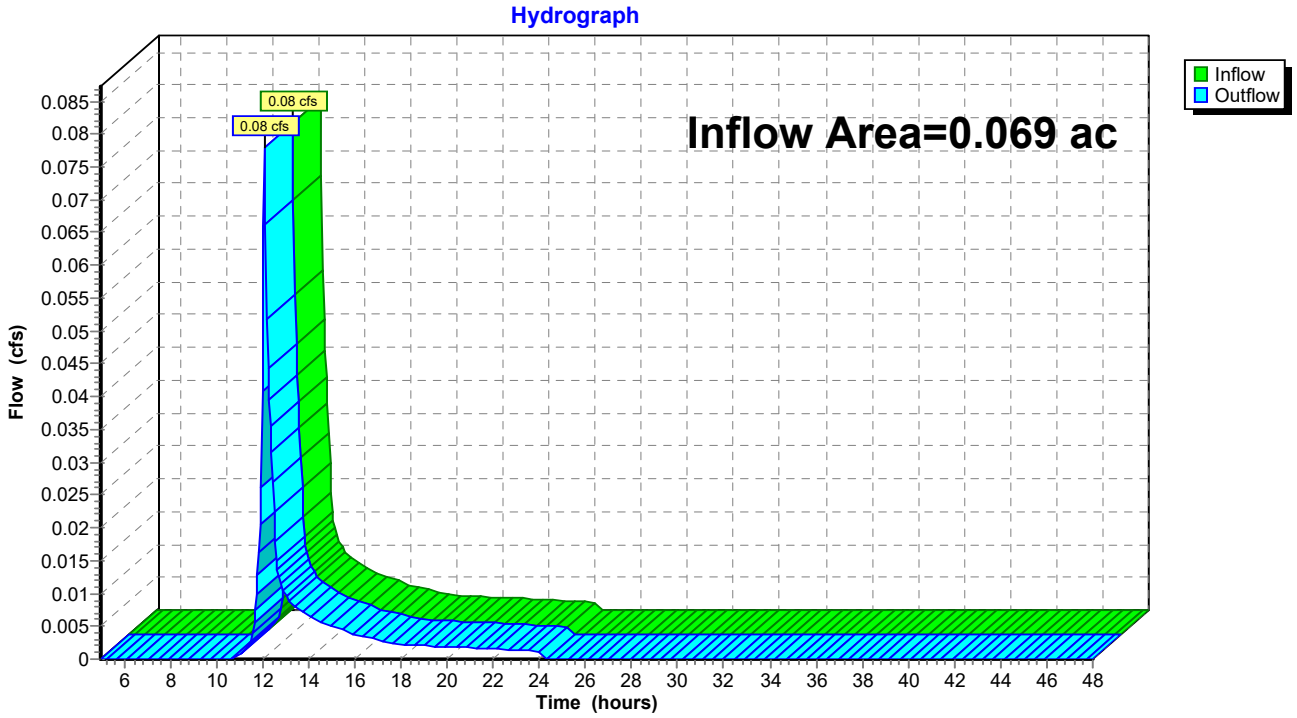
Summary for Reach DP-2B: NORTHWEST PROP. LINE POST-DEVELOPMENT

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.069 ac, 0.00% Impervious, Inflow Depth = 1.04" for 2-Year event
Inflow = 0.08 cfs @ 12.10 hrs, Volume= 0.006 af
Outflow = 0.08 cfs @ 12.10 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-2B: NORTHWEST PROP. LINE POST-DEVELOPMENT



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment4SA: NORTHWEST SITE Runoff Area=6,927 sf 0.62% Impervious Runoff Depth=2.63"
Tc=6.0 min CN=80 Runoff=0.48 cfs 0.035 af

Subcatchment4SB: NORTHWEST SITE Runoff Area=2,992 sf 0.00% Impervious Runoff Depth=2.13"
Tc=6.0 min CN=74 Runoff=0.17 cfs 0.012 af

Reach DP-2A: NORTHWEST PROP. LINE PRE-DEVELOPMENT Inflow=0.48 cfs 0.035 af
Outflow=0.48 cfs 0.035 af

Reach DP-2B: NORTHWEST PROP. LINE POST-DEVELOPMENT Inflow=0.17 cfs 0.012 af
Outflow=0.17 cfs 0.012 af

Total Runoff Area = 0.228 ac Runoff Volume = 0.047 af Average Runoff Depth = 2.48"
99.57% Pervious = 0.227 ac 0.43% Impervious = 0.001 ac

Summary for Subcatchment 4SA: NORTHWEST SITE PRE-DEVELOPMENT

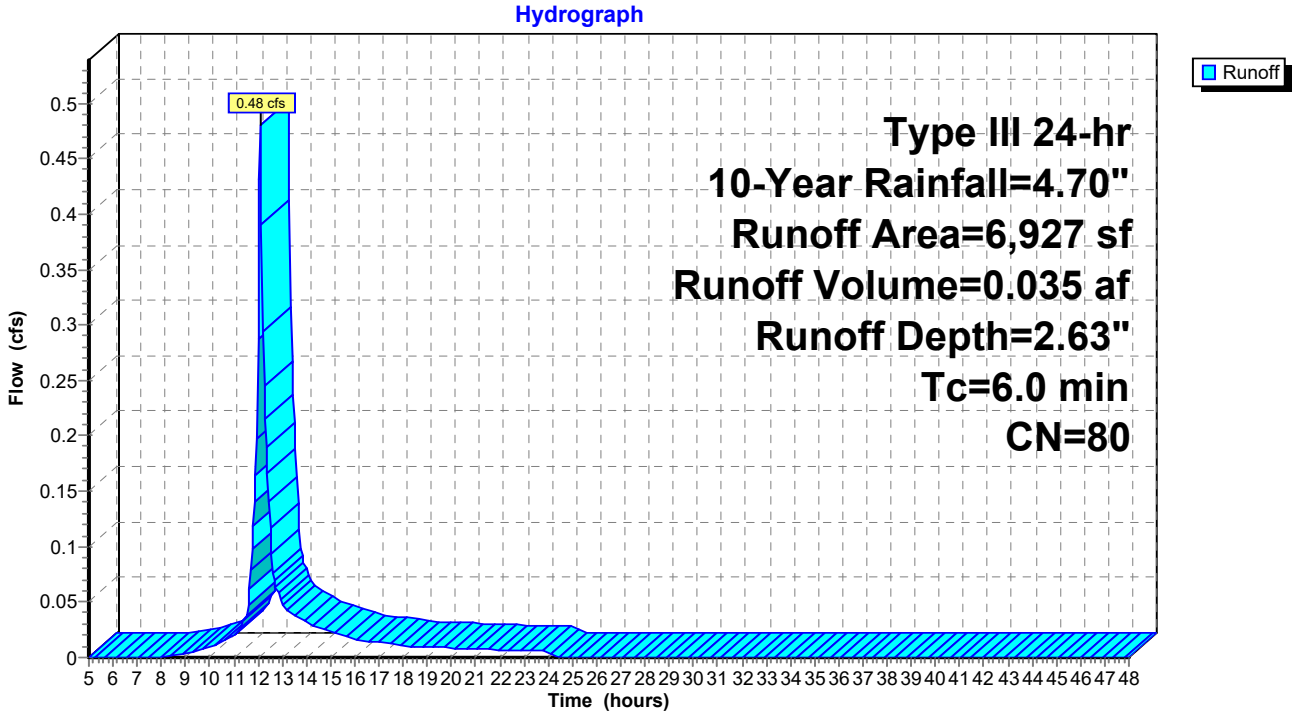
Runoff = 0.48 cfs @ 12.09 hrs, Volume= 0.035 af, Depth= 2.63"
Routed to Reach DP-2A : NORTHWEST PROP. LINE PRE-DEVELOPMENT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
666	70	Woods, Good, HSG C
43	98	Unconnected pavement, HSG C
542	96	Gravel surface, HSG C
5,676	79	50-75% Grass cover, Fair, HSG C
6,927	80	Weighted Average
6,884		99.38% Pervious Area
43		0.62% Impervious Area
43		100.00% Unconnected

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

Subcatchment 4SA: NORTHWEST SITE PRE-DEVELOPMENT



Summary for Subcatchment 4SB: NORTHWEST SITE POST-DEVELOPMENT

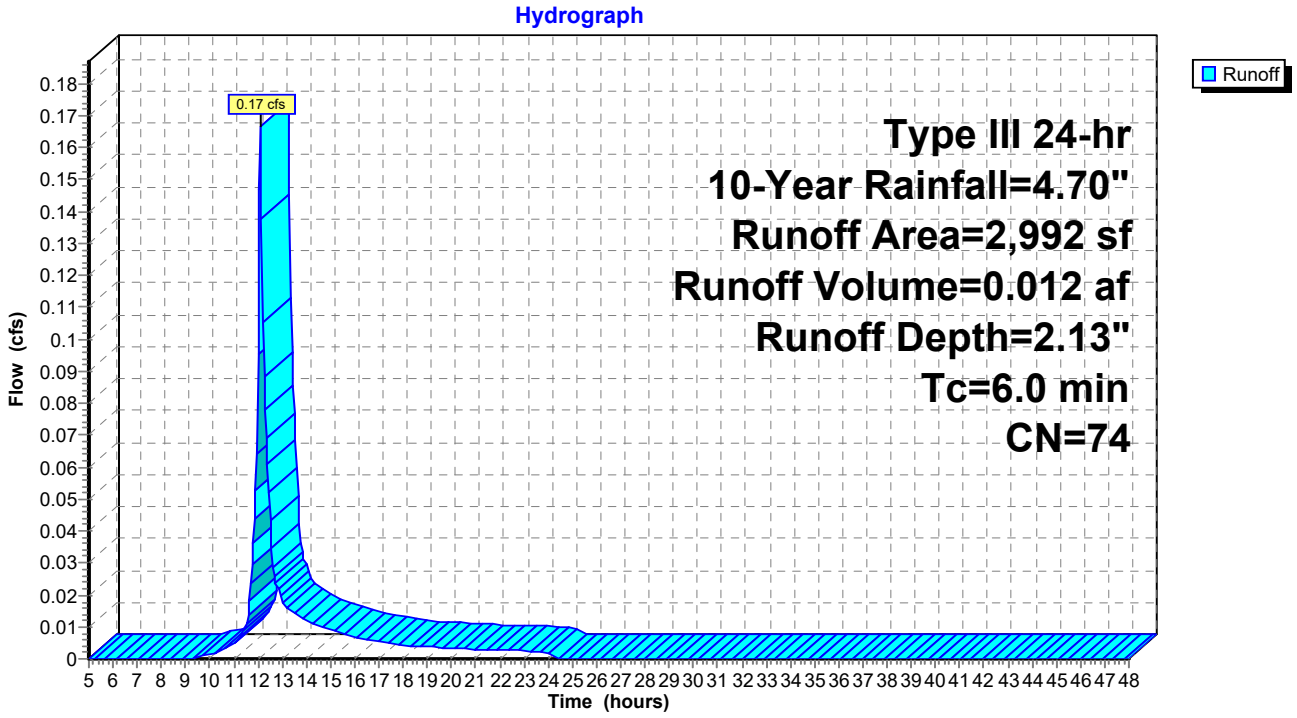
Runoff = 0.17 cfs @ 12.10 hrs, Volume= 0.012 af, Depth= 2.13"
Routed to Reach DP-2B : NORTHWEST PROP. LINE POST-DEVELOPMENT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
2,992	74	>75% Grass cover, Good, HSG C
2,992		100.00% Pervious Area

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

Subcatchment 4SB: NORTHWEST SITE POST-DEVELOPMENT



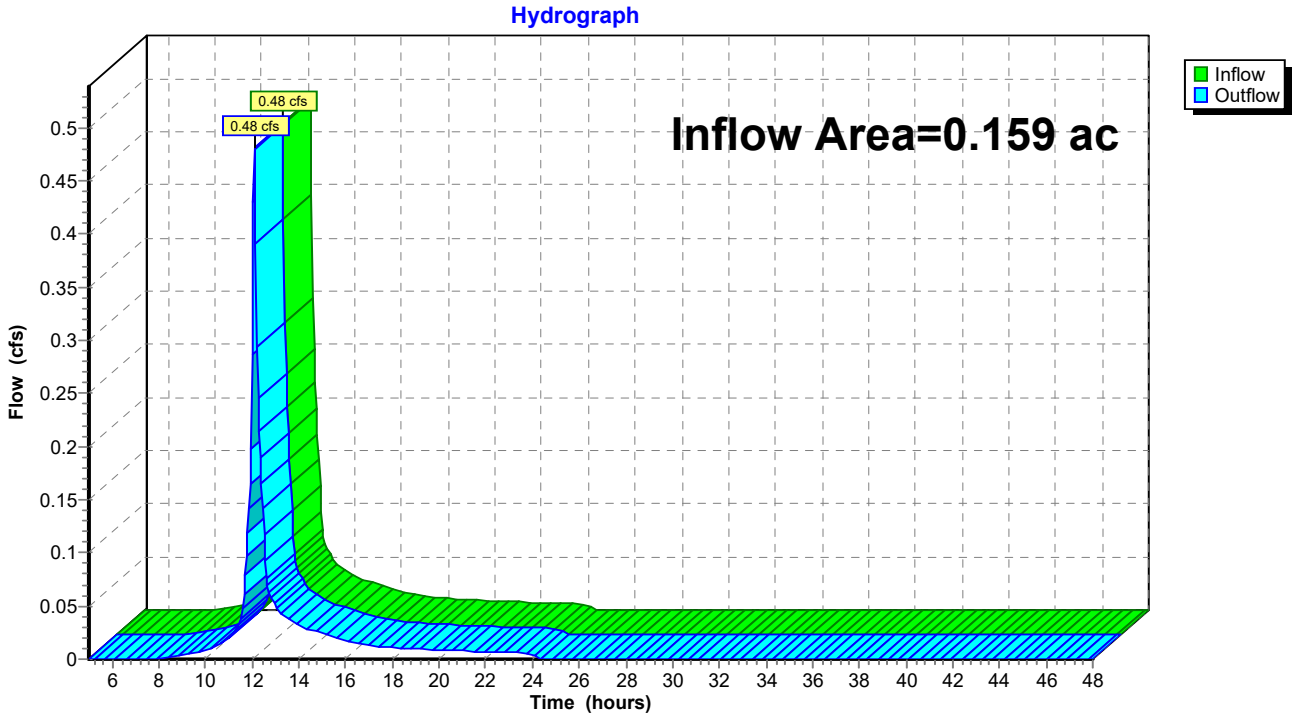
Summary for Reach DP-2A: NORTHWEST PROP. LINE PRE-DEVELOPMENT

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.159 ac, 0.62% Impervious, Inflow Depth = 2.63" for 10-Year event
Inflow = 0.48 cfs @ 12.09 hrs, Volume= 0.035 af
Outflow = 0.48 cfs @ 12.09 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-2A: NORTHWEST PROP. LINE PRE-DEVELOPMENT



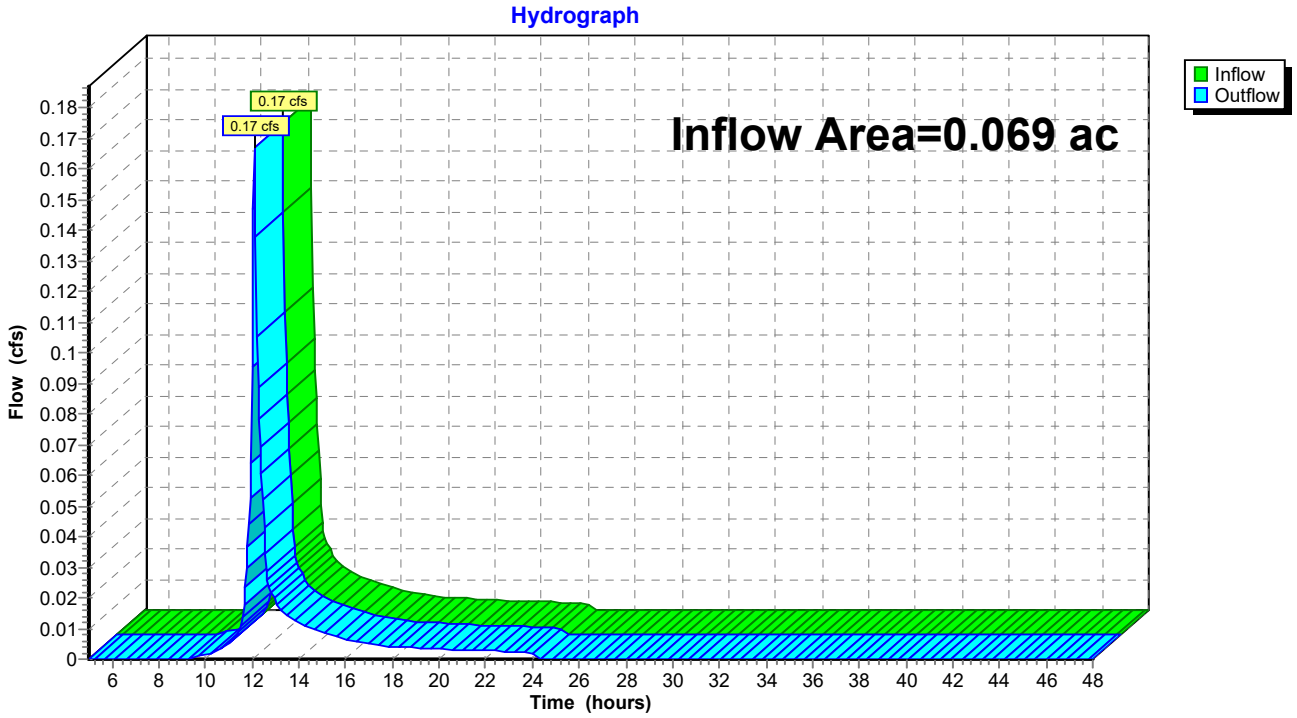
Summary for Reach DP-2B: NORTHWEST PROP. LINE POST-DEVELOPMENT

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.069 ac, 0.00% Impervious, Inflow Depth = 2.13" for 10-Year event
Inflow = 0.17 cfs @ 12.10 hrs, Volume= 0.012 af
Outflow = 0.17 cfs @ 12.10 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-2B: NORTHWEST PROP. LINE POST-DEVELOPMENT



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment4SA: NORTHWEST SITE Runoff Area=6,927 sf 0.62% Impervious Runoff Depth=3.33"
Tc=6.0 min CN=80 Runoff=0.61 cfs 0.044 af

Subcatchment4SB: NORTHWEST SITE Runoff Area=2,992 sf 0.00% Impervious Runoff Depth=2.77"
Tc=6.0 min CN=74 Runoff=0.22 cfs 0.016 af

Reach DP-2A: NORTHWEST PROP. LINE PRE-DEVELOPMENT Inflow=0.61 cfs 0.044 af
Outflow=0.61 cfs 0.044 af

Reach DP-2B: NORTHWEST PROP. LINE POST-DEVELOPMENT Inflow=0.22 cfs 0.016 af
Outflow=0.22 cfs 0.016 af

Total Runoff Area = 0.228 ac Runoff Volume = 0.060 af Average Runoff Depth = 3.16"
99.57% Pervious = 0.227 ac 0.43% Impervious = 0.001 ac

Summary for Subcatchment 4SA: NORTHWEST SITE PRE-DEVELOPMENT

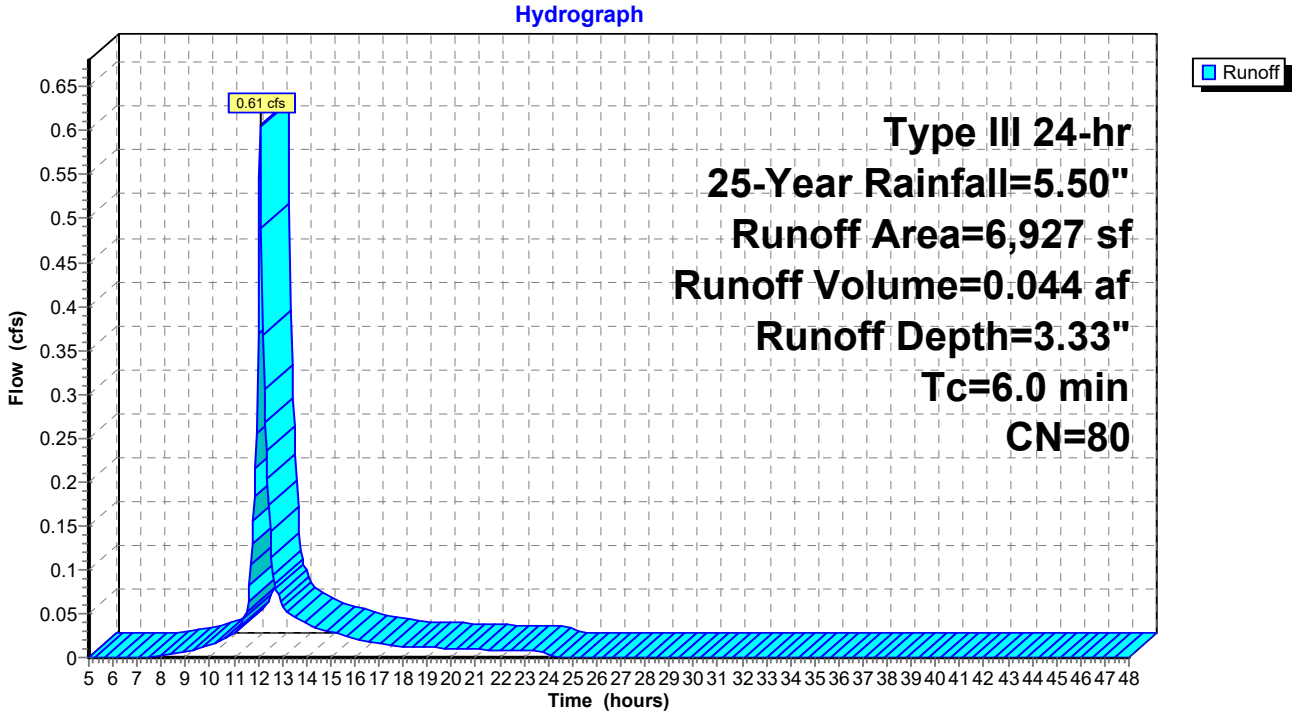
Runoff = 0.61 cfs @ 12.09 hrs, Volume= 0.044 af, Depth= 3.33"
Routed to Reach DP-2A : NORTHWEST PROP. LINE PRE-DEVELOPMENT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
666	70	Woods, Good, HSG C
43	98	Unconnected pavement, HSG C
542	96	Gravel surface, HSG C
5,676	79	50-75% Grass cover, Fair, HSG C
6,927	80	Weighted Average
6,884		99.38% Pervious Area
43		0.62% Impervious Area
43		100.00% Unconnected

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

Subcatchment 4SA: NORTHWEST SITE PRE-DEVELOPMENT



Summary for Subcatchment 4SB: NORTHWEST SITE POST-DEVELOPMENT

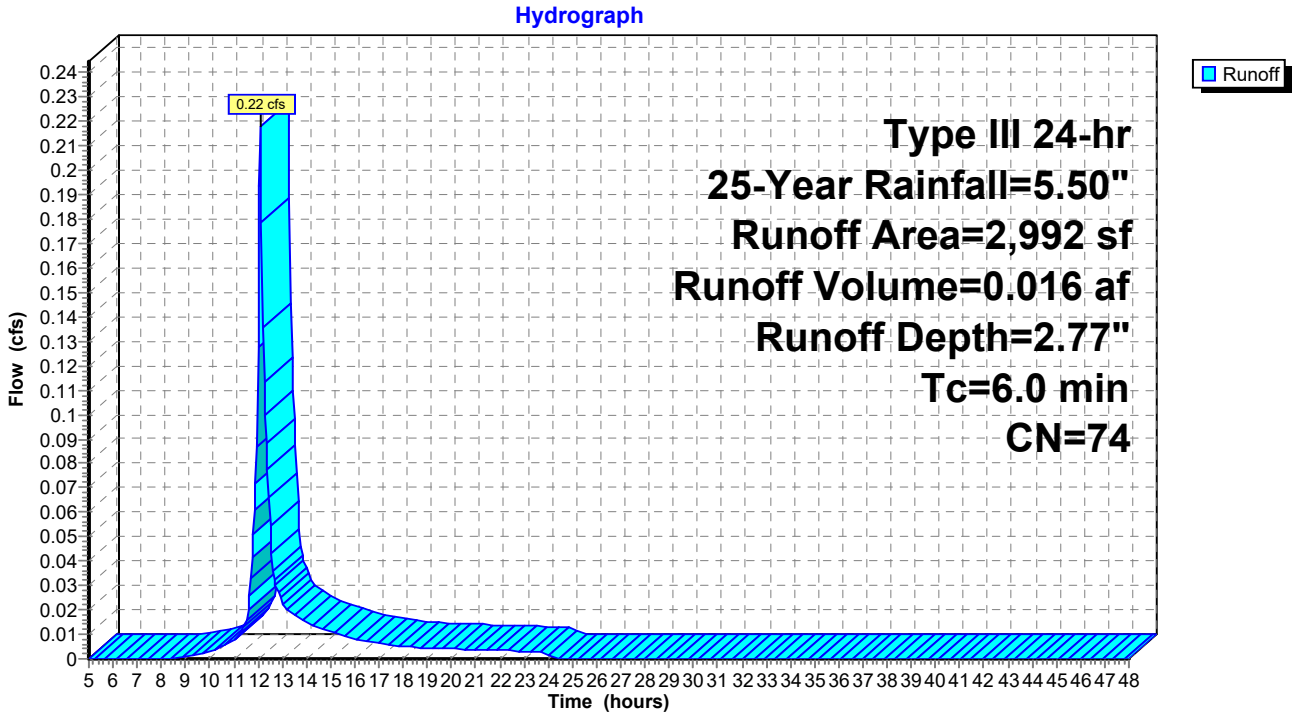
Runoff = 0.22 cfs @ 12.09 hrs, Volume= 0.016 af, Depth= 2.77"
Routed to Reach DP-2B : NORTHWEST PROP. LINE POST-DEVELOPMENT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
2,992	74	>75% Grass cover, Good, HSG C
2,992		100.00% Pervious Area

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

Subcatchment 4SB: NORTHWEST SITE POST-DEVELOPMENT



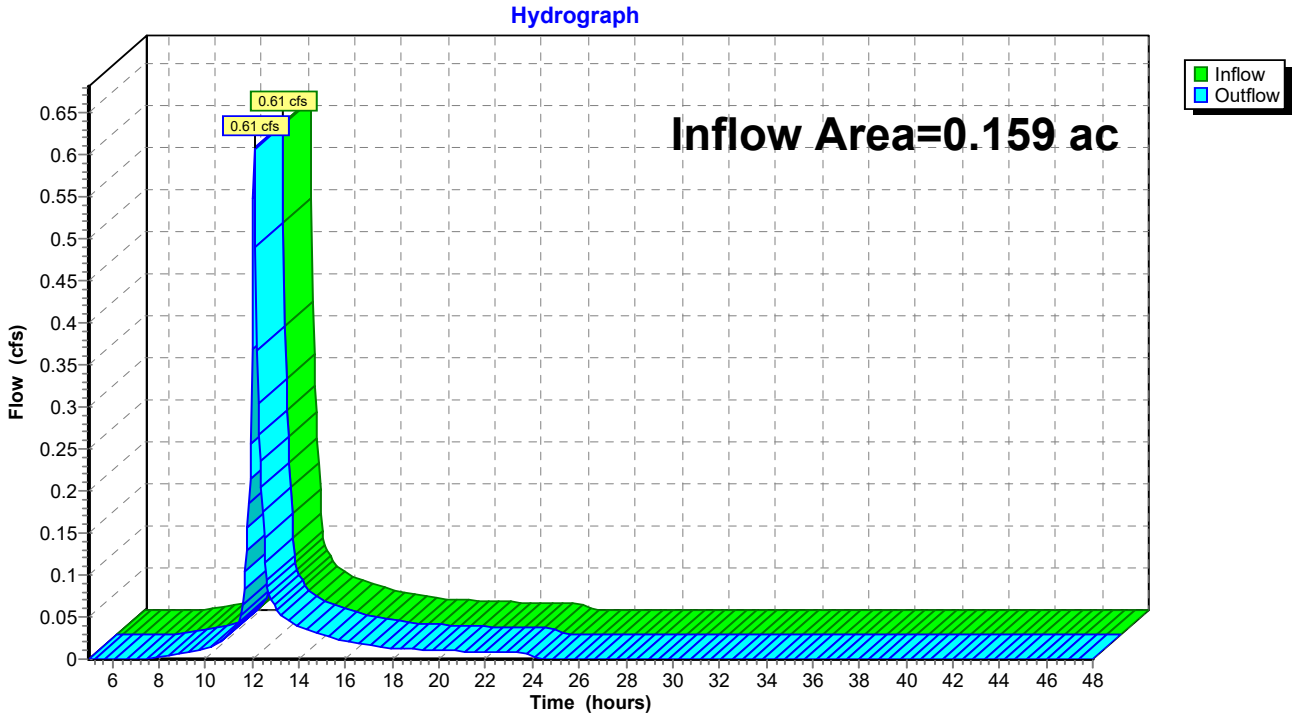
Summary for Reach DP-2A: NORTHWEST PROP. LINE PRE-DEVELOPMENT

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.159 ac, 0.62% Impervious, Inflow Depth = 3.33" for 25-Year event
Inflow = 0.61 cfs @ 12.09 hrs, Volume= 0.044 af
Outflow = 0.61 cfs @ 12.09 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-2A: NORTHWEST PROP. LINE PRE-DEVELOPMENT



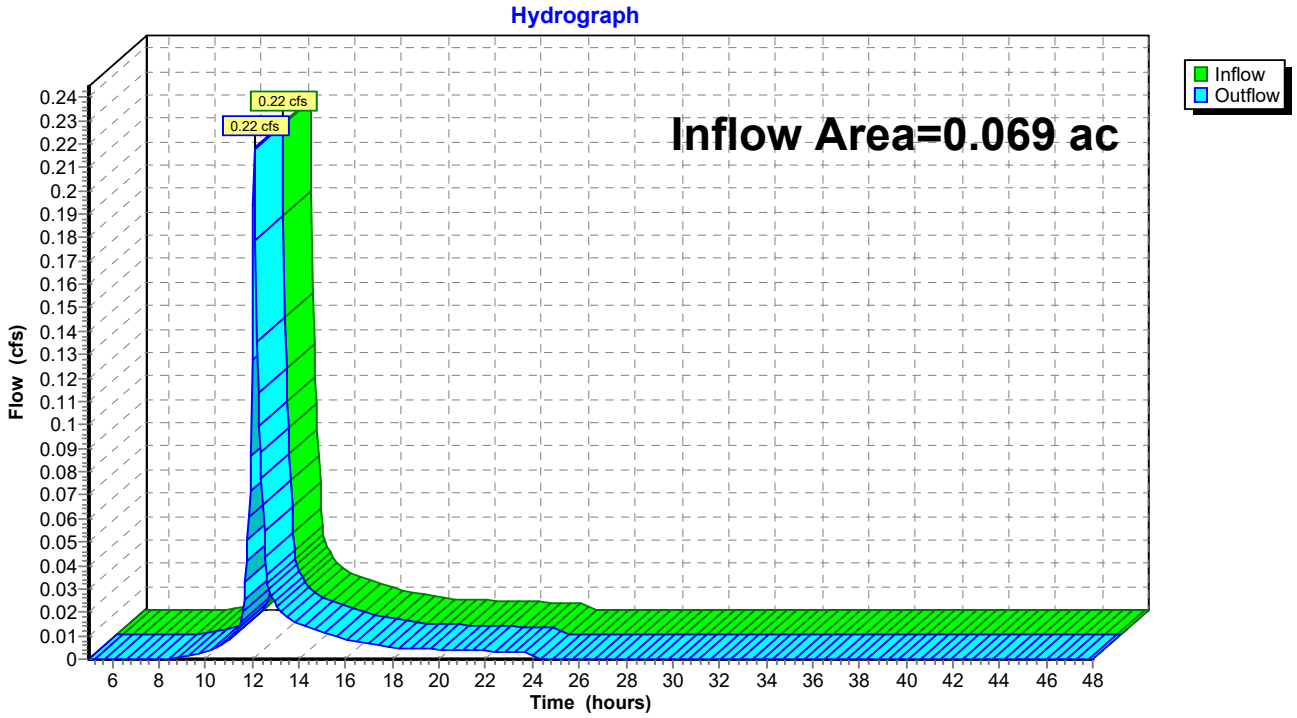
Summary for Reach DP-2B: NORTHWEST PROP. LINE POST-DEVELOPMENT

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.069 ac, 0.00% Impervious, Inflow Depth = 2.77" for 25-Year event
Inflow = 0.22 cfs @ 12.09 hrs, Volume= 0.016 af
Outflow = 0.22 cfs @ 12.09 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-2B: NORTHWEST PROP. LINE POST-DEVELOPMENT



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment4SA: NORTHWEST SITE Runoff Area=6,927 sf 0.62% Impervious Runoff Depth=4.69"
Tc=6.0 min CN=80 Runoff=0.85 cfs 0.062 af

Subcatchment4SB: NORTHWEST SITE Runoff Area=2,992 sf 0.00% Impervious Runoff Depth=4.04"
Tc=6.0 min CN=74 Runoff=0.32 cfs 0.023 af

Reach DP-2A: NORTHWEST PROP. LINE PRE-DEVELOPMENT Inflow=0.85 cfs 0.062 af
Outflow=0.85 cfs 0.062 af

Reach DP-2B: NORTHWEST PROP. LINE POST-DEVELOPMENT Inflow=0.32 cfs 0.023 af
Outflow=0.32 cfs 0.023 af

Total Runoff Area = 0.228 ac Runoff Volume = 0.085 af Average Runoff Depth = 4.50"
99.57% Pervious = 0.227 ac 0.43% Impervious = 0.001 ac

Summary for Subcatchment 4SA: NORTHWEST SITE PRE-DEVELOPMENT

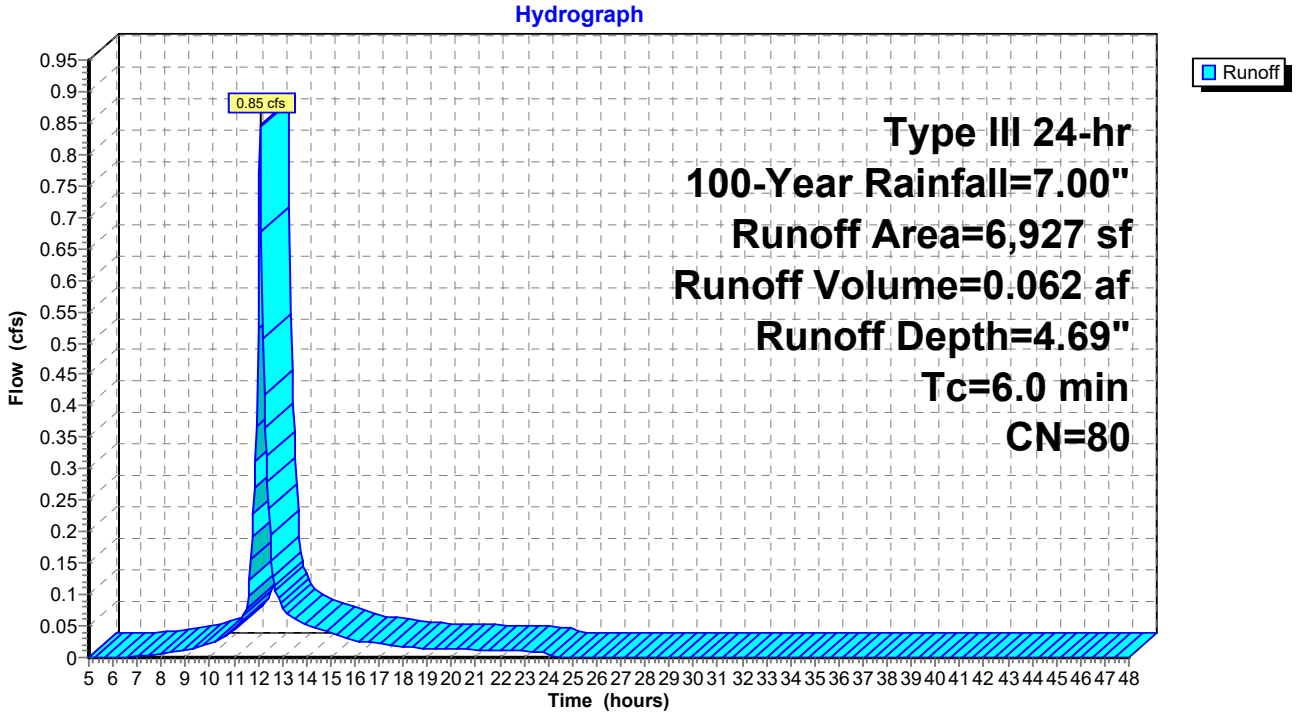
Runoff = 0.85 cfs @ 12.09 hrs, Volume= 0.062 af, Depth= 4.69"
Routed to Reach DP-2A : NORTHWEST PROP. LINE PRE-DEVELOPMENT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
666	70	Woods, Good, HSG C
43	98	Unconnected pavement, HSG C
542	96	Gravel surface, HSG C
5,676	79	50-75% Grass cover, Fair, HSG C
6,927	80	Weighted Average
6,884		99.38% Pervious Area
43		0.62% Impervious Area
43		100.00% Unconnected

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

Subcatchment 4SA: NORTHWEST SITE PRE-DEVELOPMENT



Summary for Subcatchment 4SB: NORTHWEST SITE POST-DEVELOPMENT

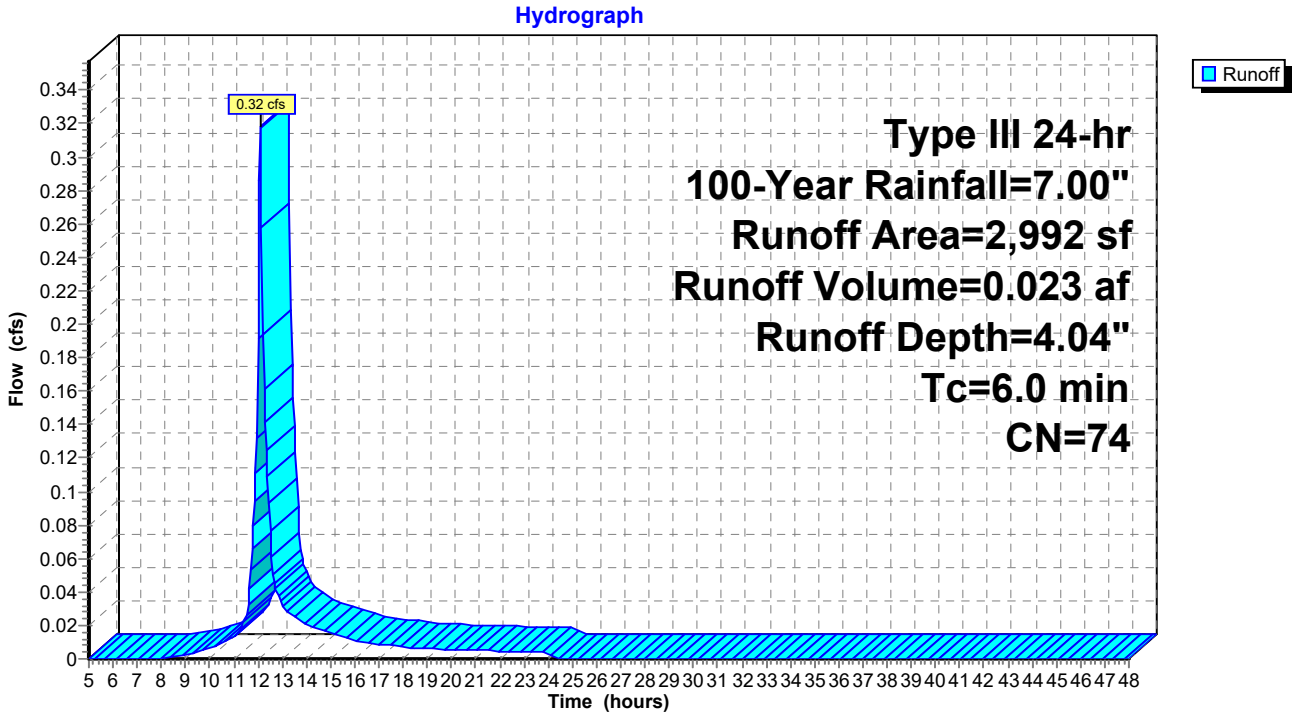
Runoff = 0.32 cfs @ 12.09 hrs, Volume= 0.023 af, Depth= 4.04"
Routed to Reach DP-2B : NORTHWEST PROP. LINE POST-DEVELOPMENT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
2,992	74	>75% Grass cover, Good, HSG C
2,992		100.00% Pervious Area

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

Subcatchment 4SB: NORTHWEST SITE POST-DEVELOPMENT



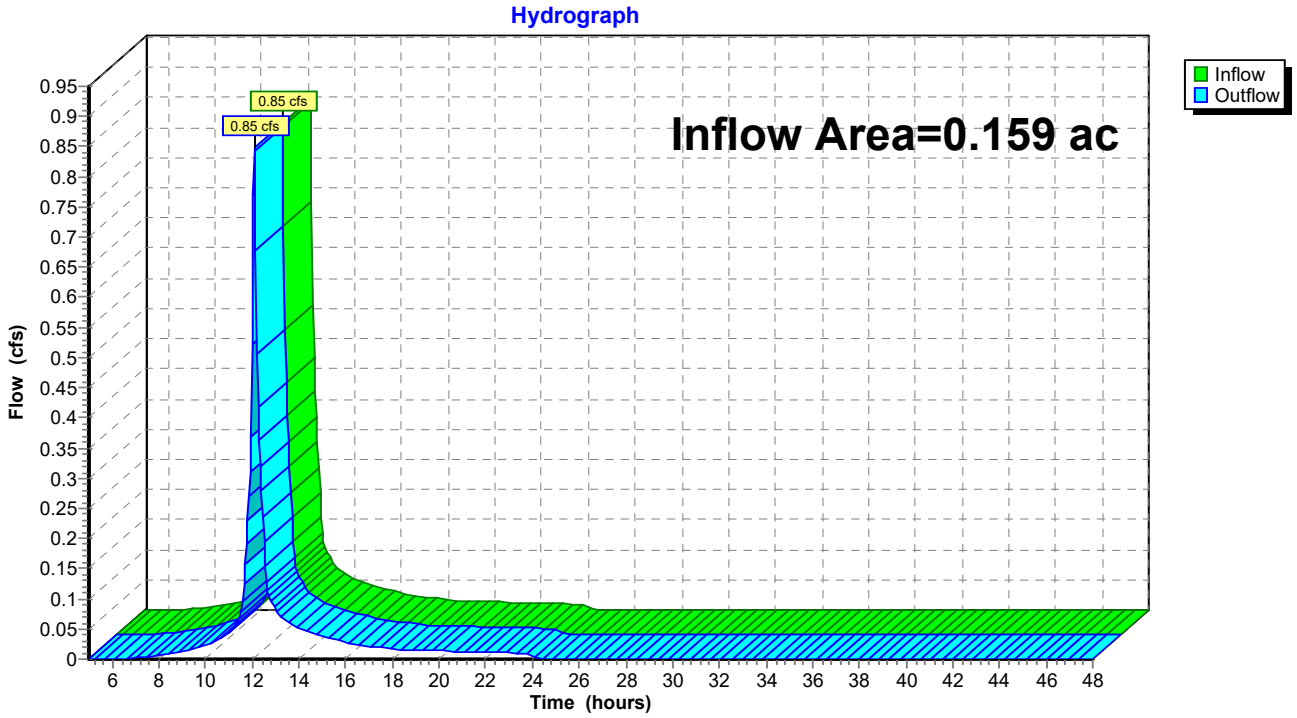
Summary for Reach DP-2A: NORTHWEST PROP. LINE PRE-DEVELOPMENT

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.159 ac, 0.62% Impervious, Inflow Depth = 4.69" for 100-Year event
Inflow = 0.85 cfs @ 12.09 hrs, Volume= 0.062 af
Outflow = 0.85 cfs @ 12.09 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-2A: NORTHWEST PROP. LINE PRE-DEVELOPMENT



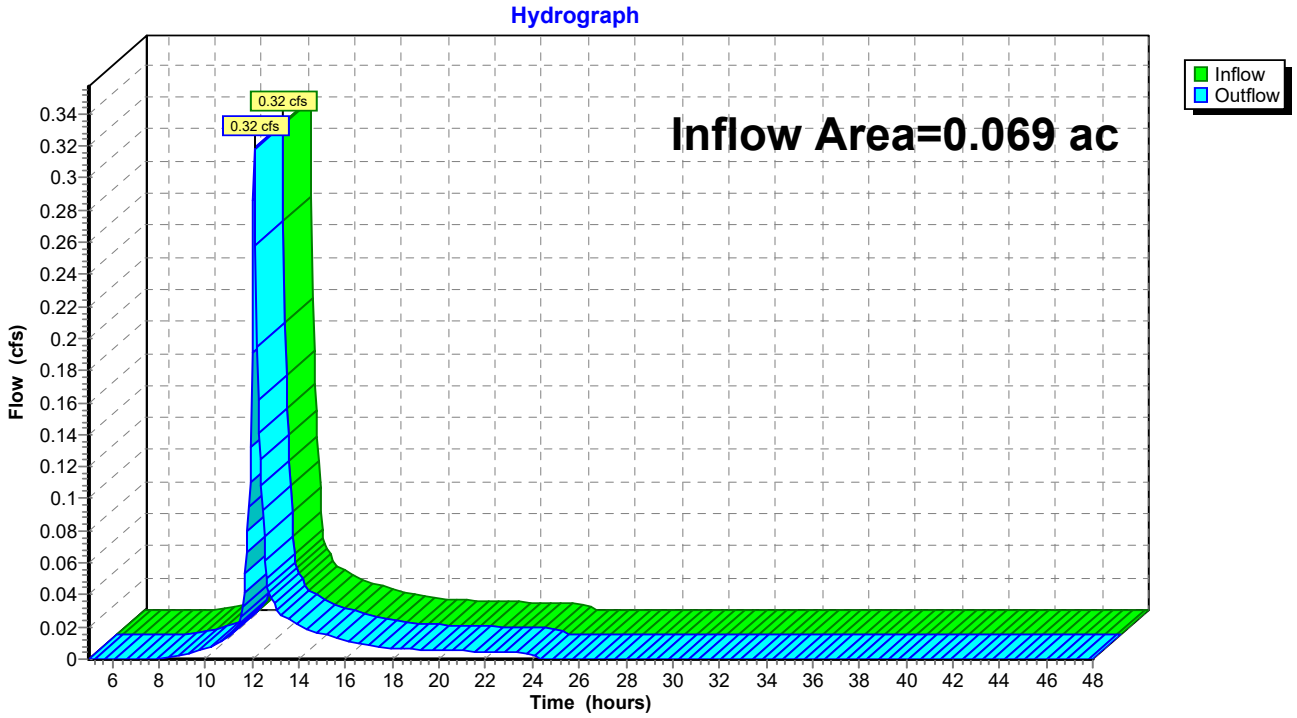
Summary for Reach DP-2B: NORTHWEST PROP. LINE POST-DEVELOPMENT

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.069 ac, 0.00% Impervious, Inflow Depth = 4.04" for 100-Year event
Inflow = 0.32 cfs @ 12.09 hrs, Volume= 0.023 af
Outflow = 0.32 cfs @ 12.09 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-2B: NORTHWEST PROP. LINE POST-DEVELOPMENT



A P P E N D I X C

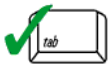
Checklist for Stormwater Report

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.

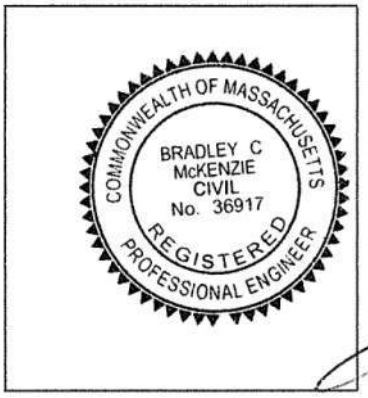
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



Signature and Date 9/20/22

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.

A P P E N D I X D

Illicit Discharge Compliance Statement
Supplemental BMP Calculations

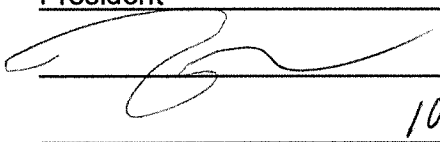
Illicit Discharge Compliance Statement

I, Bradley C. McKenzie, P.E., hereby notify the Rockland Conservation Commission that I have not witnessed, nor am aware of any existing illicit discharges at the site known as 327 & 333 Weymouth Street in Rockland, Massachusetts. I also hereby certify that the development of said property as illustrated on the final plans entitled "Site Development Plan, (APN'S 3-1, 3-1A, 3-2, 8-27 & 8-28), 327 & 333 Weymouth Street, Rockland, MA," prepared by McKenzie Engineering Group. Inc. dated October 4, 2021 and as revised and approved by the Rockland Conservation Commission and maintenance thereof in accordance with the "Construction Phase Operations and Maintenance Plan" and "Long-Term Operations and Maintenance Plan" prepared by McKenzie Engineering Group, Inc. dated October 4, 2021 and as revised and approved by the Rockland Conservation Commission will not create any new illicit discharges. There is no warranty implied regarding future illicit discharges that may occur as a result of improper construction or maintenance of the stormwater management system or unforeseen accidents.

Name: Bradley C. McKenzie, P.E.

Company: McKenzie Engineering Group, Inc.

Title: President

Signature: 

Date: 10-4-21

MCKENZIE ENGINEERING GROUP

Assinippi Office Park
150 Longwater Drive, Suite 101
Norwell, MA 02061

343 & 333 Weymouth Street
Rockland, MA

11/22/2022

WATER QUALITY VOLUME ANALYSIS

POND	IMPERVIOUS AREA (SF) CN=98	PRECIPITATION (IN)	WATER QUALITY VOLUME REQUIRED (CF)	TREATMENT VOLUME PROVIDED (CF) UP TO INVERT ELEVATION	NET TREATMENT VOLUME PROVIDED (CF)
P-1	46,577	1.00	3,881	3,920	39
TOTAL	**46,577**		**3,881**	**3,920**	**39**

WATER QUALITY VOLUME ANALYSIS - PROPRIETARY STORMWATER TREATMENTS UNITS (FIRST DEFENSE UNITS)

WATERSHED	IMPERVIOUS AREA (SF) CN=98	PRECIPITATION (IN)	qu (Fig 4) Tc 6 min. (CSM/IN)	AREA (SM)	WATER QUALITY REQUIRED (CFS)
5S	46,577	0.50	774	1.671E-03	0.647

*Use 4' Diameter First Defense Units

MCKENZIE ENGINEERING GROUP

Assinippi Office Park
150 Longwater Drive, Suite 101
Norwell, MA 02061

343 & 333 Weymouth Street
Rockland, MA

11/22/2022

DRAWDOWN WITHIN 72 HOURS ANALYSIS

POND	RAWLS RATE (IN/HR)	STORAGE VOLUME PROVIDED (CF)	BOTTOM AREA (FT2)	DRAWDOWN (HR)
P-1	1.02	18,830	4,050	55

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11/22/2022

REQUIRED RECHARGE VOLUME (CF) *"SIMPLE DYNAMIC METHOD"*

WATERSHED #	IMPERVIOUS AREA (SF)	TARGET DEPTH FACTOR (F) A SOIL	IMPERVIOUS AREA (SF)	TARGET DEPTH FACTOR (F) B SOIL	IMPERVIOUS AREA (SF)	TARGET DEPTH FACTOR (F) C SOIL	IMPERVIOUS AREA (SF)	TARGET DEPTH FACTOR (F) D SOIL		REQUIRED RECHARGE VOLUME (CF)
POND 1P		0.60		0.35	46,577	0.25		0.10		970
		0.60		0.35		0.25		0.10		0
		0.60		0.35		0.25		0.10		0
							TOTAL			**970**

CAPTURE ADJUSTMENT

WATERSHED #	TOTAL IMPERVIOUS AREA (SF)	TOTAL IMPERVIOUS COLLECTED	% DIRECTED TOWARDS INFILTRATION SYSTEM	STANDARD NO. 3 <100% - > 65% CAPTURED	CAPTURE ADJUSTMENT	ADJUSTED REQUIRED RECHARGE VOLUME (CF)
POND 1P	46,577	45,773	98.27%	**CAPTURE ADJUSTMENT REQUIRED**	1.02	987

* Required Water Quality Volume based on 0.5 inches of runoff; Required Recharge Volume based on 0.25 inches; Target Volume is Required Water Quility Volume of 3,881CF.

PROVIDED RECHARGE VOLUME (CF)
BELOW LOWEST INVERT

	REQUIRED RECHARGE VOLUME (CF)	POND	STORAGE VOLUME PROVIDED (CF)	NET STORAGE VOLUME PROVIDED (CF)
	987	P-1	3,920	2,933
TOTAL	**987**		**3,920**	**2,933**

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Standard 4: Total Suspended Solids Calculation:
Design Point #3

NAME: 333 & 343 Weymouth Street
Rockland, MA
CLIENT: Perry South Shore, LLC
COUNTY: Plymouth

Proj. No.: 218-102
Date: 6/18/2021
Revised:
Computed by: ESS
Checked by: BCM

TSS Removal Calculation Worksheet

B BMP	C TSS Removal Rate	D Starting TSS Load (*F)	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump Hooded Catch Basins	**0.25**	**1.00**	**0.25**	**0.75**
First Defense Unit-Recommended TSS Removal Per Mass STEP	**0.70**	**0.75**	**0.53**	**0.23**
Infiltration Basin	**0.80**	**0.23**	**0.18**	**0.05**

Total TSS Removal = **96%**

*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

Storm Drainage Computations

Name: 327 & 333 Weymouth St.

Client: DTC, LLC.

Proj. No.: **218-102**
Date: **19-Sep-22**
Computed by: **ESS**
Checked by: **BCM**

Design Parameters:
100 **Year Storm** Boston, MA

k_e= **0.5**

DESCRIPTION	LOCATION		AREA	C	C x A	SUM	FLOW TIME (MIN)		i*	DESIGN					CAPACITY		PROFILE						
	FROM	TO	(AC.)			C x A	PIPE	CONC TIME		Q cfs	V fps	n	PIPE SIZE	SLOPE	Q full ft^3/s	V full ft/s	LENGTH ft	FALL ft	RIM	INV UPPER	INV LOWER	W.S.E. ft	Freeboard ft
	CB-1	DMH1	0.249	0.71	0.18	0.18	0.16	6.0	7.0	1.2	3.5	0.013	12	0.0103	3.6	4.6	34	0.35	162.00	158.30	157.95	158.6	3.4
	CB-2	DMH1	0.089	0.88	0.08	0.08	0.15	6.0	7.0	0.5	3.5	0.013	12	0.0242	5.5	7.1	31	0.75	162.40	158.70	157.95	159.4	3.0
	DMH1	DMH2	---	---	---	0.25	0.40	6.2	7.0	1.8	3.9	0.013	12	0.0102	3.6	4.6	93	0.95	162.20	157.95	157.00	158.4	3.8
	CB3	DMH2	0.230	0.90	0.21	0.21	0.03	6.0	7.0	1.5	3.9	0.013	12	0.0125	4.0	5.1	8	0.10	159.60	157.10	157.00	157.5	2.1
	ROOF	DMH2	0.312	0.90	0.28	0.28	0.36	6.0	7.0	2.0	3.9	0.013	12	0.0100	3.6	4.5	85	69.00	159.60	157.85	157.00	159.0	0.6
	DMH2	DMH3	---	---	---	0.74	0.24	6.6	6.9	5.1	5.8	0.013	18	0.0157	13.1	7.4	83	1.30	160.00	157.00	155.70	157.8	2.2
	CB4	DMH3	0.246	0.90	0.22	0.22	0.01	6.0	7.0	1.6	5.1	0.013	12	0.0250	5.6	7.2	2	0.05	158.25	155.75	155.70	157.4	0.9
	DMH3	BASIN	---	---	---	0.96	0.03	6.8	6.8	6.5	5.8	0.013	18	0.0125	11.7	6.6	12	0.15	158.30	155.70	155.55	156.2	2.1

Sediment Trap Sizing for Proposed Outlets

Key: [ ] input data in cell

Equation: $d_{100}=(0.0125(Q_{100})^{(4/3)})/(Tw * D_0)$

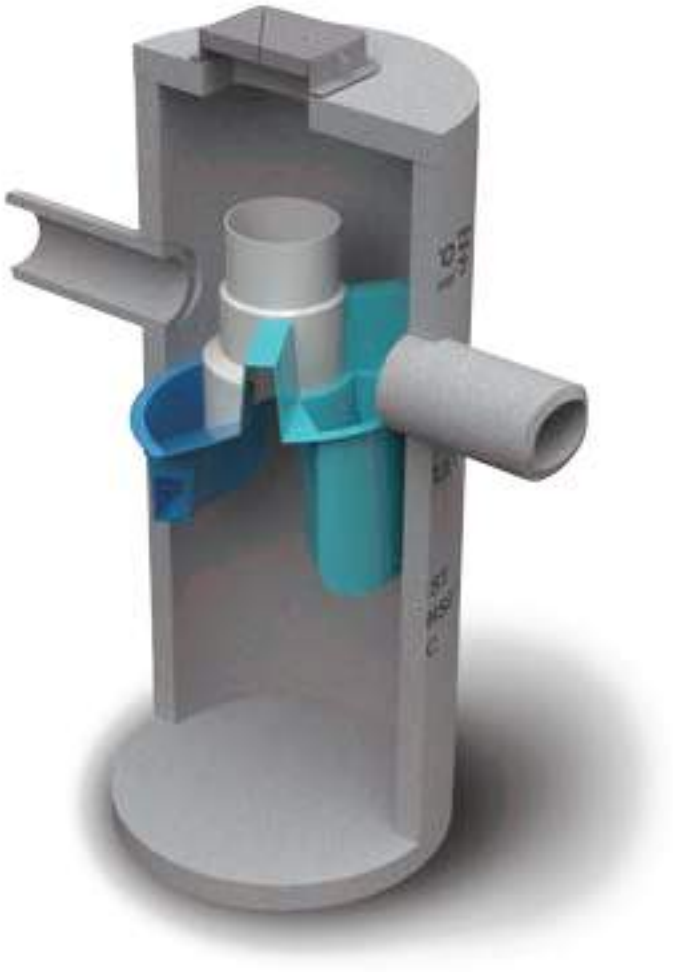
Flared End Section Infil. Basin Outlet (highest Q_{100})

Outlet Pipe Diameter (D_o):	18	in.	/	1.5	ft.	
100-yr Flow (Q_{100}):	7.01	cfs				
Depth of Trap (Y) (1/2 pipe diameter, 1ft. min):	9	in.	/	0.75	ft.	use --> 1 ft.
Depth of Tailwater (Tw) (assume 0.2')	0.2	ft.				
Min. Stone Size (d_{100}) (8" min.)	0.559	ft.	/	6.708	in.	use --> 8 in.

Trap Size

Length (l) (3'+3'+3(D_0))	10.5	ft.
Width (w) (3'+3'+2(D_0))	9	ft.

Hydro International



Operation and Maintenance Manual

First Defense® and First Defense® High Capacity

Vortex Separator for Stormwater Treatment

Table of Contents

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DISCLAIMER: Information and data contained in this manual is exclusively for the purpose of assisting in the operation and maintenance of Hydro International plc's First Defense®. No warranty is given nor can liability be accepted for use of this information for any other purpose. Hydro International plc has a policy of continuous product development and reserves the right to amend specifications without notice.

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Hydro Maintenance Services

Hydro International has been engineering stormwater treatment systems for over 30 years. We understand the mechanics of removing pollutants from stormwater and how to keep systems running at an optimal level.

Nobody Knows our Systems Better than we do

Avoid Service Negligence

Sanitation services providers not intimately familiar with stormwater treatment systems are at risk of the following:

- Inadvertently breaking parts or failing to clean/replace system components appropriately.
- Charging you for more frequent maintenance because they lacked the tools to service your system properly in the first place.
- Billing you for replacement parts that might have been covered under your Hydro warranty plan
- Charging for maintenance that may not yet have been required.

Leave the Dirty Work to us

Trash, sediment and polluted water is stored inside treatment systems until they are removed by our team with a vactor truck. Sometimes teams must physically enter the system chambers in order to prepare the system for maintenance and install any replacement parts. Services include but are not limited to:

- Solids removal
- Removal of liquid pollutants
- Replacement media installation (when applicable)

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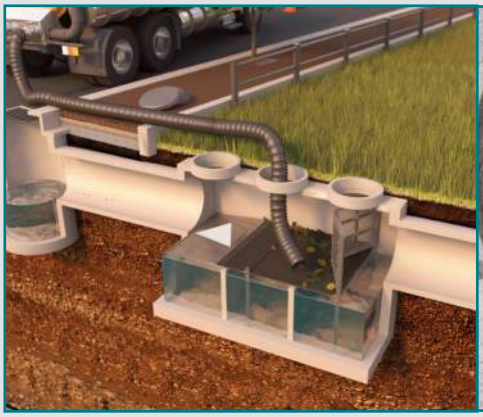
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Better Tools, Better Results

Not all vactor trucks are created equal. Appropriate tools and suction power are needed to service stormwater systems appropriately. Companies who don't specialize in stormwater treatment won't have the tools to properly clean systems or install new parts.



Service Warranty

Make sure you're not paying for service that is covered under your warranty plan. Only Hydro International's service teams can identify tune-ups that should be on us, not you.

Treatment Systems Serviced by Hydro:

- Stormwwater filters
- Stormwater separators
- Baffle boxes
- Biofilters/biorention systems
- Storage structures
- Catch basins
- Stormwater ponds
- Permeable pavement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I. First Defense® by Hydro International

Introduction

The First Defense® is an enhanced vortex separator that combines an effective and economical stormwater treatment chamber with an integral peak flow bypass. It efficiently removes total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® is available in several model configurations (refer to *Section II. Model Sizes & Configurations*, page 4) to accommodate a wide range of pipe sizes, peak flows and depth constraints.

Operation

The First Defense® operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The First Defense® has been designed to allow for easy and safe access for inspection, monitoring and clean-out procedures. Neither entry into the unit nor removal of the internal components is necessary for maintenance, thus safety concerns related to confined-space-entry are avoided.

Pollutant Capture and Retention

The internal components of the First Defense® have been designed to optimize pollutant capture. Sediment is captured and retained in the base of the unit, while oil and floatables are stored on the water surface in the inner volume (Fig.1).

The pollutant storage volumes are isolated from the built-in bypass chamber to prevent washout during high-flow storm events. The sump of the First Defense® retains a standing water level between storm events. This ensures a quiescent flow regime at the onset of a storm, preventing resuspension and washout of pollutants captured during previous events.

Accessories such as oil absorbent pads are available for enhanced oil removal and storage. Due to the separation of the oil and floatable storage volume from the outlet, the potential for washout of stored pollutants between clean-outs is minimized.

Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for “offline” arrangements using separate junction manholes
- Proven to prevent pollutant washout at up to 500% of its treatment flow
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

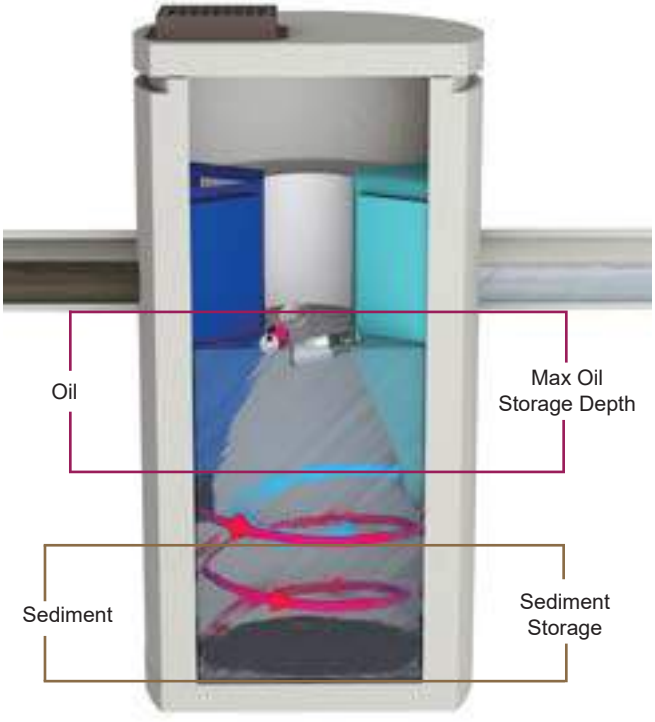

Fig.1 Pollutant storage volumes in the First Defense®.

II. Model Sizes & Configurations

The First Defense® inlet and internal bypass arrangements are available in several model sizes and configurations. The components of the First Defense®-4HC and First Defense®-6HC have modified geometries as to allow greater design flexibility needed to accommodate various site constraints.

All First Defense® models include the internal components that are designed to remove and retain total suspended solids (TSS), gross solids, floatable trash and hydrocarbons (Fig.2a - 2b). First Defense® model parameters and design criteria are shown in Table 1.

First Defense® Components

1. **Built-In Bypass**
2. **Inlet Pipe**
3. **Inlet Chute**
4. **Floatables Draw-off Port**
5. **Outlet Pipe**
6. **Floatables Storage**
7. **Sediment Storage**
8. **Inlet Grate or Cover**

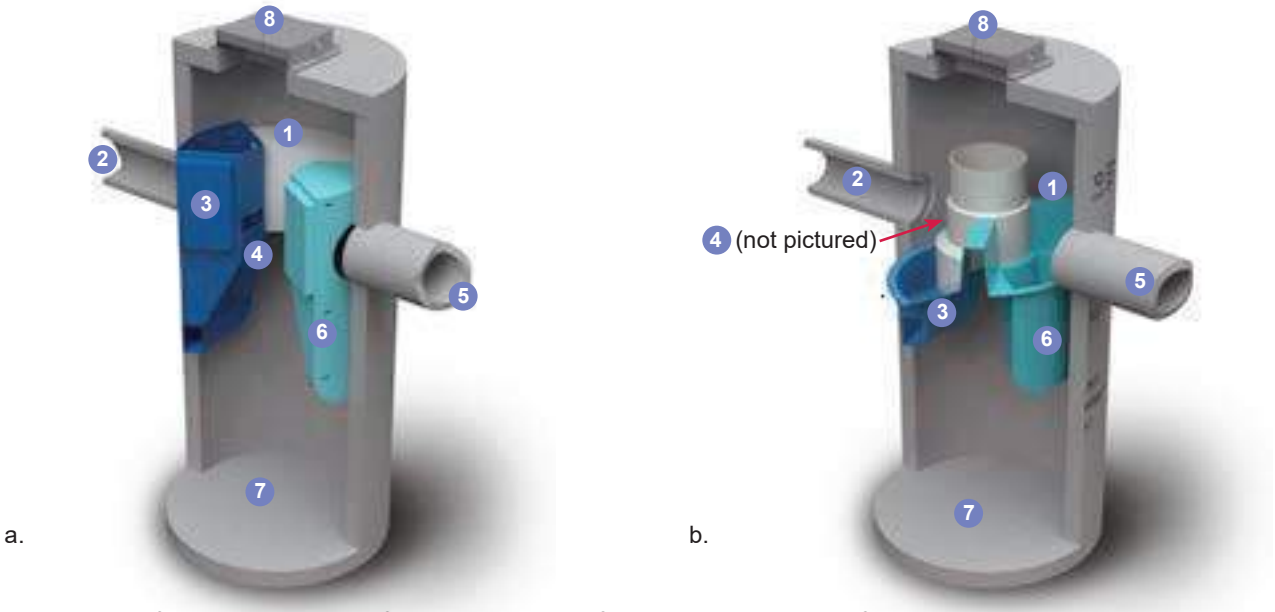

Fig.2a) First Defense®-4 and First Defense®-6; b) First Defense®-4HC and First Defense®-6HC, with higher capacity dual internal bypass and larger maximum pipe diameter.

First Defense® High Capacity Model Number	Diameter	Typical TSS Treatment Flow Rates		Peak Online Flow Rate	Maximum Pipe Diameter[1]	Oil Storage Capacity	Typical Sediment Storage Capacity[2]	Minimum Distance from Outlet Invert to Top of Rim[3]	Standard Distance from Outlet Invert to Sump Floor
		NJDEP Certified	106µm						
	(ft / m)	(cfs / L/s)	(cfs / L/s)	(cfs / L/s)	(in / mm)	(gal / L)	(yd^3 / m^3)	(ft / m)	(ft / m)
FD-3HC	3 / 0.9	0.84 / 23.7	1.60 / 45.3	15 / 424	18 / 457	125 / 473	0.4 / 0.3	2.0 - 3.5 / 0.6 - 1.0	3.71 / 1.13
FD-4HC	4 / 1.2	1.50 / 42.4	1.88 / 50.9	18 / 510	24 / 600	191 / 723	0.7 / 0.5	2.3 - 3.9 / 0.7 - 1.2	4.97 / 1.5
FD-5HC	5 / 1.5	2.34 / 66.2	2.94 / 82.1	20 / 566	24 / 609	300 / 1135	1.1 / .84	2.5 - 4.5 / 0.7 - 1.3	5.19 / 1.5
FD-6HC	6 / 1.8	3.38 / 95.7	4.73 / 133.9	32 / 906	30 / 750	496 / 1,878	1.6 / 1.2	3.0 - 5.1 / 0.9 - 1.6	5.97 / 1.8
FD-8HC	8 / 2.4	6.00 / 169.9	7.52 / 212.9	50 / 1,415	48 / 1219	1120 / 4239	2.8 / 2.1	3.0 - 6.0 / 0.9 -1.8	7.40 / 2.2

[1]Contact Hydro International when larger pipe sizes are required.
[2]Contact Hydro International when custom sediment storage capacity is required.
[3]Minimum distance for models depends on pipe diameter.

III. Maintenance

Overview

The First Defense® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the First Defense®. The First Defense® will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the First Defense® will no longer be able to store removed sediment and oil. Maximum pollutant storage capacities are provided in Table 1.

The First Defense® allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the First Defense®, nor do they require the internal components of the First Defense® to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

Maintenance Equipment Considerations

The internal components of the First Defense®-HC have a centrally located circular shaft through which the sediment storage sump can be accessed with a sump vac hose. The open diameter of this access shaft is 15 inches in diameter (Fig.3). Therefore, the nozzle fitting of any vactor hose used for maintenance should be less than 15 inches in diameter.

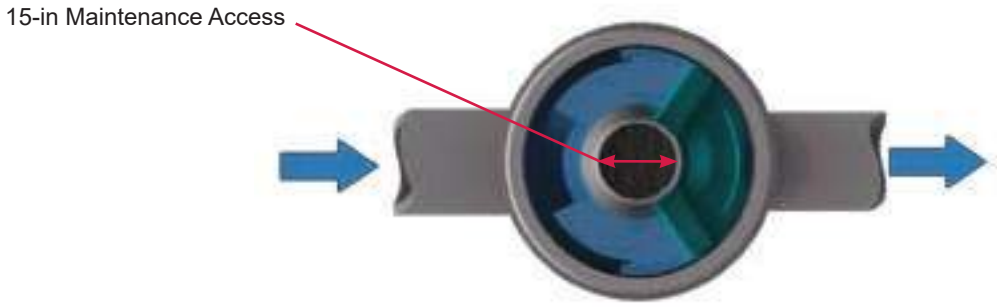

Fig.3 The central opening to the sump of the First Defense®-HC is 15 inches in diameter.

Determining Your Maintenance Schedule

The frequency of clean out is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge-Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil / flotables removal, for a 6-ft First Defense® typically takes less than 30 minutes and removes a combined water/oil volume of about 765 gallons.

Inspection Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. Fig.4 shows the standing water level that should be observed.

4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the components and water surface.

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel.

6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.

7. Securely replace the grate or lid.

8. Take down safety equipment.

9. Notify Hydro International of any irregularities noted during inspection.

Floatables and Sediment Clean Out

Floatables clean out is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig.5).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose and skimmer pole to be lowered to the base of the sump.

Scheduling

- Floatables and sump clean out are typically conducted once a year during any season.

- Floatables and sump clean out should occur as soon as possible following a spill in the contributing drainage area.

Fig.4 Floatables are removed with a vactor hose (First Defense model FD-4, shown).

Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge Judge®)
- Vactor truck (flexible hose recommended)
- First Defense® Maintenance Log

Floatables and sediment Clean Out Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.

4. Remove oil and floatables stored on the surface of the water with the vactor hose (Fig.5) or with the skimmer or net (not pictured).

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (page 9).

6. Once all floatables have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris off the sump floor (Fig.5).

7. Retract the vactor hose from the vessel.

8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components, blockages, or irregularly high or low water levels.

9. Securely replace the grate or lid.

Fig.5 Sediment is removed with a vactor hose (First Defense model FD-4, shown).

Maintenance at a Glance

Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Oil and Floatables Removal	- Once per year, with sediment removal - Following a spill in the drainage area
Sediment Removal	- Once per year or as needed - Following a spill in the drainage area
NOTE: For most clean outs the entire volume of liquid does not need to be removed from the manhole. Only remove the first few inches of oils and floatables from the water surface to reduce the total volume of liquid removed during a clean out.	

First Defense® Installation Log

HYDRO INTERNATIONAL REFERENCE NUMBER:	
SITE NAME:	
SITE LOCATION:	
OWNER:	CONTRACTOR:
CONTACT NAME:	CONTACT NAME:
COMPANY NAME:	COMPANY NAME:
ADDRESS:	ADDRESS:
TELEPHONE:	TELEPHONE:
FAX:	FAX:

INSTALLATION DATE: / /

MODEL SIZE (CIRCLE ONE): **FD-4** **FD-4HC** **FD-6** **FD-6HC**

INLET (CIRCLE ALL THAT APPLY): **GRATED INLET (CATCH BASIN)** **INLET PIPE (FLOW THROUGH)**

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
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First Defense® Inspection and Maintenance Log

Date	Initials	Depth of Floatables and Oils	Sediment Depth Measured	Volume of Sediment Removed	Site Activity and Comments

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Stormwater Solutions

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Fax: (207) 756-6212
stormwaterinquiry@hydro-int.com

www.hydro-int.com

Turning Water Around...®

A P P E N D I X E

Soil Testing Data

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

DTC, LLC
Owner Name

327 AND 333 WEYMOUTH STREET
Street Address

APN 03-01, 08-27 & 08-28
Map/Lot #

ROCKLAND
City

MA
State

02370
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 316B (Soil Map Unit)

SCITUATE GRAVELLY SANDY LOAM
Soil Name

HIGH GROUNDWATER
Soil Limitations

COARSE-LOAMY EOLIAN DEPOSITS OVER SAND LODGMENT TILL
Soil Parent material

DEPRESSIONS, HILLS
Landform

3. Surficial Geological Report Available? ☐ Yes ☒ No If yes: 2018/MA GEOLOGICAL SURVEY (Year Published/Source) THIN TILL (Map Unit)

NONSOORTED, NONSTRATIFIED MATRIX OF SAND, SOME SILT, AND A LITTLE CLAY CONTAINING SCATTERED PEBBLE, COBBLE, AND BOULDER CLASTS.
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☒ Yes ☐ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: (Wetland Type)

7. Current Water Resource Conditions (USGS): 11/22/2022 (Month/Day/ Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 1B (Hole #) | 11/22/2022 (Date) | 8:00AM (Time) | SUNNY (Weather) | 42°09'47" (Latitude) | 70°54'39" (Longitude:)

1. Land Use: VACANT LOTS WITH FILL PILES (e.g., woodland, agricultural field, vacant lot, etc.) | WOODS (Vegetation) | COBBLES (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 1 (Slope (%))

Description of Location: WOODED AREA

2. Soil Parent Material: COARSE- LOAMY EOLIAN DEPOSITS | DEPRESSION (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body ____ feet | Drainage Way ____ feet | Wetlands >50 feet | Property Line >50 feet | Drinking Water Well ____ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: ____ Depth Weeping from Pit | 51" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8"	A	SL	10YR2/4	-	-	-	-	5	M	F	
8-26"	Bw	SL	10YR3/4	-	-	-	-	5	M	F	
26-69"+	C	LS	10YR5/2	28"	7.5YR5/6	5	-	-	M	F	COARSE, SATURATED

Additional Notes:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 2B (Hole #) 11/22/2022 (Date) 9:00AM (Time) SUNNY (Weather) 42°09'47" (Latitude) 70°54'39" (Longitude:)

1. Land Use: VACANT LOT WITH FILL PILES (e.g., woodland, agricultural field, vacant lot, etc.) WOODS (Vegetation) COBBLES (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 1 (Slope (%))

Description of Location: WOODED AREA

2. Soil Parent Material: COARSE- LOAMY EOLIAN DEPOSITS DEPRESSION (Landform) BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Wetlands >50 feet
Property Line >50 feet Drinking Water Well _____ feet Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: _____ Depth Weeping from Pit 60" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10"	A	SL	10YR2/4	-	-	-	-	5	M	F	
10-39"	Bw	SL	10YR3/4	-	-	-	-	5	M	F	
39-73"+	C	LS	10YR5/3	32"	7.5YR5/6	5	-	-	M	F	COARSE

Additional Notes:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 1B	Obs. Hole # 2B
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	28" inches	32" inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: _____ inches Lower boundary: _____ inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator

Date

Erik Schoumaker / SE14264

Typed or Printed Name of Soil Evaluator / License #

Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

DTC, LLC
Owner Name

327 AND 33 WEYMOUTH STREET
Street Address

APN 03-01, 08-27 & 08-28
Map/Lot #

ROCKLAND
City

MA
State

02370
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 316B (Soil Map Unit)

SCITUATE GRAVELLY SANDY LOAM
Soil Name

HIGH GROUNDWATER
Soil Limitations

COARSE-LOAMY EOLIAN DEPOSITS OVER SAND LODGMENT TILL
Soil Parent material

DEPRESSIONS, HILLS
Landform

3. Surficial Geological Report Available? ☐ Yes ☒ No If yes: 2018/MA GEOLOGICAL SURVEY (Year Published/Source) THIN TILL (Map Unit)

NONSOORTED, NONSTRATIFIED MATRIX OF SAND, SOME SILT, AND A LITTLE CLAY CONTAINING SCATTERED PEBBLE, COBBLE, AND BOULDER CLASTS.
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☒ Yes ☐ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: (Wetland Type)

7. Current Water Resource Conditions (USGS): 11/22/2022 (Month/Day/ Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 3B (Hole #) | 11/22/2022 (Date) | 10:00AM (Time) | SUNNY (Weather) | 42°09'47" (Latitude) | 70°54'39" (Longitude)

1. Land Use: VACANT LOTS WITH FILL PILES (e.g., woodland, agricultural field, vacant lot, etc.) | WOODS (Vegetation) | COBBLES (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 1 (Slope (%))

Description of Location: WOODED AREA

2. Soil Parent Material: COARSE- LOAMY EOLIAN DEPOSITS | DEPRESSION (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body _____ feet | Drainage Way _____ feet | Wetlands >50 feet
Property Line >50 feet | Drinking Water Well _____ feet | Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: _____ Depth Weeping from Pit | 79" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-16"	A	FILL	10YR3/4	-	-	-	-	5	M	F	
16-50"	Bw	SL	10YR3/5	-	-	-	-	5	M	F	
50-82"+	C	LS	10YR5/2	57	7.5YR5/6	5	5	-	M	F	COARSE

Additional Notes:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 4B (Hole #) | 11/22/2022 (Date) | 10:30AM (Time) | SUNNY (Weather) | 42°09'47" (Latitude) | 70°54'39" (Longitude:)

1. Land Use: VACANT LOTS WITH FILL PILES (e.g., woodland, agricultural field, vacant lot, etc.) | WOODS (Vegetation) | COBBLES (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | (Slope (%))

Description of Location: WOODED AREA

2. Soil Parent Material: COARSE-LOAMY EOLIAN DEPOSITS | DEPRESSION (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body ____ feet | Drainage Way ____ feet | Wetlands >50 feet
Property Line >50 feet | Drinking Water Well ____ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: ____ Depth Weeping from Pit | 82" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-16"	A	FILL	10YR3/4	-	-	-	-	5	M	F	
16-40"	Bw	SL	10YR3/5	-	-	-	5	-	M	F	
40-84"+	C	LS	10YR5/2	57	7.5YR5/6	5	5	-	M	F	COARSE

Additional Notes:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 3B	Obs. Hole # 4B
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	57" inches	57" inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

Index Well Number _____ Reading Date _____

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: _____ inches Lower boundary: _____ inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator

Date

Erik Schoumaker / SE14264

Typed or Printed Name of Soil Evaluator / License #

Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

A P P E N D I X F

Best Management Practices
Operation and Maintenance Plans

CONSTRUCTION PHASE POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN (BEST MANAGEMENT PRACTICES OPERATION AND MAINTENANCE PLAN)

for

Proposed Commercial Building and Addition
343 & 333 Weymouth Street
Rockland, Massachusetts

Submitted to:

Town of Rockland

Prepared for:

DTC, LLC
333 WEYMOUTH ST.
ROCKLAND, MA 02370

Prepared by:

MCKENZIE ENGINEERING GROUP
Professional Civil Engineering • Project Management • Land Planning
150 Longwater Drive, Suite 101, Norwell, Massachusetts 02061
Tel.: (781) 792-3900 Facsimile: (781) 792-0333
www.mckeng.com

October 4, 2021

TABLE OF CONTENTS

Construction Phase Best Management Practices (BMP's)

Erosion and Sedimentation will be controlled at the site by utilizing Structural Practices, Stabilization Practices, and Dust Control. These practices correspond with plans entitled "Site Development Plan, 343 & 333 Weymouth Street, Rockland", issued October 4, 2021 and as revised hereinafter referred to as the Site Plans.

Responsible Party Contact Information:

Stormwater Management System Owner:
DTC, LLC
333 Weymouth Street
Rockland, MA 02370

Town of Rockland Contact Information:

Rockland Highway Department
David P. Taylor Jr.
841 Market Street
Rockland, MA 02370
Phone: (781) 878-0634

Rockland Conservation Commission
242 Union Street
Rockland, MA 02370
Phone: (781) 871-1874

Rockland Building Department
Thomas Ruble
242 Union Street
Rockland, MA 02370
Phone: (781) 871-0596

Rockland Board of Health
Delshaune Flipp
242 Union Street
Rockland, MA 02370
Phone: (781) 871-1874 x1350

Structural Practices:

1) **Compost Filter Tube Barrier Controls** – A compost filter tube barrier will be constructed along downward slopes at the limit of work in locations shown on the plans. This control will be installed prior to major soil disturbance on the site. The sediment silt sack barrier should be installed as shown on the Construction Detail Plan.

   Compost Filter Tube Design/Installation Requirements *

   a) Locate the compost filter tube where identified on the plans.

b) The compost filter tube line should be nearly level through most of its length to impound a broad, temporary pool. The last 10 to 20 feet at each end of the silt sack should be swung slightly uphill (approximately 0.5 feet in elevation) to provide storage capacity.

c) The compost filter tube shall be staked every 8 linear feet with 1-inch by 1-inch stakes.

d) Compost filter tubes should be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized through one growing season. Retained sediment must be removed and properly disposed of, or mulched and seeded.

Compost Filter Tube Inspection/Maintenance *

a) Compost filter tubes should be inspected immediately after each rainfall event of 1-inch or greater, and at least daily during prolonged rainfall. Inspect the depth of sediment, fabric tears, and to see that the fence posts are firmly in the ground. Repair or replace as necessary.

b) Remove sediment deposits promptly after storm events to provide adequate storage volume for the next rain and to reduce pressure on the fence. Sediment will be removed from behind the sediment fence when it becomes about ½ foot deep at the compost filter tube. Take care to avoid undermining fence during cleanout.

c) If the fabric tears, decomposes, or in any way becomes ineffective, replace it immediately.

d) Remove all compost filter tube materials after the contributing drainage area has been properly stabilized. Sediment deposits remaining after the fabric has been removed should be graded to conform with the existing topography and vegetated.

2) **Sediment Fence Controls** – A sediment fence will be constructed along the limit of work as needed to prevent the spreading of fine sediments from the site. This control will be installed prior to major soil disturbance on the site. The sediment fence should be installed as shown on the Erosion Control Detail Plan and be Amoco woven polypropylene 1198 or equivalent.

Sediment Fence Design/Installation Requirements *

e) Locate the fence upland of the hay bale barriers and where identified on the plans.

f) The fence line should be nearly level through most of its length to impound a broad, temporary pool. The last 10 to 20 feet at each end of the fence should be swung slightly uphill (approximately 0.5 feet in elevation) to provide storage capacity.

g) Excavate a trench approximately 8 inches deep and 4 inches wide, or a V-trench; along the line of the fence, upslope side.

h) Fasten support wire fence (14 gauge with 6-inch mesh) securely to the upslope side of the fence posts with wire ties or staples. Wire should extend 6 inches into the trench.

i) Attach continuous length of fabric to upslope side of fence posts. Avoid joints, particularly at low points in the fence line. Where joints are necessary, fasten fabric securely to support posts and overlap to the next post.

j) Place the bottom one foot of fabric in the trench. Backfill with compacted earth or gravel.

k) Filter cloth shall be fastened securely to the woven wire fence with ties spaced every 24 inches at the top, mid-section, and bottom.

l) Sediment fences should be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized through one growing season and only following approval by the Engineering Department or their representative. Retained sediment must be removed and properly disposed of, or mulched and seeded.

Sediment Fence Inspection/Maintenance *

e) Silt fences should be inspected immediately after each rainfall event of 1-inch or greater, and at least daily during prolonged rainfall. Inspect the depth of sediment, fabric tears, if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground. Repair or replace as necessary.

f) Remove sediment deposits promptly after storm events to provide adequate storage volume for the next rain and to reduce pressure on the fence. Sediment will be removed from behind the sediment fence when it becomes about ½ foot deep at the fence. Take care to avoid undermining fence during cleanout.

g) If the fabric tears, decomposes, or in any way becomes ineffective, replace it immediately.

h) Remove all fencing materials after the contributing drainage area has been properly stabilized. Sediment deposits remaining after the fabric has been removed should be graded to conform to the existing topography and vegetation.

3) **Stabilized Construction Entrance** – A stabilized construction entrance will be placed at the proposed entrance of the Site at Abington Street. The construction entrance will keep mud and sediment from being tracked off the construction site onto Abington Street by vehicles leaving the site. The stabilized construction entrance will be installed immediately after the clear and grubbing of the roadway entrance and associated roadway fill to maintain access to the site are completed.

The stormwater runoff from the entrance will be diverted to a temporary sedimentation basin. The stabilized construction entrance shall be constructed as shown on the Construction Detail Plans.

Construction Entrance Design/Construction Requirements *

a) Grade foundation for positive drainage towards the temporary sedimentation basin.

b) Stone for a stabilized construction entrance shall consist of 1 to 3-inch stone placed on a stable foundation.

c) Pad dimensions: The minimum length of the gravel pad should be 50 feet. The pad should extend the full width of the proposed roadway, or wide enough so that the largest construction vehicle will fit in the entrance with room to spare; whichever is greater.

d) A geotextile filter fabric shall be placed between the stone fill and the earth surface below the pad to reduce the migration of soil particles from the underlying soil into the stone and vice versa. The filter fabric should be Amoco woven polypropylene 1198 or equivalent.

e) Washing: If the site conditions are such that the majority of mud is not removed from the vehicle tires by the gravel pad, then the tires should be washed before the vehicle enters the street. The wash area shall be located at the stabilized construction entrance.

f) Water employed in the washing process shall be directed to the temporary sedimentation basin/dewatering area as shown on the plans prior to discharge. Sediment should be prevented from entering any watercourses.

Construction Entrance Inspection/Maintenance *

a) The entrance should be maintained in a condition that will prevent tracking or flowing of sediment onto Abington Street. This may require periodic topdressing with additional stone.

b) The construction entrance and sediment disposal area shall be inspected weekly and after heavy rains or heavy use.

c) Mud and sediment tracked or washed onto public road shall be immediately removed by sweeping.

d) Once mud and soil particles clog the voids in the gravel and the effectiveness of the gravel pad is no longer satisfactory, the pad must be topdressed with new stone. Replacement of the entire pad may be necessary when the pad becomes completely clogged.

e) If washing facilities are used, the temporary sedimentation basin/dewatering area should be cleaned out as often as necessary to assure that adequate trapping efficiency and storage volume is available. Any water pumped from the

temporary sedimentation basin shall be directed into a sediment dirt bag or equivalent inlet protection prior to discharge. Discharge should not be across the disturbed construction site but rather to undisturbed areas.

f) The pad shall be reshaped as needed for drainage and runoff control.

g) Broken road pavement on Abington/Weymouth Street shall be repaired immediately.

h) All temporary erosion and sediment control measures shall be removed within 30 days after final site stabilization is achieved or after the temporary practices are no longer needed and only following approval by the Public Works Department or their representative. Trapped sediment shall be removed or stabilized on site. Disturbed soil areas resulting from removal shall be permanently stabilized.

Stabilization Practices:

Stabilization measures shall be implemented as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased, with the following exceptions.

- Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by snow cover, stabilization measures shall be initiated as soon as practicable.

- Where construction activity will resume on a portion of the site within 21 days from when activities ceased, (e.g. the total time period that construction activity is temporarily ceased is less than 21 days) then stabilization measures do not have to be initiated on that portion of the site by the 14th day after construction activity temporarily ceased.

- The contractor shall provide erosion control measures around all soil stockpiles.

1) **Temporary Seeding** – Temporary seeding will allow a short-term vegetative cover on disturbed site areas that may be in danger of erosion. Temporary seeding will be done at stock piles and disturbed portions of the site where construction activity will temporarily cease for at least 21 days. The temporary seedings will stabilize cleared and unvegetated areas that will not be brought into final grade for several weeks or months.

Temporary Seeding Planting Procedures *

a) Planting should preferably be done between April 1st and June 30th, and September 1st through September 31st. If planting is done in the months of July and August, irrigation may be required. If planting is done between October 1st and March 31st, mulching should be applied immediately after planting. If seeding is done during the summer months, irrigation of some sort will probably be necessary.

b) Before seeding, install structural practice controls. Utilize Amoco supergro or equivalent.

c) Select the appropriate seed species for temporary cover from the following table.

Species	Seeding Rate (lbs/1,000 sq.ft.)	Seeding Rate (lbs/acre)	Recommended Seeding Dates	Seed Cover required
Annual Ryegrass	1	40	April 1st to June 1st August 15th to Sept. 15th	¼ inch
Foxtail Millet	0.7	30	May 1st to June 30th	½ to ¾ inch
Oats	2	80	April 1st to July 1st August 15th to Sept. 15th	1 to 1-½ inch
Winter Rye	3	120	August 15th to Oct. 15th	1 to 1-½ inch

Apply the seed uniformly by hydroseeding, broadcasting, or by hand.

d) Use effective mulch, such as clean grain straw; tacked and/or tied with netting to protect seedbed and encourage plant growth.

Temporary Seeding Inspection/Maintenance *

a) Inspect within 6 weeks of planting to see if stands are adequate. Check for damage within 24 hours of the end to a heavy rainfall, defined as a 2-year storm event (i.e., 3.2 inches of rainfall within a twenty-four hour period). Stands should be uniform and dense. Reseed and mulch damaged and sparse areas immediately. Tack or tie down mulch as necessary.

b) Seeds should be supplied with adequate moisture. Furnish water as needed, especially in abnormally hot or dry weather. Water application rates should be controlled to prevent runoff.

2) **Geotextiles** - Geotextiles such as jute netting will be used in combination with other practices such as mulching to stabilize slopes. The following geotextile materials or equivalent are to be utilized for structural and nonstructural controls as shown in the following table.

Practice	Manufacturer	Product	Remarks
Sediment Fence	Amoco	Woven polypropylene 1198 or equivalent	0.425 mm opening
Construction Entrance	Amoco	Woven polypropylene 2002 or equivalent	0.300 mm opening
Outlet Protection	Amoco	Nonwoven polypropylene 4551 or equivalent	0.150 mm opening
Erosion Control (slope stability)	Amoco	Supergro or equivalent	Erosion control revegetation mix, open polypropylene fiber on degradable polypropylene net

			scrim

Amoco may be reached at (800) 445-7732

Geotextile Installation

a) Netting and matting require firm, continuous contact between the materials and the soil. If there is no contact, the material will not hold the soil and erosion will occur underneath the material.

Geotextile Inspection/Maintenance *

a) In the field, regular inspections should be made to check for cracks, tears, or breaches in the fabric. The appropriate repairs should be made.

3) **Mulching and Netting** – Mulching will provide immediate protection to exposed soils during the period of short construction delays, or over winter months through the application of plant residues, or other suitable materials, to exposed soil areas. In areas, which have been seeded either for temporary or permanent cover, mulching should immediately follow seeding. On steep slopes, mulch must be supplemented with netting. The preferred mulching material is straw. All netting shall be biodegradable or photodegradable.

Mulch (Hay or Straw) Materials and Installation

a) Straw has been found to be one of the most effective organic mulch materials. The specifications for straw are described below, but other material may be appropriate. The straw should be air-dried; free of undesirable seeds & coarse materials. The application rate per 1,000 sq.ft. is 90-100 lbs. (2-3 bales) and the application rate per acre is 2 tons (100-120 bales). The application should cover about 90% of the surface. The use of straw mulch is appropriate where mulch is maintained for more than three months. Straw mulch is subject to wind blowing unless anchored, is the most commonly used mulching material, and has the best microenvironment for germinating seeds.

Mulch Maintenance *

a) Inspect after rainstorms to check for movement of mulch or erosion. If washout, breakage, or erosion occurs, repair surface, reseed, remulch, and install new netting.

b) Straw or grass mulches that blow or wash away should be repaired promptly.

c) If plastic netting is used to anchor mulch, care should be taken during initial mowings to keep the mower height high. Otherwise, the netting can wrap up on the mower blade shafts. After a period of time, the netting degrades and becomes less of a problem.

d) Continue inspections until vegetation is well established.

4) **Land Grading** – Grading on fill slopes, cut slopes, and stockpile areas will be done with full siltation controls in place.

Land Grading Design/Installation Requirements

a) Areas to be graded should be cleared and grubbed of all timber, logs, brush, rubbish, and vegetated matter that will interfere with the grading operation. Topsoil should be stripped and stockpiled for use on critical disturbed areas for establishment of vegetation. Cut slopes to be topsoiled should be thoroughly scarified to a minimum depth of 3-inches prior to placement of topsoil.

b) Fill materials should be generally free of brush, rubbish, rocks, and stumps. Frozen materials or soft and easily compressible materials should not be used in fills intended to support buildings, parking lots, roads, conduits, or other structures.

c) Earth fill intended to support structural measures should be compacted to a minimum of 90 percent of Standard Proctor Test density with proper moisture control, or as otherwise specified by the engineer responsible for the design. Compaction of other fills should be to the density required to control sloughing, erosion or excessive moisture content. Maximum thickness of fill layers prior to compaction should not exceed 9 inches.

d) The uppermost one foot of fill slopes should be compacted to at least 85 percent of the maximum unit weight (based on the modified AASHTO compaction test). This is usually accomplished by running heavy equipment over the fill.

e) Fill should consist of material from borrow areas and excess cut will be stockpiled in areas shown on the Site Plans. All disturbed areas should be free draining, left with a neat and finished appearance, and should be protected from erosion.

f) Infiltration basins shall be excavated, graded and shaped to subgrade elevation and shall then be suitably protected with installation of erosion control measures to prevent sediment-laden runoff from washing into the basins. The basins shall also be protected from heavy equipment activity from this point forward. Prior to application of loam and seed to infiltration basin surfaces, the contractor shall remove any unsuitable soil such as silt or clay that may have been deposited during construction. The surface shall be scarified with a York rake or other small tractor mounted equipment. The loam and seed shall then be applied as required by this document.

Land Grading Stabilization Inspection/Maintenance *

a) All slopes should be checked periodically to see that vegetation is in good condition. Any rills or damage from erosion and animal burrowing should be repaired immediately to avoid further damage.

b) If seeps develop on the slopes, the area should be evaluated to determine if the seep will cause an unstable condition. Subsurface drains or a gravel mulch may be required to solve seep problems. However, no seeps are anticipated.

c) Areas requiring revegetation should be repaired immediately. Control undesirable vegetation such as weeds and woody growth to avoid bank stability problems in the future.

5) **Topsoiling *** – Topsoiling will help establish vegetation on all disturbed areas throughout the site during the seeding process. The soil texture of the topsoil to be used will be a sandy loam to a silt loam texture with 15% to 20% organic content.

Topsoiling Placement

a) Topsoil should not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed seeding.

b) Do not place topsoil on slopes steeper than 2.5:1, as it will tend to erode.

c) If topsoil and subsoil are not properly bonded, water will not infiltrate the soil profile evenly and it will be difficult to establish vegetation. The best method is to actually work the topsoil into the layer below for a depth of at least 6 inches.

6) **Permanent Seeding** – Permanent Seeding should be done immediately after the final design grades are achieved. Native species of plants should be used to establish perennial vegetative cover on disturbed areas. The revegetation should be done early enough in the fall so that a good cover is established before cold weather comes and growth stops until the spring. A good cover is defined as vegetation covering 75 percent or more of the ground surface.

Permanent Seeding Seedbed Preparation

a) In infertile or coarse-textured subsoil, it is best to stockpile topsoil and re-spread it over the finished slope at a minimum 2 to 6-inch depth and roll it to provide a firm seedbed. The topsoil must have a sandy loam to silt loam texture with 15% to 20% organic content. If construction fill operations have left soil exposed with a loose, rough, or irregular surface, smooth with blade and roll.

b) Loosen the soil to a depth of 3-5 inches with suitable agricultural or construction equipment.

c) Areas not to receive topsoil shall be treated to firm the seedbed after incorporation of the lime and fertilizer so that it is depressed no more than ½ - 1 inch when stepped on with a shoe. Areas to receive topsoil shall not be firmed until after topsoiling and lime and fertilizer is applied and incorporated, at which time it shall be treated to firm the seedbed as described above.

Permanent Seeding Grass Selection/Application

a) Select an appropriate cool or warm season grass based on site conditions and seeding date. Apply the seed uniformly by hydro-seeding, broadcasting, or by hand. Uniform seed distribution is essential. On steep slopes, hydroseeding

may be the most effective seeding method. Surface roughening is particularly important when preparing slopes for hydroseeding.

b) Lime and fertilize. Organic fertilizer shall be utilized in areas within the 100 foot buffer zone to a wetland resource area.

c) Mulch the seedings with straw applied at the rate of ½ tons per acre. Anchor the mulch with erosion control netting or fabric on sloping areas. Amoco supergro or equivalent should be utilized.

Permanent Seeding Inspection/Maintenance *

a) Frequently inspect seeded areas for failure and make necessary repairs and reseed immediately. Conduct or follow-up survey after one year and replace failed plants where necessary.

b) If vegetative cover is inadequate to prevent rill erosion, overseed and fertilize in accordance with soil test results.

c) If a stand has less than 40% cover, reevaluate choice of plant materials and quantities of lime and fertilizer. Re-establish the stand following seedbed preparation and seeding recommendations, omitting lime and fertilizer in the absence of soil test results. If the season prevents resowing, mulch or jute netting is an effective temporary cover.

d) Seeded areas should be fertilized during the second growing season. Lime and fertilize thereafter at periodic intervals, as needed.

Fueling and Maintenance of Equipment and Vehicles:

1. Refueling/maintenance Rules – The site supervisor shall produce a written document received by all subcontractors and employees that delineates their responsibilities on site. This document shall include language that shall permit the maintenance of vehicles only in designated locations on the job site. In the event of mechanical failure of a vehicle, the vehicle shall be moved to the designated maintenance area on the site to perform maintenance. The site supervisor shall document receipt of these instructions by obtaining the signatures of subcontractors and individuals that may enter the site and the date in which they were notified of their responsibilities. Refueling for vehicles or equipment shall occur either within the designated washout area or shall utilize temporary drip protection measures at the location of fueling. The site supervisor or their representative shall be present at the time of any fueling procedure. The site supervisor shall have a fuel spill plan and measures on site to initiate containment and clean-up in the event a fuel spill occurs.

2. Installation Schedule: Prior to start of Work

3. Maintenance and Inspection: The site supervisor shall maintain a log of individuals receiving these instructions.

4. Specific Pollution Prevention Practices

Pollution Prevention Practice # 1

a. Description: Fueling operations shall take place in designated area(s) as shown on site maps. Provide temporary drip protection during fueling operations which take place outside of designated area(s). Materials necessary to address a spill shall be made readily available in a location known to the site supervisor or his/her designee.

b. Installation: Fueling operation procedures shall be in effect throughout the project duration.

c. Maintenance Requirements: All emergency response equipment listed in the Emergency Response Equipment Inventory shall be made readily available and kept in a designated location known to the site supervisor or his/her designee. All such materials shall be replenished as necessary to the listed amounts.

Dust Control:

Dust control will be utilized throughout the entire construction process of the site. For example, keeping disturbed surfaces moist during windy periods will be an effective control measure, especially for construction access roads. The use of dust control will prevent the movement of soil to offsite areas. However, care must be taken to not create runoff from excessive use of water to control dust. The following are methods of Dust Control that may be used on-site:

- Vegetative Cover – The most practical method for disturbed areas not subject to traffic.
- Calcium Chloride – Calcium chloride may be applied by mechanical spreader as loose, dry granules or flakes at a rate that keeps the surface moist but not so high as to cause water pollution or plant damage.
- Sprinkling – The site may be sprinkled until the surface is wet. Sprinkling will be effective for dust control on haul roads and other traffic routes.
- Stone – Stone will be used to stabilize construction roads; will also be effective for dust control.

The general contractor shall employ an on-site water vehicle for the control of dust as necessary.

Washing of Equipment and Vehicles

Vehicle Washing Rules - The site supervisor shall produce a written document received by all subcontractors and employees that delineates their responsibilities on site. The site supervisor shall document receipt of these instructions by obtaining the signatures of subcontractors and individuals that may enter the site and the date in which they were notified of their responsibilities. This document shall include language that shall not permit vehicle washing on the job site. Concrete trucks shall be exempt from this rule. Concrete truck cleaning shall be confined within the work area and conducted in a manner to prevent water drainage beyond the specified area of work.

Concrete truck washout shall be conducted in designated areas and shall not be discharged in areas which would allow wash water to leave the site or enter protected areas.

Maintenance Requirements

1. The site supervisor shall maintain a log of individuals receiving these instructions.

Storage, Handling, and Disposal of Construction Products, Materials, and Wastes

Building Products - Building products are not anticipated during this phase of construction.

Pesticides, Herbicides, Insecticides, Fertilizers, and Landscape Materials

The use of pesticides and herbicides is not currently anticipated for this site. Fertilizers and landscape materials will be used to stabilize slopes and other disturbed areas.

1. Store all fertilizers and landscape materials in designated locations. Store all weather sensitive materials in closed containers in accordance with manufacturer's recommendations.

Maintenance Requirements

1. The site supervisor shall regularly inspect the designated storage areas as well as any portions of the site under construction to ensure that all materials are properly stored. The site supervisor shall immediately address any issues and instruct personnel to secure and properly store all materials.

Diesel Fuel, Oil, Hydraulic Fluids, Other Petroleum Products, and Other Chemicals

Refueling and maintenance for vehicles or equipment shall occur either within the designated washout area or shall utilize temporary drip protection measures at the location of fueling. The site supervisor or their representative shall be present at the time of any fueling procedure. The site supervisor shall have a fuel spill plan and measures on site to initiate containment and clean-up in the event a fuel spill occurs.

Refueling and maintenance of equipment shall take place in designated areas whenever possible. Refueling or maintenance of equipment in locations other than those designated for such activity shall be performed under the supervision of the site supervisor or his/her designee and shall employ drip pans or other suitable means of preventing fuel, hydraulic fluid, etc. from spilling or being otherwise carried offsite or into protected areas.

Maintenance Requirements

1. All emergency response equipment listed in the Emergency Response Equipment Inventory shall be made readily available and kept in a designated location known to the site supervisor or his/her designee. All such materials shall be replenished as necessary to the listed amounts.

Hazardous or Toxic Waste

(Note: Examples include paints, solvents, petroleum-based products, wood preservatives, additives, curing compounds, acids.)

Hazardous or toxic waste associated with paints, solvents, petroleum-based products, wood preservatives, additives, curing compounds, acids shall be collected in approved containers and disposed of in accordance with municipal, state and federal regulations.

Hazardous or toxic waste shall be collected in approved containers and disposed of in accordance with municipal, state and federal regulations. Hazardous and toxic waste shall not be disposed of in solid waste containers intended for non-hazardous construction debris.

Maintenance Requirements

1. The site supervisor shall regularly inspect all portions of the project under construction and ensure that all hazardous or toxic materials are disposed of in accordance with the practices detailed above and shall immediately correct any improper disposal practices.

Construction and Domestic Waste

(Note: Examples include packaging materials, scrap construction materials, masonry products, timber, pipe and electrical cuttings, plastics, styrofoam, concrete, and other trash or building materials.)

Construction and domestic waste shall be disposed of in a trash receptacle (dumpster) which shall be removed and disposed of at an approved land fill.

Recyclable waste material shall be stored in an appropriate container or in a designated location on site until it can be removed.

1. Trash receptacles (dumpsters) and recyclable waste material containers shall be located as needed throughout the site.

Maintenance Requirements

1. The site supervisor shall inspect all trash receptacles and containers to confirm that construction and domestic waste is properly contained, and shall also ascertain that waste is being picked up in a timely manner to ensure that no receptacles are overflowing. Pick-up schedules shall be modified or the number of receptacles shall be increased as needed.

Sanitary Waste

During the construction process, portable toilets will be provided in an appropriate location during the construction process.

Maintenance Requirements

1. The site supervisor shall execute a contract with a vendor to supply and maintain portable toilets throughout the site for the project duration. The site supervisor shall determine if a sufficient number of toilets are present to meet staffing levels and shall ensure that the toilets are regularly and properly maintained.

Washing of Applicators and Containers used for Paint, Concrete or Other Materials

Concrete washout shall be restricted to designated areas. Paints, form release oils, curing compounds, etc. shall be recycled and/or disposed of utilizing appropriate containers in accordance with manufacturer's recommendations and EPA guidelines.

1. Install straw bale and plastic liner washout pit at the designated location on site. Concrete trucks shall wash out only at washout pit or other similar acceptable facility such as a portable roll-off washout pit.
2. Provide suitable containers for recycling or disposal for cleanup of paints, form release oils, curing compounds, etc.

Maintenance Requirements

1. The site supervisor shall inspect concrete washout pits (or other acceptable facility) to ensure that they are properly maintained. If necessary, wash water in a concrete washout pit shall be vacuumed off and the hardened concrete broken up and recycled. Wash water and broken up concrete shall be properly disposed of at a suitable facility. If necessary the wash out pit shall be repaired and relined with plastic prior to continued use.
2. Containers for waste paint, form release oil, curing compounds, etc. shall be sealed and removed from the site and properly disposed of at a suitable facility. Empty containers shall replace those being removed for disposal.

Fertilizers

Fertilizers shall be used only as necessary to establish vegetative stabilized slopes and disturbed areas. Apply at recommended rates. Use only slow release fertilizers to minimize discharge of nitrogen or phosphorous.

1. Store all fertilizers in designated locations. Store all weather sensitive materials in closed containers in accordance with manufacturer's recommendations.
2. To prevent accidental release of fertilizers, the site supervisor shall attempt to coordinate delivery of fertilizers to coincide with application and reduce the need to warehouse large quantities on-site.

Maintenance Requirements

1. Site supervisor shall make regular inspections to ensure that fertilizer is being applied at proper rates and that all perimeter controls are in place and properly maintained to control runoff which may contain fertilizer. Stored fertilizer shall be properly covered or enclosed in a designated location to prevent introduction into stormwater runoff.

Spill Prevention and Response

The site supervisor or their representative shall be present on the job site at all times during the course of work and shall be present during the delivery, removal of any liquid/chemical materials to or from the job site. They will also be present during any refueling practices. All subcontractors will be notified of their responsibilities in writing. In the event a spill occurs, the site supervisor shall be notified immediately.
The site supervisor shall have in place a spill prevention plan and resources to contain and clean up any potential spills in a timely manner. Refer to the following Spill Containment & Management Plan, including Spill Report, Emergency Response Equipment Inventory, and Emergency Notification and phone numbers.

Non-Stormwater Discharges:

The construction de-watering and all non-stormwater discharges will be directed into a sediment dirt bag (or equivalent inlet protection) or a sediment basin. Sediment material

removed shall be disposed of in accordance with all applicable local, state, and federal regulations.

The developer and site general contractor will comply with the E.P.A.'s Final General Permit for Construction De-watering Discharges, (N.P.D.E.S., Section 402 and 40 C.F.R. 122.26(b)(14)(x).

Inspection/Maintenance:

Operator personnel must inspect the construction site at least once every 14 calendar days and within 24 hours of a storm event of ½-inch or greater. The applicant shall be responsible to secure the services of a design professional or similar professional (inspector) on an on-going basis throughout all phases of the project. Refer to the Inspection/Maintenance Requirements presented earlier in the "Structural and Stabilization Practices." The inspector should review the erosion and sediment controls with respect to the following:

- Whether or not the measure was installed/performed correctly.
- Whether or not there has been damage to the measure since it was installed or performed.
- What should be done to correct any problems with the measure.

The inspector should complete the Stormwater Management Construction Phase BMP Inspection Schedule and Evaluation Checklist, as attached, for documenting the findings and should request the required maintenance or repair for the pollution prevention measures when the inspector finds that it is necessary for the measure to be effective. The inspector should notify the appropriate person to make the changes and submit copies of the form to the Rockland Highway Department.

Project Location: 343 & 333 Weymouth Street, Rockland Date:
Stormwater Management – Construction Phase
Best Management Practices – Inspection Schedule and Evaluation Checklist

Construction Practices

Best Management Practice	Inspection Frequency	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check	Cleaning/Repair Needed: (List Items)	Date of Cleaning/ Repair	Performed by
Silt Sock and Sediment Fence Controls	After heavy rainfall events (minimum weekly)			1. Sediment Fence Design/Installation Requirements 2. Sediment Fence Inspection/Maintenance	☐yes ☐no		
Stabilized Construction Entrance	After heavy rainfall events (minimum weekly)			1. Construction Entrance Design/ Construction Requirements 2. Construction Entrance Inspection/ Maintenance	☐yes ☐no		
Temporary Sedimentation Basins	After heavy rainfall events (minimum weekly)			1. Sediment Basin Inspection/ Maintenance	☐yes ☐no		
Temporary Seeding	After heavy rainfall events (minimum weekly)			1. Temporary Seeding Planting Procedures 2. Temporary Seeding Inspection/ Maintenance	☐yes ☐no		
Geotextiles	After heavy rainfall events (minimum weekly)			1. Geotextile Inspection/Maintenance	☐yes ☐no		
Mulching & Netting	After heavy rainfall events (minimum weekly)			1. Mulch Maintenance	☐yes ☐no		
Land Grading	After heavy rainfall events (minimum weekly)			1. Land Grading Stabilization Inspection/ Maintenance	☐yes ☐no		

Permanent Seeding	After heavy rainfall events (minimum weekly)			1. Permanent Seeding Inspection/ Maintenance	☐**yes** ☐**no**		
Dust Control	After heavy rainfall events (minimum weekly)				☐**yes** ☐**no**		
Soil Stockpiling	After heavy rainfall events (minimum weekly)				☐**yes** ☐**no**		

(1) Refer to the Massachusetts Stormwater Handbook issued January 2, 2008.

Notes (Include deviations from : Definitive Subdivision Decision and Special Conditions and Approved Plan):

Stormwater Control Manager _____

Spill Containment and Management Plan

August 16, 2021

Initial Notification

In the event of a spill, the facility manager will be notified immediately.

Facility Managers (name)

DTC, LLC
333 Weymouth Street
Rockland, MA 02370

Facility Manager (phone) 617-828-7667

Assessment - Initial Containment

The supervisor will assess the incident and initiate containment control measures with the appropriate spill containment equipment included in the spill kit kept on-site. The supervisor will first contact the Fire Department and then notify the Police Department, Department of Public Works, Board of Health and Conservation Commission. The fire department is ultimately responsible for matters of public health and safety and should be notified immediately.

Contact:	Phone Number:
Fire Department:	911
Police Department:	911
Department of Public Works:	(781) 878-0634 .
Board of Health Phone:	(781) 871-1874 x1350 .
Conservation Commission Phone:	(781) 871-1874

Further Notification

Based on the assessment from the Fire Chief, additional notification to a cleanup contractor may be made. The Massachusetts Department of Environmental Protection (DEP) and the EPA may be notified depending upon the nature and severity of the spill. The Fire Chief will be responsible for determining the level of cleanup and notification required. The attached list of emergency phone numbers shall be posted in the facility office and readily accessible to all employees.

HAZARDOUS WASTE / OIL SPILL REPORT

Date____/_____/_____ Time_____ AM / PM

Exact location (Transformer #)_____

Type of equipment_____Make_____Size_____

S / N_____Weather Conditions_____

On or near water ☐ Yes If yes, name of body of water_____
☐ No

Type of chemical / oil spilled_____

Amount of chemical / oil spilled_____

Cause of spill_____

_____

_____

Measures taken to contain or clean up spill_____

_____

_____

Amount of chemical / oil recovered_____Method_____

Material collected as a result of clean up

_____drums containing_____

_____drums containing_____

_____drums containing_____

Location and method of debris disposal_____

_____

Name and address of any person, firm, or corporation suffering damages_____

_____

Procedures, method, and precautions instituted to prevent a similar occurrence from recurring____

_____

Spill reported to General Office by_____Time_____AM / PM

Spill reported to DEP / National Response Center by_____

DEP Date____/_____/_____ Time_____ AM / PM Inspector_____

NRC Date____/_____/_____ Time_____ AM / PM Inspector_____

Additional comments_____

_____

_____

EMERGENCY RESPONSE EQUIPMENT
INVENTORY

The following equipment and materials shall be maintained at all times and stored in a secure area for long-term emergency response need.

--	SORBENT PADS	1 BALE
--	SAND BAGS (empty)	5
--	SPEEDI-DRI ABSORBENT	2 – 40LB BAGS
--	12” INFLATABLE PIPE PLUG	1
--	SQUARE END SHOVELS	1
--	PRY BAR	1
--	CATCH BASIN COVER	1

EMERGENCY NOTIFICATION PHONE NUMBERS

1. FACILITY MANAGER
   NAME: DTC, LLC BEEPER: _____
   PHONE: (617) 828-7667 CELL PHONE: _____

   ALTERNATE:
   NAME: _____ BEEPER: N/A _____
   PHONE: _____ CEL PHONE: N/A _____

2. FIRE DEPARTMENT
   EMERGENCY: 911
   BUSINESS: (781) 878-2123

   POLICE DEPARTMENT
   EMERGENCY: 911
   BUSINESS: (781) 871-3890

   DEPARTMENT OF PUBLIC WORKS (HIGHWAY DEPT.)
   CONTACT: David Taylor
   BUSINESS: (781) 878-0634
   ALTERNATE:

   CONSERVATION COMMISSION
   CONTACT:
   BUSINESS: (781) 871-1874

   BOARD OF HEALTH
   CONTACT: Delshaune Flipp
   BUSINESS: (781) 871-1874 x1350

3. MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
   EMERGENCY: (978) 694-3200
   SOUTHEAST REGION - LAKEVILLE OFFICE: (508) 946-2714

4. NATIONAL RESPONSE CENTER
   PHONE: (800) 424-8802

   ALTERNATE: U.S. ENVIRONMENTAL PROTECTION AGENCY
   EMERGENCY: (617) 223-7265
   BUSINESS: (617) 860-4300

POST-DEVELOPMENT BEST MANAGEMENT PRACTICE
OPERATION AND MAINTENANCE PLAN & LONG-TERM POLLUTION PREVENTION PLAN

for

Proposed Commercial Building and Addition
343 & 333 Weymouth Street
Rockland, Massachusetts

Submitted to:

Town of Rockland

Prepared for:

DTC, LLC
333 WEYMOUTH ST.
ROCKLAND, MA 02370

Prepared by:

MCKENZIE ENGINEERING GROUP

Professional Civil Engineering • Project Management • Land Planning
150 Longwater Drive, Suite 101, Norwell, Massachusetts 02061
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October 4, 2021

TABLE OF CONTENTS

Post-Development Best Management Practice
Operation and Maintenance Plan &
Long-Term Pollution Prevention Plan

Post-Development Best Management Practices (BMPs) Operation and Maintenance Plan

Responsible Party/Property Owner/Developer contact information:

Property Owners: DTC, LLC
333 Weymouth Street
Rockland, MA 02370

Developer Contact Information:
DTC, LLC
333 Weymouth Street
Rockland, MA 02370

Town of Rockland Contact Information:
Rockland Highway Department
David P. Taylor Jr.
841 Market Street
Rockland, MA 02370
Phone: (781) 878-0634

Rockland Conservation Commission
242 Union Street
Rockland, MA 02370
Phone: (781) 871-1874

Rockland Building Department
Thomas Ruble
242 Union Street
Rockland, MA 02370
Phone: (781) 871-0596

Rockland Board of Health
Delshaune Flipp
242 Union Street
Rockland, MA 02370
Phone: (781) 871-1874 x1350

Best Management Practices (BMPs) of the Commonwealth of Massachusetts Department of Environmental Protection's (DEP's) Stormwater Management Policy (SMP) have been implemented and utilized for the project. The following information provided is to be used as a guideline for monitoring and maintaining the performance of the drainage facilities and to ensure that the quality of water runoff meets the standards set forth by the SMP. The structural Best Management Practices (BMPs) shall be inspected during rainfall conditions during the first year of operation to verify functionality.

BMPs included in the design consist of the use of:

- Deep sump catch basins with hooded outlets
- First Defense units
- Stormwater management basins
- Outlet protection at stormwater management basins
- Roadway pavement maintenance
- Restrictions on the use of pesticides and herbicides within the 100-foot buffer zone

Operation:

Once the stormwater management basins have been constructed and the site has been permanently stabilized and the stormwater facilities are online, the operation of the stormwater management system will function as intended. Stormwater runoff is directed into the catch basins and closed drainage system to the First Defense units, and lastly to the storage portion of the infiltration basins where it will outlet directed at the wetland complex located north of the site. The stormwater management basins have been designed to attenuate peak flows for the 2-year through 100-year storm events, and will provide the required one foot of freeboard above the 100-year storm storage level.

Maintenance:

1. **Paved Areas** –Sweepers shall sweep paved areas periodically during dry weather to remove excess sediments and to reduce the amount of sediments that the drainage system shall have to remove from the runoff. The sweeping shall be conducted primarily between March 15th and November 15th. Special attention should be made to sweeping paved surfaces in March and April before spring rains wash residual sand into the drainage system.

   The frequency of sweeping shall be quarterly.

   Salt used for de-icing on the parking lot during winter months shall be limited as much as possible as this will reduce the need for removal and treatment. Sand containing the minimum amount of calcium chloride (or approved equivalent) needed for handling may be applied as part of the routine winter maintenance activities.

   Cost: The property owner should consult local sweeping contractors for detailed cost estimates.

2. **Catch Basins -** Catch basin grates shall be checked quarterly and following heavy rainfalls to verify that the inlet openings are not clogged by debris. Debris shall be removed from the grates and disposed of properly. Deep sump catch basins shall be inspected and cleaned bi-annually of all accumulated sediments. Catch basins with hoods shall be inspected annually to check oil build-up and outlet obstructions. Material shall be removed from catch basins and disposed of in accordance with all applicable regulations.

   Cost: Estimated $50 - $100 per cleaning as needed. The property owner should consult local vacuum cleaning contractors for detailed cost estimates.

3. **First Defense Units** – The First Defense proprietary separator shall be maintained in accordance with manufacturer's recommendations. The unit shall be inspected on

a quarterly basis for accumulation of oils and other floatables and for sediments. For maximum depth of accumulated sediments refer to manufacturers technical manuals, as maximum depths vary for different units. Oils and sediments shall be removed by a vacuum truck service. Material shall be removed from the First Defense unit and disposed of in accordance with all applicable local, state and federal regulations. Entry into the chamber is not required for regular maintenance. However, if necessary authorized personnel may utilize the by-pass chamber as a platform when additional service is required. (Confined space precautions must be taken).

For further maintenance documentation, see attached manufacturer's maintenance procedures.

4. **Infiltration Basins -** The infiltration basins, emergency spillway, inlets and vehicular access shall be checked for debris accumulation on a quarterly basis. Additional inspections should be scheduled during the first few months to make sure that the vegetation becomes adequately established in the infiltration basin and that the facility is functioning as intended. Trash, leaves, branches, etc. shall be removed from facility. Silt, sand and sediment, if significant accumulation occurs, shall be removed by rubber-tired excavator annually. Material removed from the basin shall be disposed of in accordance with all applicable local, state, and federal regulations. The infiltration basins and vehicular access shall be kept free of woody vegetation by mowing at least twice per year. Reseeding, weed control, and invasive species removal may need to be performed periodically to maintain healthy vegetation and maintain the pollutant removal efficiency of the facilities. In the case that water remains in the infiltration facilities for greater than three (3) days after a storm event, an inspection is warranted and necessary maintenance or repairs to the outlet control structure or bottom of the basin may be necessary. Any slope erosion within the facility shall be stabilized and repaired as soon as practical.

   The emergency spillway and embankment shall be inspected annually for structural integrity. The inspections shall be conducted by qualified personnel.

   Cost: $500-$1000 per cleaning if excavator is necessary to remove sediment. The Owner should consult local landscape contractors for a detailed cost estimate.

5. **Outlet Protection** - All outfall protection structures shall be inspected quarterly and following major storm events defined as a storm event exceeding one inch of rainfall within a twenty-four-hour period to check for signs for erosion. Any necessary repairs shall be performed promptly and cleaned to remove accumulated sediment as necessary. Material removed shall be disposed of in accordance with all applicable local, state, and federal regulations. Rip-Rap overflow structure shall be weeded and cleaned on a quarterly basis to ensure that water overflowing the spillway will not become obstructed by debris.

6. **Pesticides, Herbicides, and Fertilizers -** Pesticides and herbicides shall be used sparingly. Fertilizers should be restricted to the use of organic fertilizers only.

   Cost: Included in the routine landscaping maintenance schedule. The Owner should consult local landscaping contractors for details.

7. **Snow Removal -** Snow accumulations removed from driveway and parking areas should be placed in upland areas only, where sand and other debris will remain after snowmelt for later removal. Excess snow should be removed from the site and

properly disposed of in an approved snow disposal facility. Care must be exercised not to deposit snow in the following areas: in the wetland, drainage depression, infiltration basin, bioswales, and where sand and debris can get into the watercourse.

Cost: The owner should consult local snow removal contractors for a detailed cost estimate.

Maintenance Responsibilities:

All post construction maintenance activities will be documented and kept on file. Annual inspection reports in the form of an Evaluation Checklist, see attached form, will be submitted to the Town of Rockland. Inspections shall be performed by a licensed engineer or similar professional (inspector).

All BMPs will be owned and maintained by the property owner.

Long-Term Pollution Prevention Plan

Good Housekeeping:

To develop and implement an operation and maintenance program with the goal of preventing or reducing pollutant runoff by keeping potential pollutants from coming into contact with stormwater or being transported off site without treatment, the following efforts will be made:

- Property Management awareness and training on how to incorporate pollution prevention techniques into maintenance operations.
- Follow appropriate best management practices (BMPs) by proper maintenance and inspection procedures.
- Homeowner education outreach, including promoting recycling through the Town of Rockland Transfer Station.

Storage and Disposal of Household Waste and Toxics:

This management measure involves educating the general public on the management considerations for hazardous materials. Failure to properly store hazardous materials dramatically increases the probability that they will end up in local waterways. Many people have hazardous chemicals stored throughout their homes, especially in garages and storage sheds. Practices such as covering hazardous materials or even storing them properly, can have dramatic impacts. Property owners are encouraged to support the household hazardous product collection events sponsored by the Town of Rockland.

MADEP has prepared several materials for homeowners and property owners on how to properly use and dispose of household hazardous materials:

http://www.mass.gov/dep/recycle/reduce/househol.htm

For consumer questions on household hazardous waste call the following number:

DEP Household Hazardous Waste Hotline 800-343-3420

The following is a list of management considerations for hazardous materials as outlined by the EPA:

- Ensuring sufficient aisle space to provide access for inspections and to improve the ease of material transport;

- Storing materials well away from high-traffic areas to reduce the likelihood of accidents that might cause spills or damage to drums, bags, or containers.
- Stacking containers in accordance with the manufacturers' directions to avoid damaging the container or the product itself;
- Storing containers on pallets or equivalent structures. This facilitates inspection for leaks and prevents the containers from coming into contact with wet floors, which can cause corrosion. This consideration also reduces the incidence of damage by pests.

The following is a list of commonly used hazardous materials used in the households and businesses:

Batteries – automotive and rechargeable
.....nickel cadmium batteries
.....(no alkaline batteries)
Gasoline
Oil-based paints
Fluorescent light bulbs and lamps
Pool chemicals
Propane tanks
Lawn chemicals,
fertilizers and weed killers
Turpentine
Bug sprays
Antifreeze
Paint thinners, strippers, varnishes and
.....stains
Arts and crafts chemicals
Charcoal lighter fluid

Disinfectant
Drain clog dissolvers
Driveway sealer
Flea dips, sprays and collars
Houseplant insecticides
Metal polishes
Mothballs
Motor oil and filters
Muriatic acid (concrete cleaner)
Nail polishes and nail polish
removers
Oven cleaner
Household pest and rat poisons
Rug and upholstery cleaners
Shoe polish
Windshield wiper fluid

Vehicle Washing:

This management measure involves educating the general public on the water quality impacts of the outdoor washing of automobiles and how to avoid allowing polluted runoff to enter the storm drain system. Outdoor car washing has the potential to result in high loads of nutrients, metals, and hydrocarbons during dry weather conditions in many watersheds, as the detergent-rich water used to wash the grime off our cars flows down the street and into the storm drain. The following management practices will be encouraged:

- Washing cars on gravel, grass, or other permeable surfaces.
- Blocking off the storm drain during car washing and redirecting wash water onto grass or landscaping to provide filtration.
- Using hoses with nozzles that automatically turn off when left unattended.
- Using only biodegradable soaps.
- Minimize the amounts of soap and water used. Wash cars less frequently.
- Promote use of commercial car wash services.

Landscape Maintenance:

This management measure seeks to control the storm water impacts of landscaping and lawn care practices through education and outreach on methods that reduce nutrient loadings and the amount of storm water runoff generated from lawns. Nutrient loads generated by fertilizer use on suburban lawns can be significant, and recent research has shown that lawns produce more surface runoff than previously thought.

Using proper landscaping techniques can effectively increase the value of a property while benefiting the environment. These practices can benefit the environment by reducing water use; decreasing energy use (because less water pumping and treatment is required); minimizing runoff of storm and irrigation water that transports soils, fertilizers, and pesticides; and creating additional habitat for plants and wildlife. The following lawn and landscaping management practices will be encouraged:

- Mow lawns at the highest recommended height.
- Minimize lawn size and maintain existing native vegetation.
- Collect rainwater for landscaping/gardening needs (rain barrels and cisterns to capture roof runoff).
- Raise public awareness for promoting the water efficient maintenance practices by informing users of water efficient irrigation techniques and other innovative approaches to water conservation.
- Abide by water restrictions and other conservation measures implemented by the Town of Rockland.
- Water only when necessary.
- Use automatic irrigation systems to reduce water use.

Integrated Pest Management (IPM):

This management measure seeks to limit the adverse impacts of insecticides and herbicides by providing information on alternative pest control techniques other than chemicals or explaining how to determine the correct dosages needed to manage pests.

The presence of pesticides in stormwater runoff has a direct impact on the health of aquatic organisms and can present a threat to humans through contamination of drinking water supplies. The pesticides of greatest concern are insecticides, such as diazinon and chloropyrifos, which even at very low levels can be harmful to aquatic life. The major source of pesticides to urban steams is home application of products designed to kill insects and weeds in the lawn and garden. The following IPM practices will be encouraged:

- Lawn care and landscaping management programs including appropriate pesticide use management as part of program.
- Raise public awareness by referring homeowners to “A Homeowner’s Guide to Environmentally Sound Lawncare, Maintaining a Healthy Lawn the IPM Way”, Massachusetts Department of Food and Agriculture, Pesticide Bureau or link **http://www.mass.gov/dep/water/resources/nonpoint.htm#megaman>**

Pet Waste Management:

Pet waste management involves using a combination of pet waste collection programs, pet awareness and education, to alert residents to the proper disposal techniques for pet droppings. The following management practices will be encouraged:

- Raise awareness of homeowners that are also pet owners that they are encouraged to pick up after their pets and dispose of the waste either in the trash, including on their own lawns and walking trails.
- Provide signage along walking trails.

Proper Management of Deicing Chemicals and Snow:

Driveways and parking areas shall be maintained by the property owner. The following deicing chemicals and snow storage practices will be encouraged:

- Select effective snow disposal sites adjacent to or on pervious surfaces in upland areas away from water resources and wells. At these locations, the snow meltwater can filter in to the soil, leaving behind sand and debris, which can be removed in the springtime.
- No roadway deicing materials shall be stockpiled on site unless all storage areas are protected from exposure to rain, snow, snowmelt and runoff.
- Avoid dumping snow into any waterbody, including wetlands, cranberry bogs, infiltration/infiltration basins, and grassed swales/channels.
- Avoid disposing of snow on top of storm drain catch basins.

Project Location: 343 & 333 Weymouth Street, Rockland, MA

Stormwater Management – Post Construction Phase

Best Management Practices – Inspection Schedule and Evaluation Checklist

Long Term Practices

Best Management Practice	Inspection Frequency (1)	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check (1)	Cleaning/Repair Needed: ☐yes ☐no (List Items)	Date of Cleaning/ Repair	Performed by
Street Sweeping Maintenance	4-times annually - specifically in Spring and Fall			1. Sediment build-up 2. Trash and debris 3. Minor Spills (vehicular)			
Deep Sump and Hooded Catch basin	After heavy rainfall events (minimum quarterly)			1. Sediment level exceeds 8” 2. Trash and debris 3. Floatable oils or hydrocarbons 4. Grate or outlet blockages			
Drainage Depression Areas	(minimum monthly) (Cleaned quarterly)			1. Sediment and debris build-up 2. Standing water greater than 48 hours			
Proprietary Pretreatment Units	After heavy rainfall events (minimum quarterly)			1. Sediment level exceeds Manufacturer’s specification 2. Trash and debris 3. Floatable oils or hydrocarbons 4. Outlet blockages			
Outlet Protection	Quarterly			1. Sediment build-up 2. Trash and debris 3. Displacement of rip rap 4. Excess vegetation			
Infiltration Basin	Monthly for first six months; After heavy rainfall events (minimum quarterly)			1. Sediment build-up 2. Water levels and proper drainage 3. Ponding water 4. Trash and debris			

(1) Refer to the Massachusetts Stormwater Management, Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspection and maintenance of specific BMP’s.

Notes (Include deviations from: Con Com Order of Conditions, PB Approval, Construction Sequence and Approved Plan):

1.

Stormwater Control Manager _____ Stamp:

Spill Containment and Management Plan

August 16, 2021

Initial Notification

In the event of a spill, the facility manager will be notified immediately.

Facility Managers (name)

DTC, LLC
333 Weymouth Street
Rockland, MA 02370

Facility Manager (phone) 617-828-7667

Assessment - Initial Containment

The supervisor will assess the incident and initiate containment control measures with the appropriate spill containment equipment included in the spill kit kept on-site. The supervisor will first contact the Fire Department and then notify the Police Department, Department of Public Works, Board of Health and Conservation Commission. The fire department is ultimately responsible for matters of public health and safety and should be notified immediately.

Contact:	Phone Number:
Fire Department:	911
Police Department:	911
Department of Public Works:	(781) 878-0634 .
Board of Health Phone:	(781) 871-1874 x1350 .
Conservation Commission Phone:	(781) 871-1874

Further Notification

Based on the assessment from the Fire Chief, additional notification to a cleanup contractor may be made. The Massachusetts Department of Environmental Protection (DEP) and the EPA may be notified depending upon the nature and severity of the spill. The Fire Chief will be responsible for determining the level of cleanup and notification required. The attached list of emergency phone numbers shall be posted in the facility office and readily accessible to all employees.

HAZARDOUS WASTE / OIL SPILL REPORT

Date____/_____/_____ Time_____ AM / PM

Exact location (Transformer #)_____

Type of equipment_____Make_____Size_____

S / N_____Weather Conditions_____

On or near water ☐ Yes If yes, name of body of water_____
☐ No

Type of chemical / oil spilled_____

Amount of chemical / oil spilled_____

Cause of spill_____

_____

_____

Measures taken to contain or clean up spill_____

_____

_____

Amount of chemical / oil recovered_____Method_____

Material collected as a result of clean up

_____drums containing_____

_____drums containing_____

_____drums containing_____

Location and method of debris disposal_____

_____

Name and address of any person, firm, or corporation suffering damages_____

_____

Procedures, method, and precautions instituted to prevent a similar occurrence from recurring____

_____

Spill reported to General Office by_____Time_____AM / PM

Spill reported to DEP / National Response Center by_____

DEP Date____/_____/_____ Time_____ AM / PM Inspector_____

NRC Date____/_____/_____ Time_____ AM / PM Inspector_____

Additional comments_____

_____

_____

EMERGENCY RESPONSE EQUIPMENT
INVENTORY

The following equipment and materials shall be maintained at all times and stored in a secure area for long-term emergency response need.

--	SORBENT PADS	1 BALE
--	SAND BAGS (empty)	5
--	SPEEDI-DRI ABSORBENT	2 – 40LB BAGS
--	12” INFLATABLE PIPE PLUG	1
--	SQUARE END SHOVELS	1
--	PRY BAR	1
--	CATCH BASIN COVER	1

EMERGENCY NOTIFICATION PHONE NUMBERS

1. FACILITY MANAGER
   NAME: DTC, LLC BEEPER: _____
   PHONE: (617) 828-7667 CELL PHONE: _____

   ALTERNATE:
   NAME: _____ BEEPER: N/A _____
   PHONE: _____ CEL PHONE: N/A _____

2. FIRE DEPARTMENT
   EMERGENCY: 911
   BUSINESS: (781) 878-2123

   POLICE DEPARTMENT
   EMERGENCY: 911
   BUSINESS: (781) 871-3890

   DEPARTMENT OF PUBLIC WORKS (HIGHWAY DEPT.)
   CONTACT: David Taylor
   BUSINESS: (781) 878-0634
   ALTERNATE:

   CONSERVATION COMMISSION
   CONTACT:
   BUSINESS: (781) 871-1874

   BOARD OF HEALTH
   CONTACT: Delshaune Flipp
   BUSINESS: (781) 871-1874 x1350

3. MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
   EMERGENCY: (978) 694-3200
   SOUTHEAST REGION - LAKEVILLE OFFICE: (508) 946-2714

4. NATIONAL RESPONSE CENTER
   PHONE: (800) 424-8802

   ALTERNATE: U.S. ENVIRONMENTAL PROTECTION AGENCY
   EMERGENCY: (617) 223-7265
   BUSINESS: (617) 860-4300