

DRAINAGE CALCULATIONS AND STORMWATER MANAGEMENT PLAN

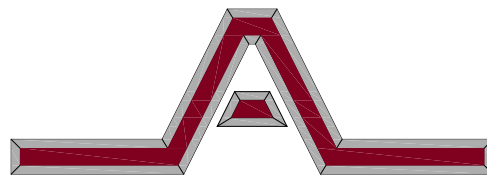
For The
Proposed Mixed Use Development

located at
**Lot 3C Green Street
Worcester, Massachusetts**

Submitted to:
**City of Worcester
Planning Board
455 Main Street Room 404
Worcester, MA 01608**

Prepared for:
**Rossi Development
345 Boylston Street
Newton, MA 02459**

Prepared by



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December 11, 2024

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**Proposed Mixed-Use Development
Lot 3C Green Street
Worcester, MA**

Project Description

The project consists of the re-development of a property comprised of approximately 5,739 ± s.f. of land located on Green Street in Worcester, Massachusetts. The property was previously occupied entirely by bituminous concrete parking area which has since been removed. The property is currently identified as a portion of Lot #3A on a recorded plan entitled "ALTA/NSPS Land Title Survey" prepared by Control Point Associates dated November 4, 2024. The subject property has been identified as a proposed lot known as Lot 3C. Proposed work will include the construction of a new mixed-use building with two retail units on the first floor, forty-two (42) residential units, installation of utility services, stormwater management systems and incidental site work.

Site Description

The subject property was previously occupied entirely by bituminous concrete parking area and has since been demolished. The site was previously 100% impervious in the pre-development condition. Stormwater runoff from the site area had a single distinct drainage pattern where stormwater runoff drained via surface flow in an easterly direction toward the Green Street closed drainage system (DP-1). In the pre-development condition, there are no storm water controls to provide water quality treatment or groundwater recharge.

In the proposed condition, the groundcover of the site will be significantly altered. The groundcover will include building roof area, walkway areas, retaining walls and landscaped areas. In the proposed condition, the site will mimic the drainage patterns of the existing condition and will drain toward the Green Street closed drainage system (DP-1). The proposed roof area will be captured via roof drain and will discharge to a the closed drainage system in Green Street (DP-1). The site area will drain via surface as in the existing conditions to the closed drainage system in Green Street (DP-1). The proposed project will reduce impervious area on site by 680 s.f. (12% of lot coverage). The inclusion of the landscaped areas will reduce peak rates of runoff being directed to the closed drainage system will promoting groundwater recharge.

Soils information was obtained from available USDA Soil Conservation Service (SCS) Maps for Worcester County. The soils on site are classified as Urban Land (60). Refer to Figure 5of5 for a delineation of the boundaries of the soil with respect to the subject parcel and the attached SCS soil description.

The Flood Insurance Rate Map for the City of Worcester (Community Panel 25027C0618E with an effective date of July 4, 2011) describes the project as Zone X. Zone X is classified as areas determined to be outside the 0.2% chance floodplain.

Pre-Development Condition

Technical Release 20 (TR-20) Program for Project Formulation Hydrology developed by the Soil Conservation Service (SCS) was employed to develop pre and post-development peak flows. Drainage calculations were performed for the pre-development condition for the 2, 10, 25, and 100-year type III 24-hour storm events. Rainfall intensities were obtained from NOAA Atlas 14. Refer to Appendix A for computer results, soil characteristics, cover descriptions and times of concentrations calculations.

In both the pre-development and post-development stormwater analysis a single watershed area was analyzed. Refer to Existing Watershed Plan (EWP) in Appendix A for a delineation of the watershed areas as well as the location of the design points. The same design points were analyzed in both the pre and post development condition.

A summary of the peak rates of the runoff during the Pre-Development Conditions is as follows:

Pre-Development Condition Peak Discharge Summary (in CFS):

	2-Year Storm (3.17 IN)	10-Year Storm (4.90 IN)	25-Year Storm (5.98 IN)	100-Year Storm (7.65 IN)
Design Point #1 (Green Street)	0.40 CFS	0.63 CFS	0.77 CFS	0.99 CFS

Proposed Development

The proposed project includes the construction of the new mixed-use building, concrete walkways, retaining walls, and landscaped areas. Stormwater from the proposed roof area will be captured via roof drain and will discharge directly to the closed drainage system in Green Street (DP-1). The remaining site area will drain via surface flow to the closed drainage system as in the existing condition. The inclusion of landscaped areas will reduce the total impervious area from the pre-development condition and will reduce peak rates of runoff for all storms up to and including the 100-year storm event. The project will improve the quality of storm water runoff being directed to the closed drainage system while promoting groundwater recharge.

Again, drainage calculations were performed for the post-development condition for the 2, 10, 25, and 100-year type III 24-hour storm events. Refer to Appendix B for computer results, soil characteristics, cover descriptions, times of concentration calculations, and the Proposed Watershed Plans (PWP). A summary of the peak rates of runoff during the Post-Development Condition is as follows:

Post-Development Condition Peak Discharge Summary (in CFS):

	2-Year Storm (3.17 IN)	10-Year Storm (4.90 IN)	25-Year Storm (5.98 IN)	100-Year Storm (7.65 IN)
Design Point #1 (Green Street)	0.36 CFS	0.58 CFS	0.72 CFS	0.94 CFS

Erosion and Siltation Control

Straw wattles and silt fence will be placed at the downhill limit of work prior to the commencement of any construction activity. The integrity of the erosion control devices will be maintained by periodic inspection and replacement as necessary. The straw wattles and silt fence will remain in place until the first course of pavement has been placed and the site has been stabilized.



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PROJECT:

Plan of Land

Lot 3C Green Street
 Worcester, MA

PROJECT: 24-61423

DATE: December 9, 2024

SCALE: 1:25,000

DWG FILE NAME: FIGURES.dwg

DESIGNED BY: Eric Bradanese, P.E.

CHECKED BY: Richard A. Salvo, P.E.

DRAWING TITLE:

FIGURE 1 - USGS LOCUS MAP

Page #:

1 of 5



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PROJECT:

Plan of Land

Lot 3C Green Street
 Worcester, MA

PROJECT: 24-61423

DATE: December 9, 2024

SCALE: 1"=150'

DWG FILE NAME: FIGURES.dwg

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FIGURE 2 - ORTHO PHOTO

Page #:
2 of 5



PANEL 618 OF 1075
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WORCESTER, CITY OF	250349	0618	E



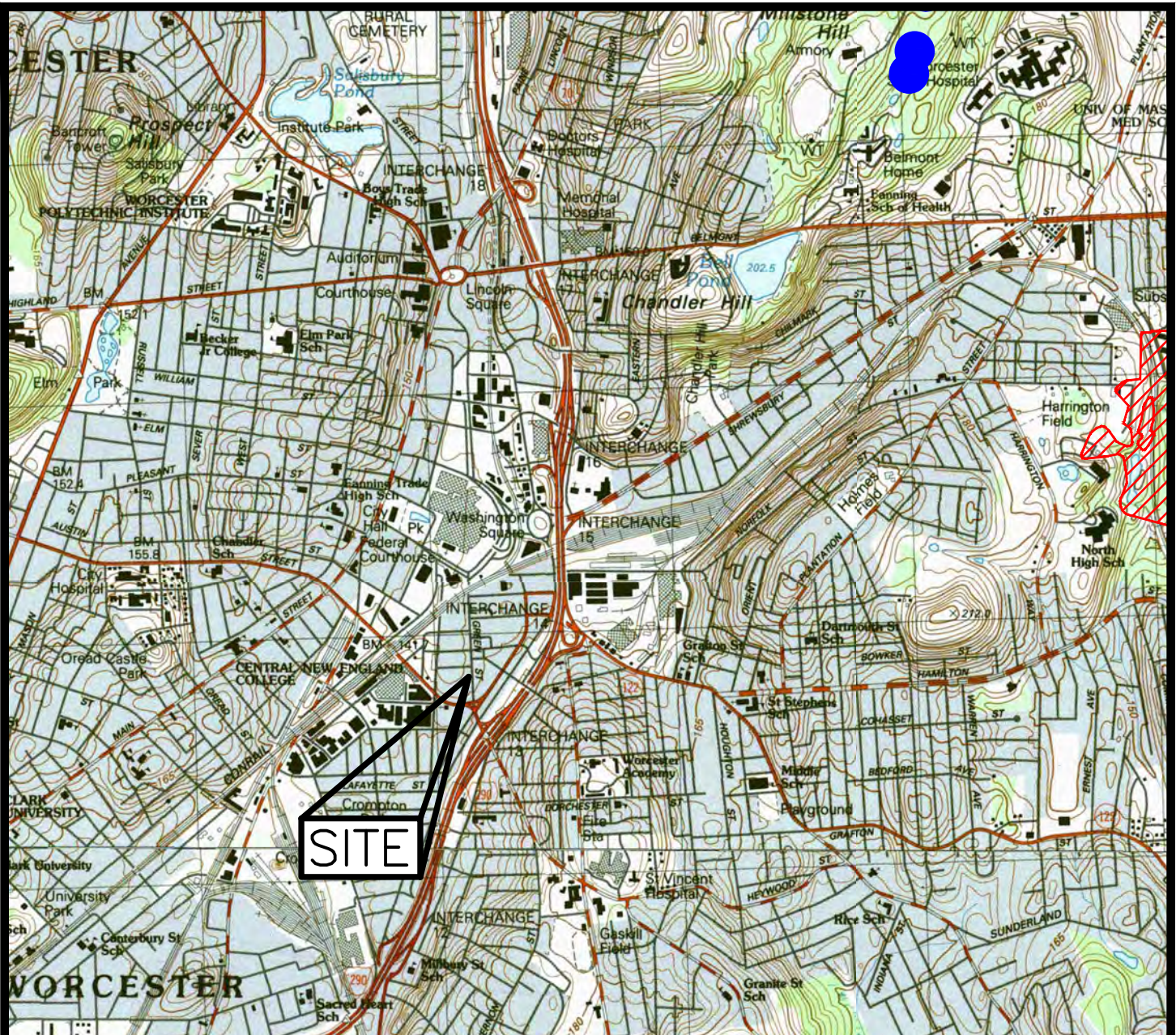
MAP NUMBER
25027C0618E
EFFECTIVE DATE
JULY 4, 2011

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PROJECT: Plan of Land
 Lot 3C Green Street
 Worcester, MA

PROJECT: 24-61423	DATE: December 9, 2024
SCALE: 1"=500'	DWG FILE NAME: FIGURES.dwg
DESIGNED BY: Eric Bradanese, P.E.	CHECKED BY: Richard A. Salvo, P.E.



LEGEND:

-  = NHEP CERTIFIED VERNAL POOL
-  = NHEP ESTIMATED HABITATS OF RARE SPECIES
-  = NHEP PRIORITY HABITATS OF RARE SPECIES

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PROJECT:

Plan of Land

Lot 3C Green Street
 Worcester, MA

PROJECT: 24-61423

DATE: December 9, 2024

SCALE: 1:25,000

DWG FILE NAME: FIGURES.dwg

DESIGNED BY: Eric Bradanese, P.E.

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FIGURE 4 - NATURAL HERITAGE MAP

Page #:

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PROJECT:

Plan of Land

Lot 3C Green Street
 Worcester, MA

PROJECT: 24-61423

DATE: December 9, 2024

SCALE: 1"=80'

DWG FILE NAME: FIGURES.dwg

DESIGNED BY: Eric Bradanese, P.E.

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FIGURE 5 - SCS SOILS MAP

Page #:

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Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. Soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Additional information about the map units described in this report is available in other soil reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the soil reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description

Worcester County, Massachusetts, Northeastern Part

602—Urban land

Map Unit Setting

National map unit symbol: w3q8

Mean annual precipitation: 32 to 50 inches

Mean annual air temperature: 45 to 50 degrees F

Frost-free period: 145 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Excavated and filled land

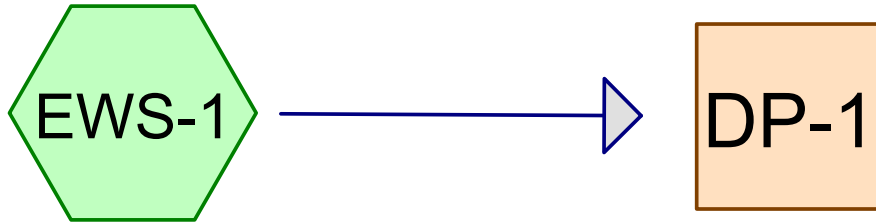
Data Source Information

Soil Survey Area: Worcester County, Massachusetts, Northeastern Part

Survey Area Data: Version 19, Aug 27, 2024

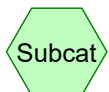
APPENDIX A

**Existing Conditions Drainage Calculations
Existing Watershed Plan**



EWS-1

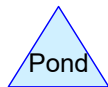
Green Street Closed
Drainage System



Subcat



Reach



Pond



Link

Pre-Development Condition

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year Storm	Type III 24-hr		Default	24.00	1	3.17	2
2	10-Year Storm	Type III 24-hr		Default	24.00	1	4.90	2
3	25-Year Storm	Type III 24-hr		Default	24.00	1	5.98	2
4	100-Year Storm	Type III 24-hr		Default	24.00	1	7.65	2

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Page 3

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
5,739	98	Paved parking, HSG B (EWS-1)
5,739	98	TOTAL AREA

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
5,739	HSG B	EWS-1
0	HSG C	
0	HSG D	
0	Other	
5,739		TOTAL AREA

Pre-Development Condition

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Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchment Numbers
0	5,739	0	0	0	5,739	Paved parking	E W S- 1
0	5,739	0	0	0	5,739	TOTAL AREA	

Pre-Development Condition

Type III 24-hr 2-Year Storm Rainfall=3.17"

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Time span=0.00-28.00 hrs, dt=0.02 hrs, 1401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EWS-1: EWS-1

Runoff Area=5,739 sf 100.00% Impervious Runoff Depth=2.94"
Tc=6.0 min CN=98 Runoff=0.40 cfs 1,405 cf

Reach DP-1: Green Street Closed Drainage System

Inflow=0.40 cfs 1,405 cf
Outflow=0.40 cfs 1,405 cf

Total Runoff Area = 5,739 sf Runoff Volume = 1,405 cf Average Runoff Depth = 2.94"
0.00% Pervious = 0 sf 100.00% Impervious = 5,739 sf

Pre-Development Condition

Type III 24-hr 2-Year Storm Rainfall=3.17"

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Summary for Subcatchment EWS-1: EWS-1

Runoff = 0.40 cfs @ 12.08 hrs, Volume= 1,405 cf, Depth= 2.94"

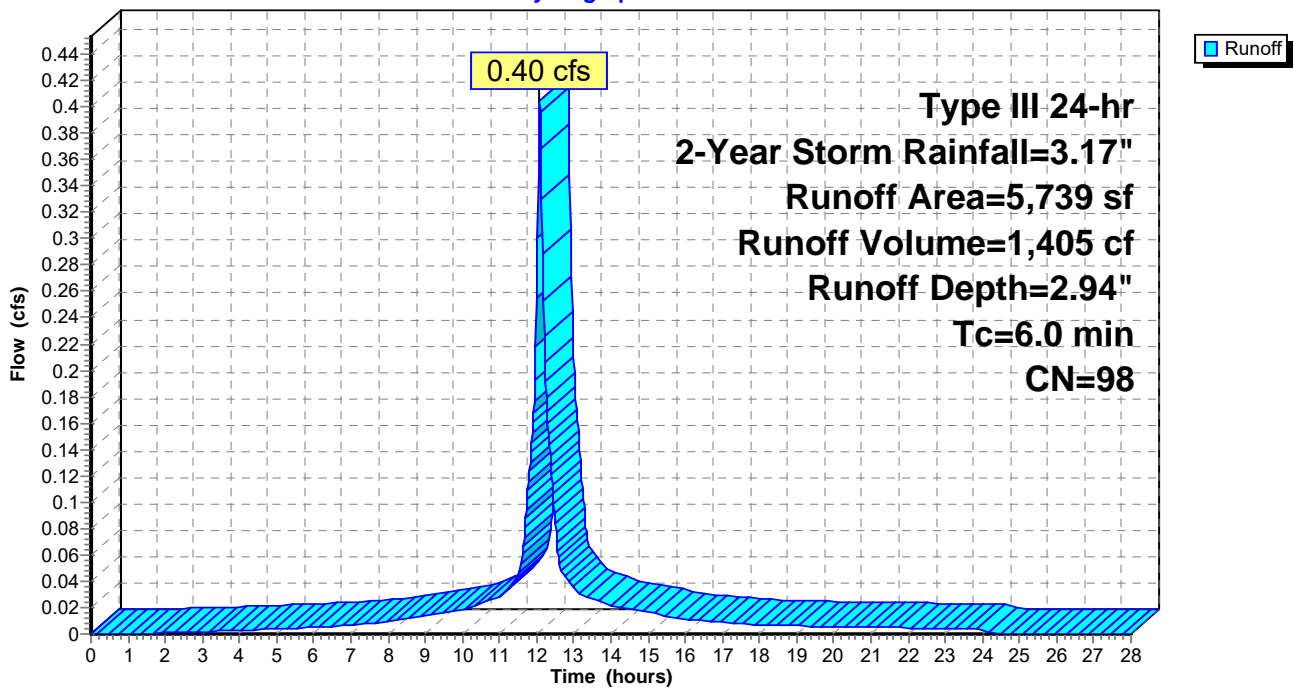
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Storm Rainfall=3.17"

Area (sf)	CN	Description
5,739	98	Paved parking, HSG B
5,739		100.00% Impervious Area

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

Subcatchment EWS-1: EWS-1

Hydrograph



Pre-Development Condition

Type III 24-hr 2-Year Storm Rainfall=3.17"

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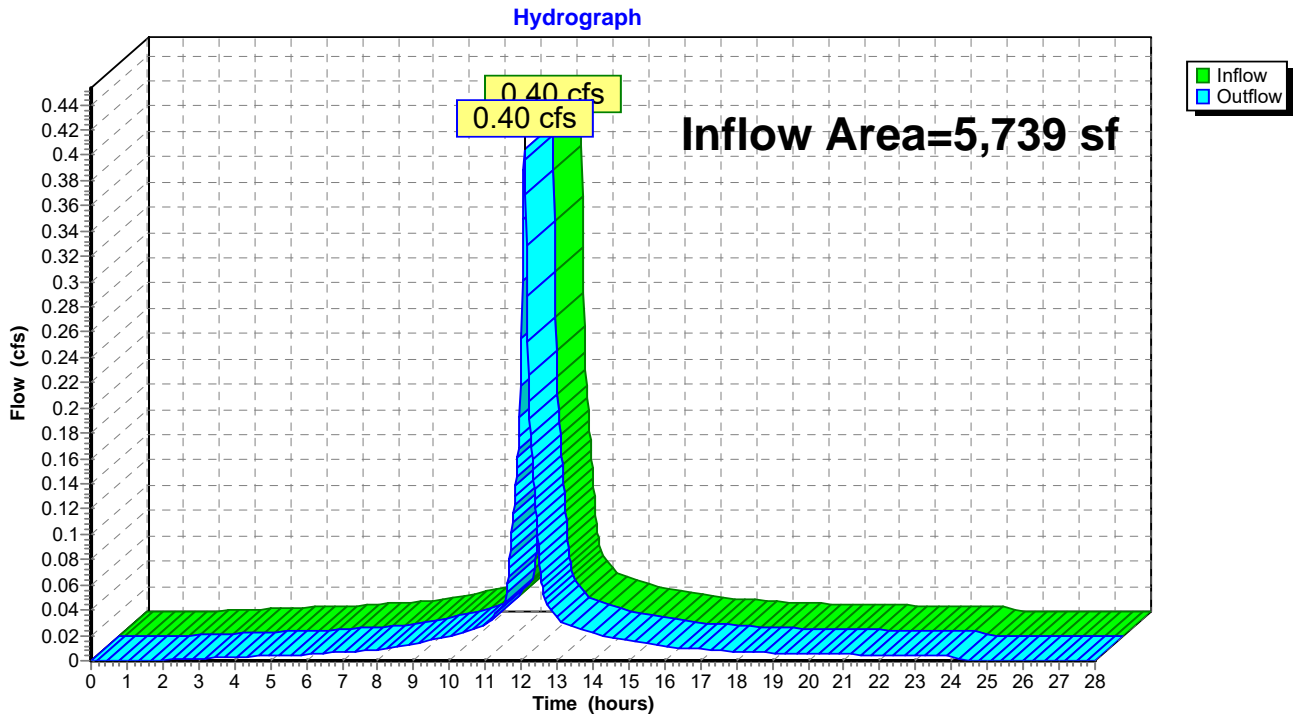
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Summary for Reach DP-1: Green Street Closed Drainage System

Inflow Area = 5,739 sf, 100.00% Impervious, Inflow Depth = 2.94" for 2-Year Storm event
Inflow = 0.40 cfs @ 12.08 hrs, Volume= 1,405 cf
Outflow = 0.40 cfs @ 12.08 hrs, Volume= 1,405 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs

Reach DP-1: Green Street Closed Drainage System



Pre-Development Condition

Type III 24-hr 10-Year Storm Rainfall=4.90"

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Time span=0.00-28.00 hrs, dt=0.02 hrs, 1401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EWS-1: EWS-1

Runoff Area=5,739 sf 100.00% Impervious Runoff Depth=4.66"
Tc=6.0 min CN=98 Runoff=0.63 cfs 2,230 cf

Reach DP-1: Green Street Closed Drainage System

Inflow=0.63 cfs 2,230 cf
Outflow=0.63 cfs 2,230 cf

Total Runoff Area = 5,739 sf Runoff Volume = 2,230 cf Average Runoff Depth = 4.66"
0.00% Pervious = 0 sf 100.00% Impervious = 5,739 sf

Pre-Development Condition

Type III 24-hr 10-Year Storm Rainfall=4.90"

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Summary for Subcatchment EWS-1: EWS-1

Runoff = 0.63 cfs @ 12.08 hrs, Volume= 2,230 cf, Depth= 4.66"

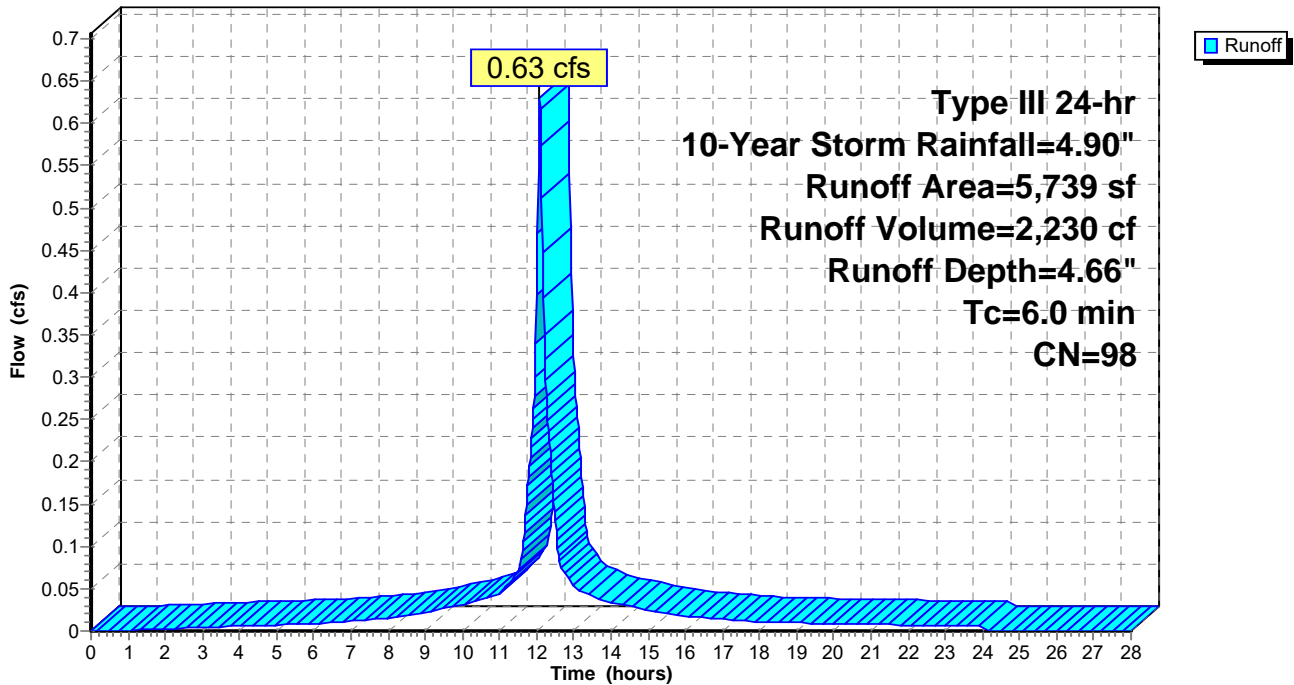
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Storm Rainfall=4.90"

Area (sf)	CN	Description
5,739	98	Paved parking, HSG B
5,739		100.00% Impervious Area

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

Subcatchment EWS-1: EWS-1

Hydrograph



Pre-Development Condition

Type III 24-hr 10-Year Storm Rainfall=4.90"

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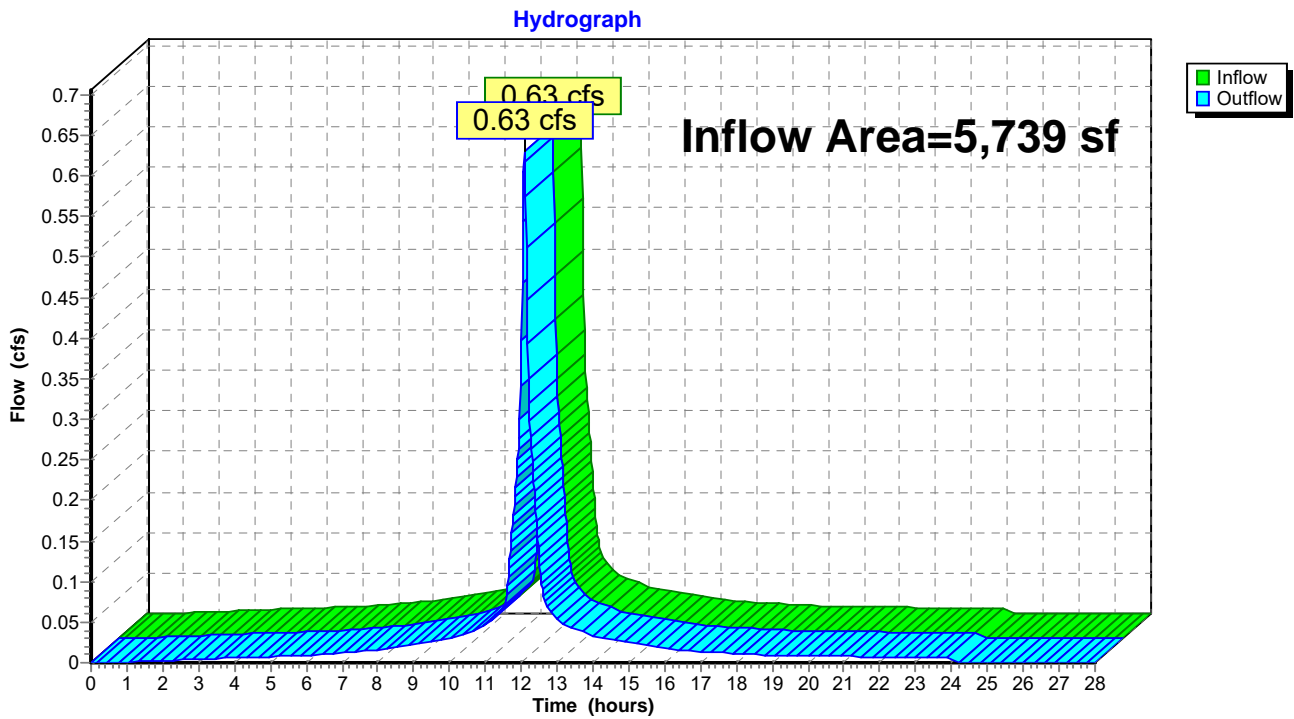
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Summary for Reach DP-1: Green Street Closed Drainage System

Inflow Area = 5,739 sf, 100.00% Impervious, Inflow Depth = 4.66" for 10-Year Storm event
Inflow = 0.63 cfs @ 12.08 hrs, Volume= 2,230 cf
Outflow = 0.63 cfs @ 12.08 hrs, Volume= 2,230 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs

Reach DP-1: Green Street Closed Drainage System



Pre-Development Condition

Type III 24-hr 25-Year Storm Rainfall=5.98"

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Time span=0.00-28.00 hrs, dt=0.02 hrs, 1401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EWS-1: EWS-1

Runoff Area=5,739 sf 100.00% Impervious Runoff Depth=5.74"
Tc=6.0 min CN=98 Runoff=0.77 cfs 2,746 cf

Reach DP-1: Green Street Closed Drainage System

Inflow=0.77 cfs 2,746 cf
Outflow=0.77 cfs 2,746 cf

Total Runoff Area = 5,739 sf Runoff Volume = 2,746 cf Average Runoff Depth = 5.74"
0.00% Pervious = 0 sf 100.00% Impervious = 5,739 sf

Pre-Development Condition

Type III 24-hr 25-Year Storm Rainfall=5.98"

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Summary for Subcatchment EWS-1: EWS-1

Runoff = 0.77 cfs @ 12.08 hrs, Volume= 2,746 cf, Depth= 5.74"

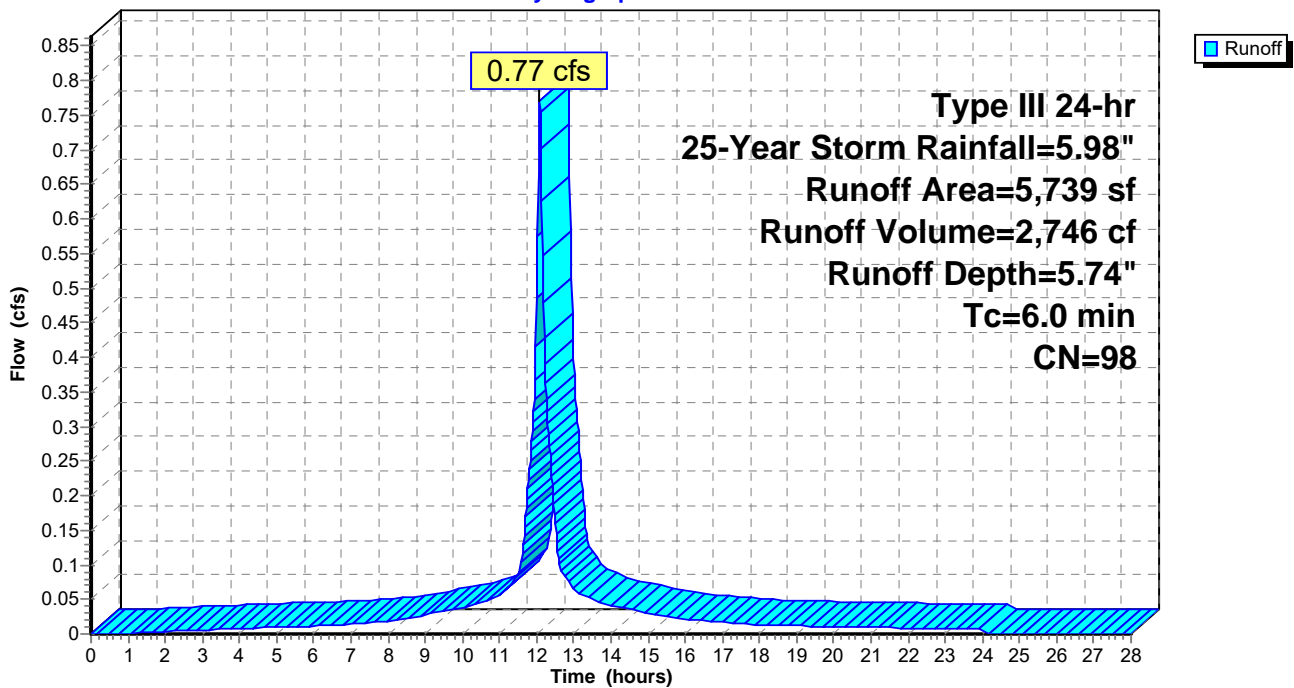
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Storm Rainfall=5.98"

Area (sf)	CN	Description
5,739	98	Paved parking, HSG B
5,739		100.00% Impervious Area

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

Subcatchment EWS-1: EWS-1

Hydrograph



Pre-Development Condition

Type III 24-hr 25-Year Storm Rainfall=5.98"

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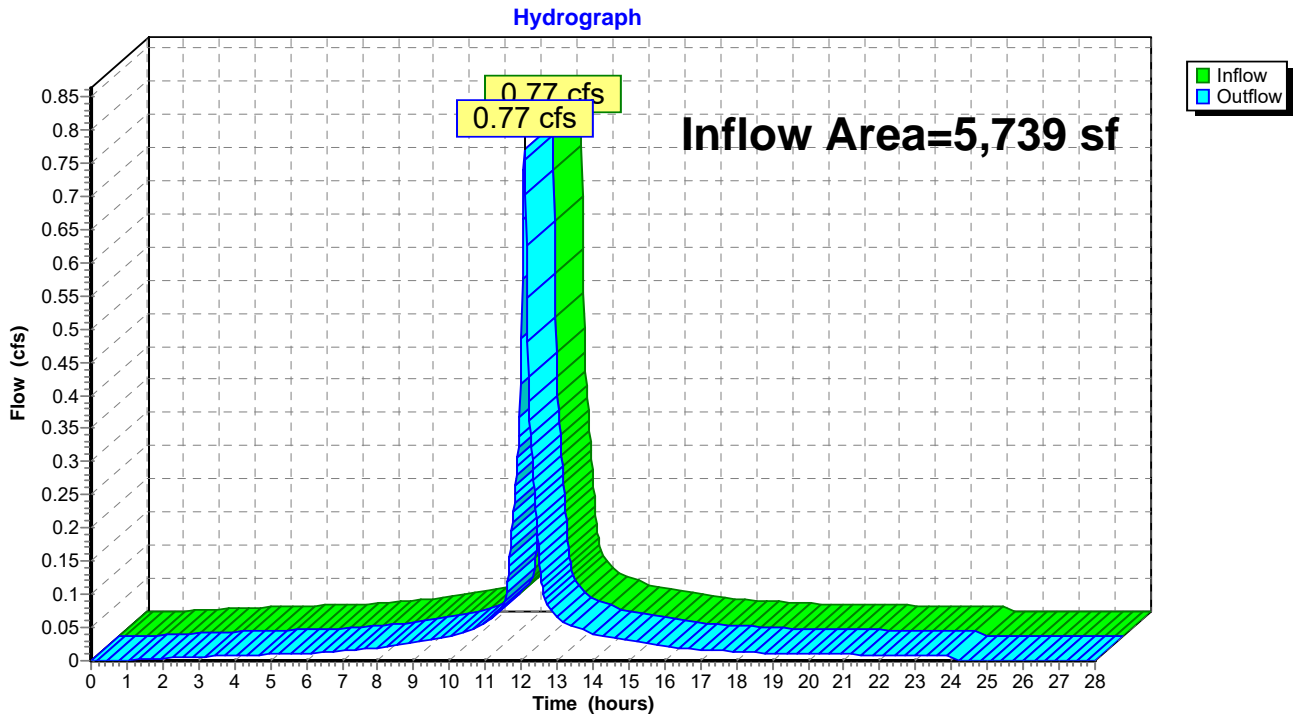
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Summary for Reach DP-1: Green Street Closed Drainage System

Inflow Area = 5,739 sf, 100.00% Impervious, Inflow Depth = 5.74" for 25-Year Storm event
Inflow = 0.77 cfs @ 12.08 hrs, Volume= 2,746 cf
Outflow = 0.77 cfs @ 12.08 hrs, Volume= 2,746 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs

Reach DP-1: Green Street Closed Drainage System



Pre-Development Condition

Type III 24-hr 100-Year Storm Rainfall=7.65"

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Time span=0.00-28.00 hrs, dt=0.02 hrs, 1401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EWS-1: EWS-1

Runoff Area=5,739 sf 100.00% Impervious Runoff Depth=7.41"
Tc=6.0 min CN=98 Runoff=0.99 cfs 3,544 cf

Reach DP-1: Green Street Closed Drainage System

Inflow=0.99 cfs 3,544 cf
Outflow=0.99 cfs 3,544 cf

Total Runoff Area = 5,739 sf Runoff Volume = 3,544 cf Average Runoff Depth = 7.41"
0.00% Pervious = 0 sf 100.00% Impervious = 5,739 sf

Pre-Development Condition

Type III 24-hr 100-Year Storm Rainfall=7.65"

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Summary for Subcatchment EWS-1: EWS-1

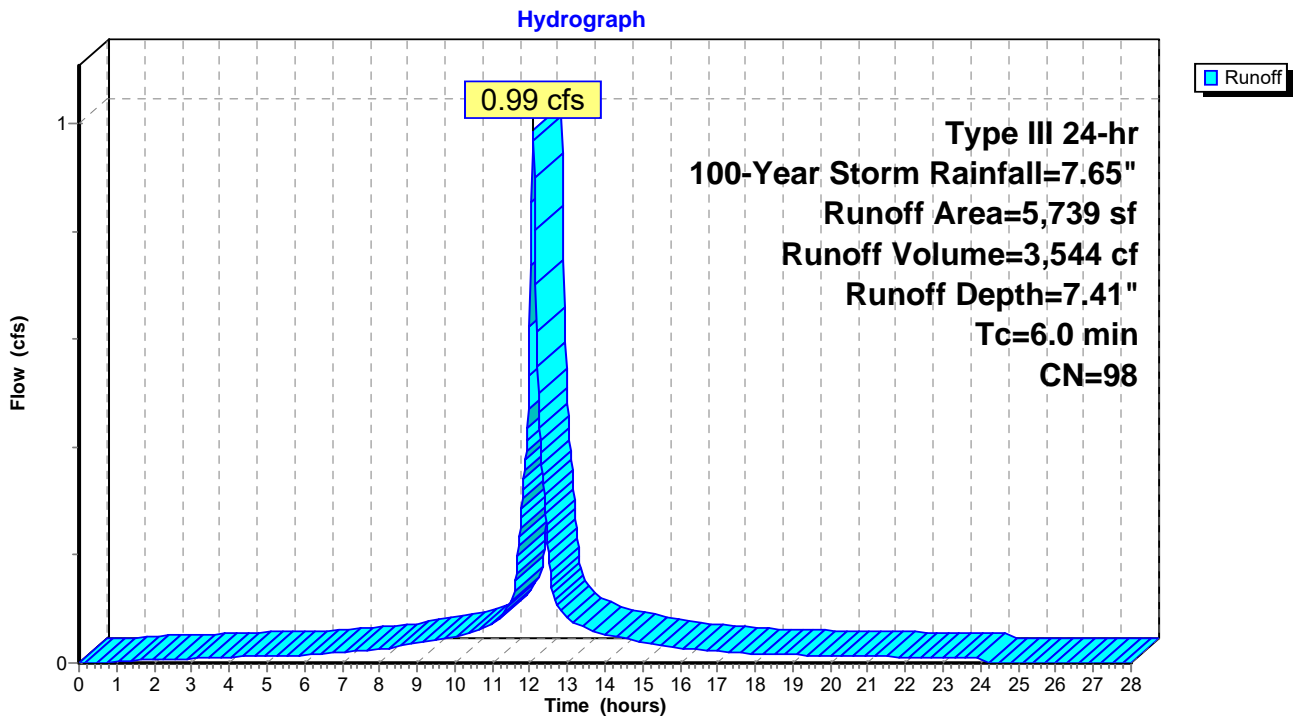
Runoff = 0.99 cfs @ 12.08 hrs, Volume= 3,544 cf, Depth= 7.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Storm Rainfall=7.65"

Area (sf)	CN	Description
5,739	98	Paved parking, HSG B
5,739		100.00% Impervious Area

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

Subcatchment EWS-1: EWS-1



Pre-Development Condition

Type III 24-hr 100-Year Storm Rainfall=7.65"

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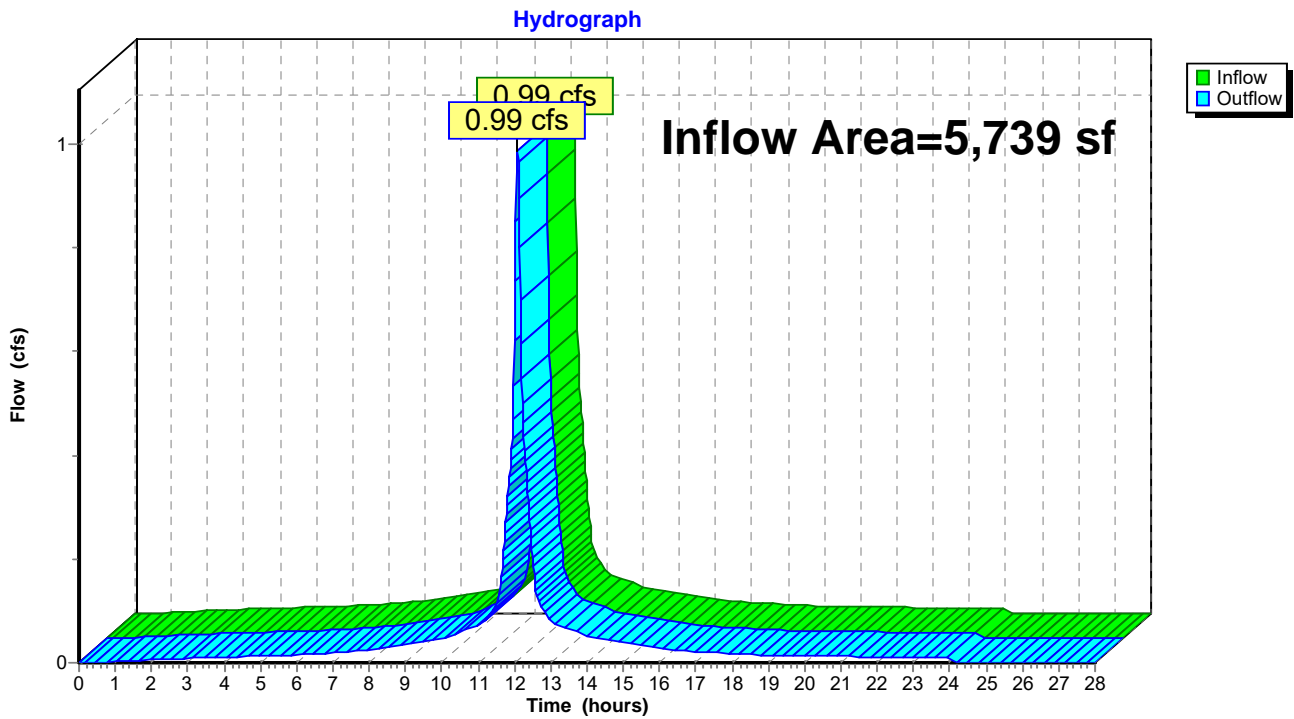
Page 17

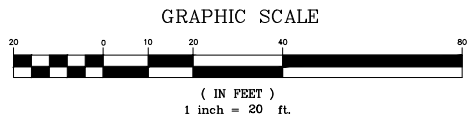
Summary for Reach DP-1: Green Street Closed Drainage System


Inflow Area = 5,739 sf, 100.00% Impervious, Inflow Depth = 7.41" for 100-Year Storm event
Inflow = 0.99 cfs @ 12.08 hrs, Volume= 3,544 cf
Outflow = 0.99 cfs @ 12.08 hrs, Volume= 3,544 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs

Reach DP-1: Green Street Closed Drainage System

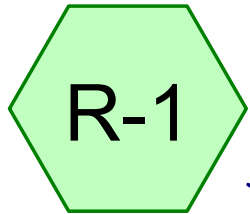




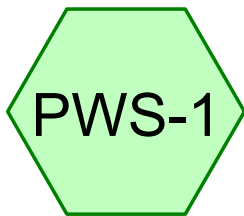
APPLICANT: Rossi Development 345 Boylston Street Suite 300 Newton, MA 02459	DWG. NO. EWS	DRAWING TITLE: Existing Watershed Plan
	PROJECT: Proposed Site Plan Lot 3C Green Street Worcester, Massachusetts	
PROJECT #: 24-61423 SCALE: AS NOTED DESIGN BY: Eric Bradness, P.E.		DATE: December 9, 2024 DWG FILE NAME: 24-61423.dwg CHECKED BY: Richard A. Salvo, P.E.
PREPARED BY:  Engineering Alliance, Inc. Civil Engineering & Land Planning Consultants 194 Central Street Saugus, MA 01906 Tel: (781) 231-1349 Fax: (781) 417-0020		
		DESCRIPTION OF REVISION
		DATE

APPENDIX B

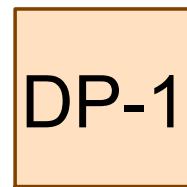
**Proposed Conditions Drainage Calculations
Proposed Watershed Plan**



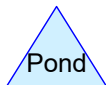
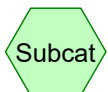
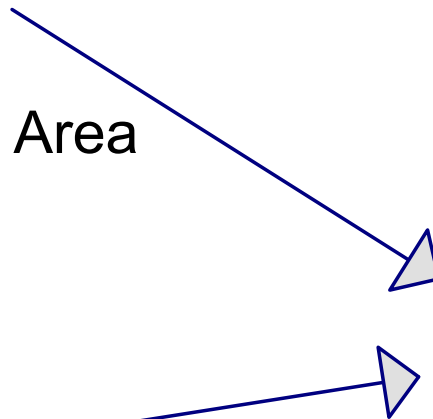
Building Roof Area



Site Area



Green Street Closed
Drainage System



Post-Development Condition

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Page 2

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year Storm	Type III 24-hr		Default	24.00	1	3.17	2
2	10-Year Storm	Type III 24-hr		Default	24.00	1	4.90	2
3	25-Year Storm	Type III 24-hr		Default	24.00	1	5.98	2
4	100-Year Storm	Type III 24-hr		Default	24.00	1	7.65	2

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
922	61	>75% Grass cover, Good, HSG B (PWS-1)
4,505	98	Roofs, HSG B (R-1)
312	98	Walkways & Walls, HSG B (PWS-1)
5,739	92	TOTAL AREA

Post-Development Condition

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Page 4

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
5,739	HSG B	PWS-1, R-1
0	HSG C	
0	HSG D	
0	Other	
5,739		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
0	922	0	0	0	922	>75% Grass cover, Good	
0	4,505	0	0	0	4,505	Roofs	
0	312	0	0	0	312	Walkways & Walls	
0	5,739	0	0	0	5,739	TOTAL AREA	

Post-Development Condition

Type III 24-hr 2-Year Storm Rainfall=3.17"

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Time span=0.00-28.00 hrs, dt=0.02 hrs, 1401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWS-1: Site Area

Runoff Area=1,234 sf 25.28% Impervious Runoff Depth=0.81"
Tc=6.0 min CN=70 Runoff=0.02 cfs 83 cf

Subcatchment R-1: Building Roof Area

Runoff Area=4,505 sf 100.00% Impervious Runoff Depth=2.94"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,103 cf

Reach DP-1: Green Street Closed Drainage System

Inflow=0.34 cfs 1,186 cf
Outflow=0.34 cfs 1,186 cf

Total Runoff Area = 5,739 sf Runoff Volume = 1,186 cf Average Runoff Depth = 2.48"
16.07% Pervious = 922 sf 83.93% Impervious = 4,817 sf

Post-Development Condition

Type III 24-hr 2-Year Storm Rainfall=3.17"

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Summary for Subcatchment PWS-1: Site Area

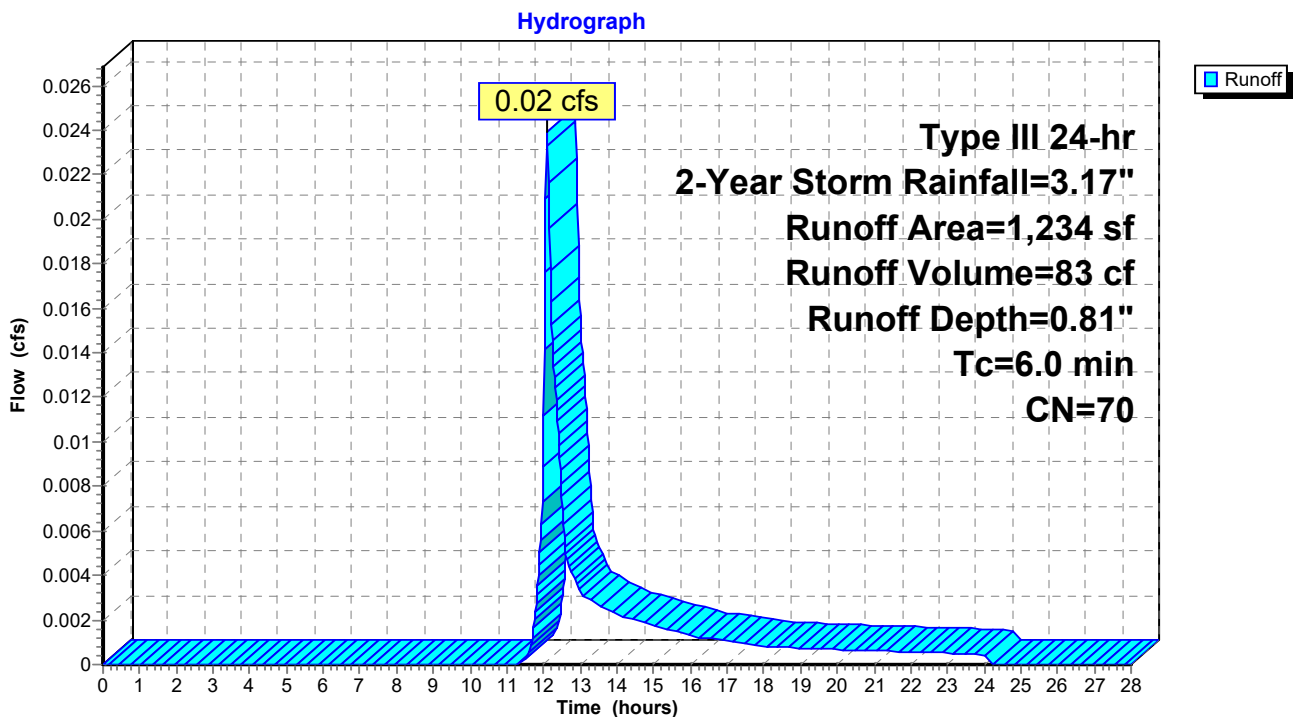
Runoff = 0.02 cfs @ 12.10 hrs, Volume= 83 cf, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Storm Rainfall=3.17"

Area (sf)	CN	Description
312	98	Walkways & Walls, HSG B
922	61	>75% Grass cover, Good, HSG B
1,234	70	Weighted Average
922		74.72% Pervious Area
312		25.28% Impervious Area

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

Subcatchment PWS-1: Site Area



Post-Development Condition

Type III 24-hr 2-Year Storm Rainfall=3.17"

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Page 8

Summary for Subcatchment R-1: Building Roof Area

Runoff = 0.32 cfs @ 12.08 hrs, Volume= 1,103 cf, Depth= 2.94"

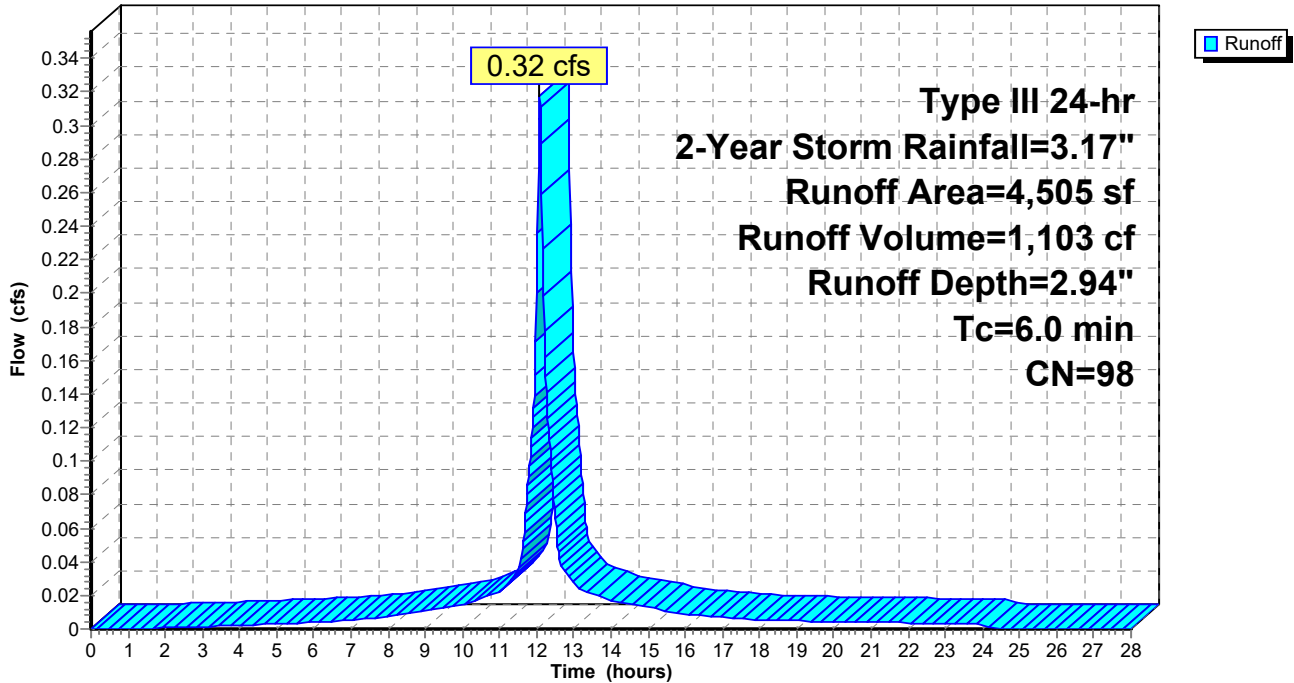
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Storm Rainfall=3.17"

Area (sf)	CN	Description
4,505	98	Roofs, HSG B
4,505		100.00% Impervious Area

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

Subcatchment R-1: Building Roof Area

Hydrograph



Post-Development Condition

Type III 24-hr 2-Year Storm Rainfall=3.17"

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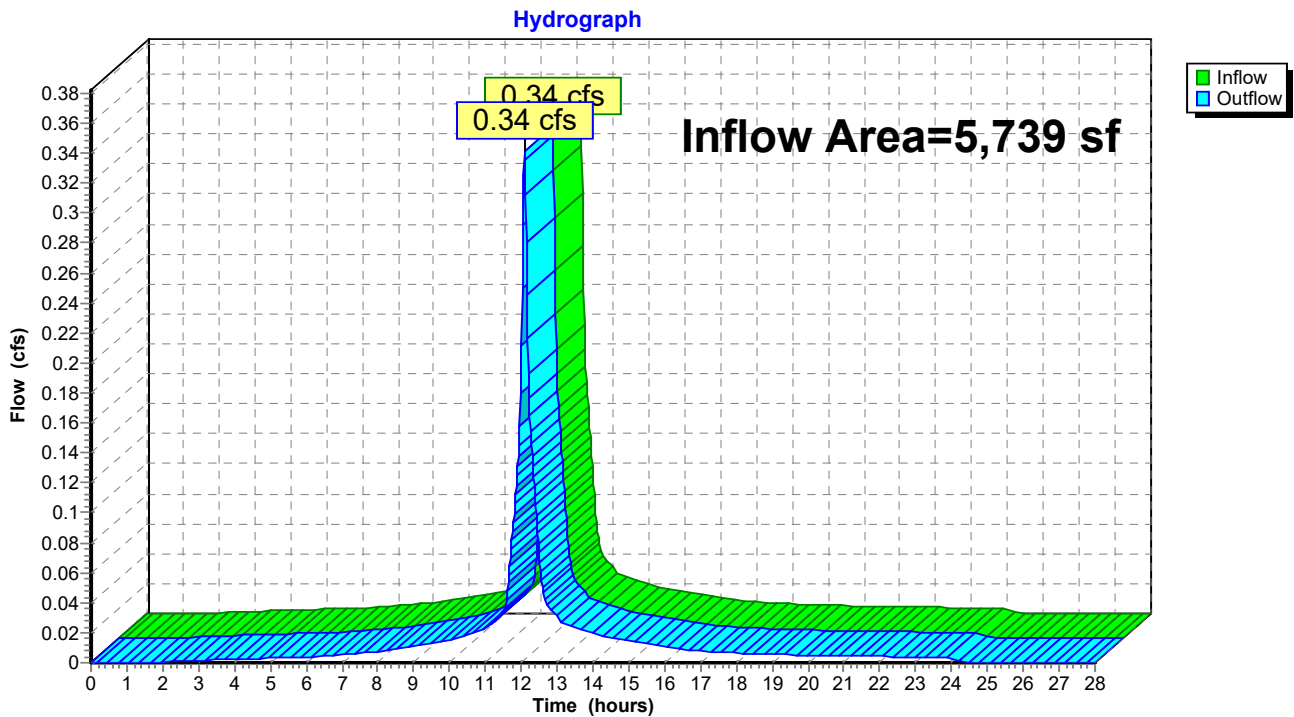
Page 9

Summary for Reach DP-1: Green Street Closed Drainage System

Inflow Area = 5,739 sf, 83.93% Impervious, Inflow Depth = 2.48" for 2-Year Storm event
Inflow = 0.34 cfs @ 12.08 hrs, Volume= 1,186 cf
Outflow = 0.34 cfs @ 12.08 hrs, Volume= 1,186 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs

Reach DP-1: Green Street Closed Drainage System



Post-Development Condition

Type III 24-hr 10-Year Storm Rainfall=4.90"

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Time span=0.00-28.00 hrs, dt=0.02 hrs, 1401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWS-1: Site Area

Runoff Area=1,234 sf 25.28% Impervious Runoff Depth=1.96"
Tc=6.0 min CN=70 Runoff=0.06 cfs 202 cf

Subcatchment R-1: Building Roof Area

Runoff Area=4,505 sf 100.00% Impervious Runoff Depth=4.66"
Tc=6.0 min CN=98 Runoff=0.49 cfs 1,751 cf

Reach DP-1: Green Street Closed Drainage System

Inflow=0.56 cfs 1,952 cf
Outflow=0.56 cfs 1,952 cf

Total Runoff Area = 5,739 sf Runoff Volume = 1,952 cf Average Runoff Depth = 4.08"
16.07% Pervious = 922 sf 83.93% Impervious = 4,817 sf

Post-Development Condition

Type III 24-hr 10-Year Storm Rainfall=4.90"

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Summary for Subcatchment PWS-1: Site Area

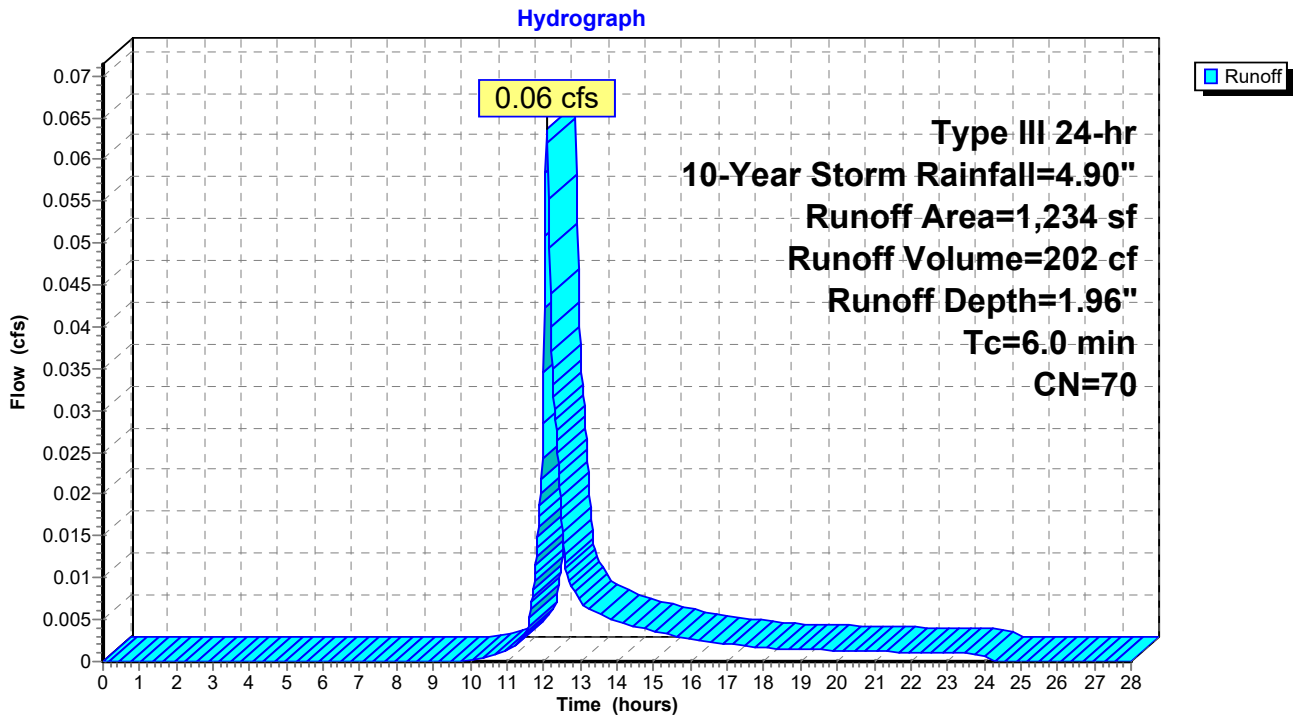
Runoff = 0.06 cfs @ 12.09 hrs, Volume= 202 cf, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Storm Rainfall=4.90"

Area (sf)	CN	Description
* 312	98	Walkways & Walls, HSG B
922	61	>75% Grass cover, Good, HSG B
1,234	70	Weighted Average
922		74.72% Pervious Area
312		25.28% Impervious Area

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

Subcatchment PWS-1: Site Area



Post-Development Condition

Type III 24-hr 10-Year Storm Rainfall=4.90"

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Summary for Subcatchment R-1: Building Roof Area

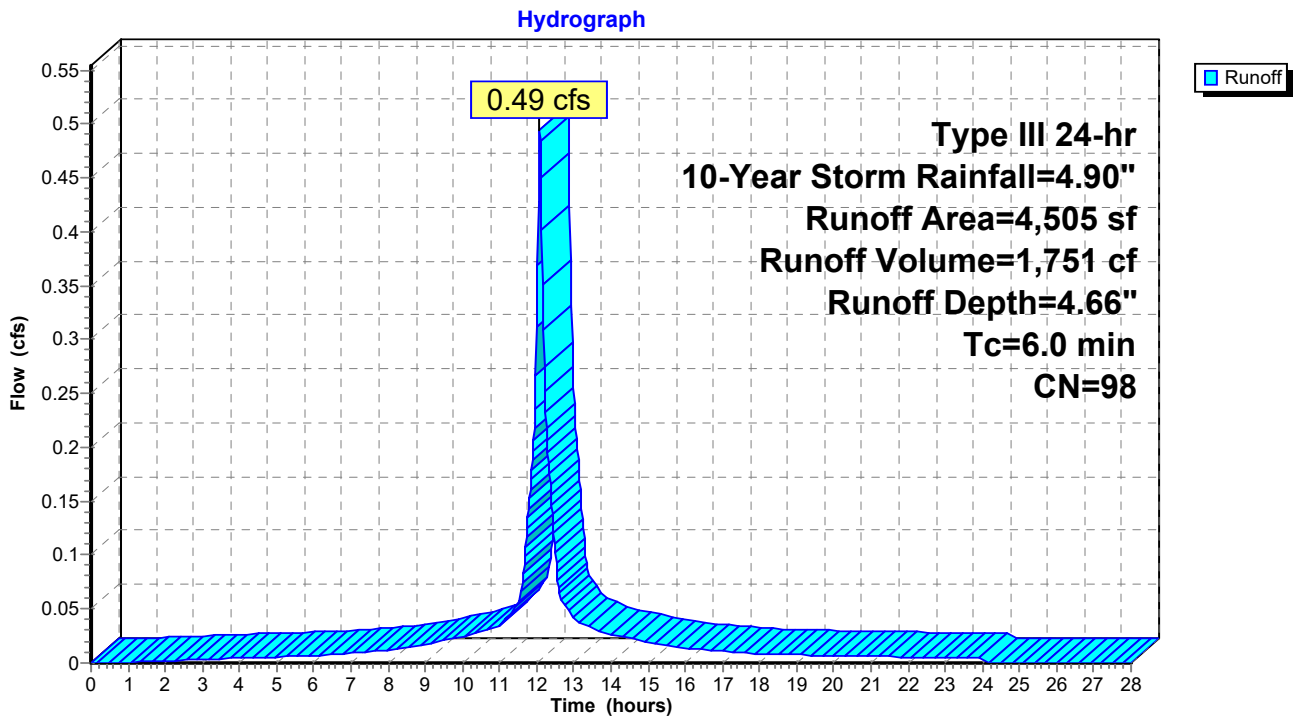
Runoff = 0.49 cfs @ 12.08 hrs, Volume= 1,751 cf, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Storm Rainfall=4.90"

Area (sf)	CN	Description
4,505	98	Roofs, HSG B
4,505		100.00% Impervious Area

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

Subcatchment R-1: Building Roof Area



Post-Development Condition

Type III 24-hr 10-Year Storm Rainfall=4.90"

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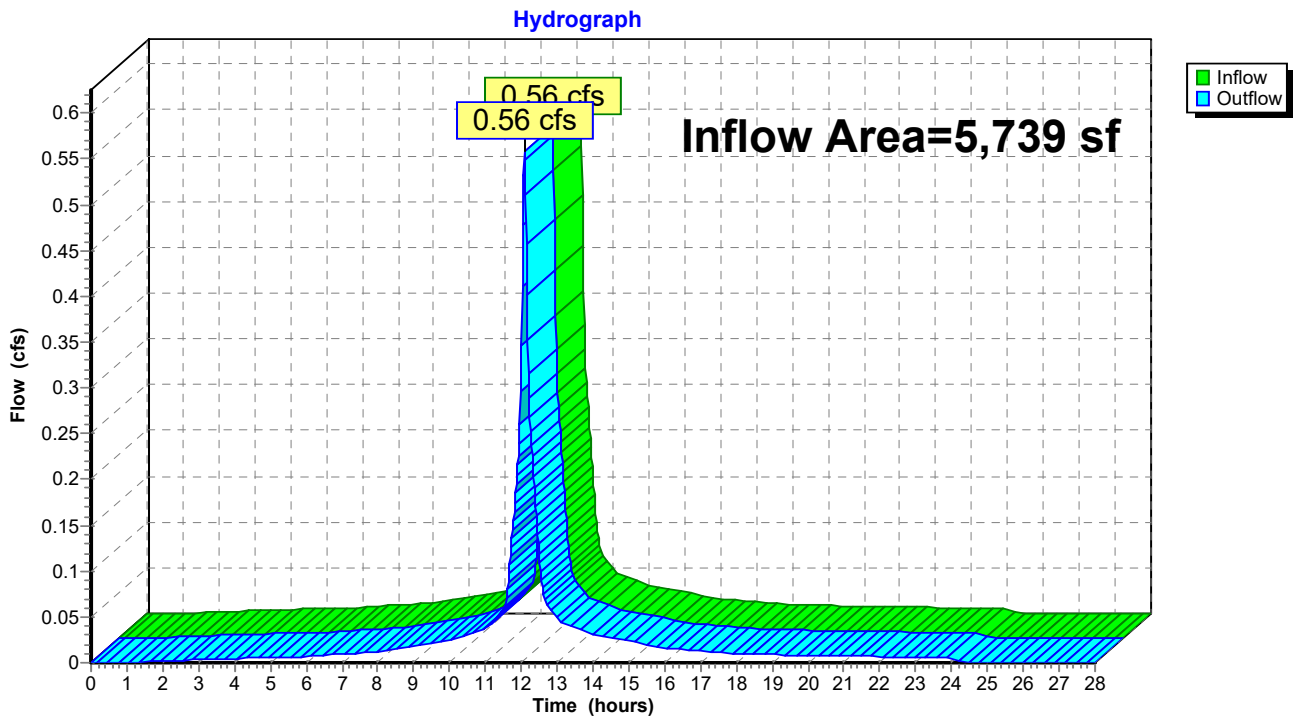
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Summary for Reach DP-1: Green Street Closed Drainage System

Inflow Area = 5,739 sf, 83.93% Impervious, Inflow Depth = 4.08" for 10-Year Storm event
Inflow = 0.56 cfs @ 12.08 hrs, Volume= 1,952 cf
Outflow = 0.56 cfs @ 12.08 hrs, Volume= 1,952 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs

Reach DP-1: Green Street Closed Drainage System



Post-Development Condition

Type III 24-hr 25-Year Storm Rainfall=5.98"

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Time span=0.00-28.00 hrs, dt=0.02 hrs, 1401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWS-1: Site Area

Runoff Area=1,234 sf 25.28% Impervious Runoff Depth=2.79"
Tc=6.0 min CN=70 Runoff=0.09 cfs 287 cf

Subcatchment R-1: Building Roof Area

Runoff Area=4,505 sf 100.00% Impervious Runoff Depth=5.74"
Tc=6.0 min CN=98 Runoff=0.61 cfs 2,156 cf

Reach DP-1: Green Street Closed Drainage System

Inflow=0.70 cfs 2,442 cf
Outflow=0.70 cfs 2,442 cf

Total Runoff Area = 5,739 sf Runoff Volume = 2,442 cf Average Runoff Depth = 5.11"
16.07% Pervious = 922 sf 83.93% Impervious = 4,817 sf

Post-Development Condition

Type III 24-hr 25-Year Storm Rainfall=5.98"

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Summary for Subcatchment PWS-1: Site Area

Runoff = 0.09 cfs @ 12.09 hrs, Volume= 287 cf, Depth= 2.79"

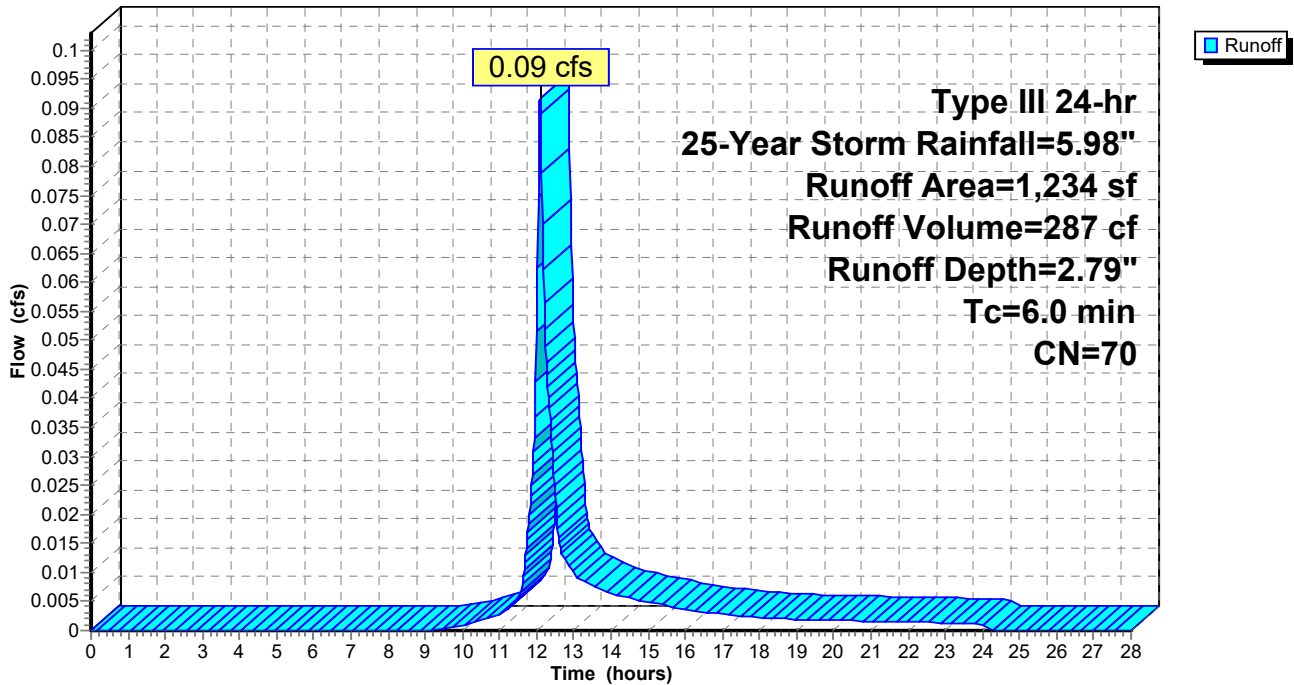
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Storm Rainfall=5.98"

	Area (sf)	CN	Description
*	312	98	Walkways & Walls, HSG B
	922	61	>75% Grass cover, Good, HSG B
	1,234	70	Weighted Average
	922		74.72% Pervious Area
	312		25.28% Impervious Area

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

Subcatchment PWS-1: Site Area

Hydrograph



Post-Development Condition

Type III 24-hr 25-Year Storm Rainfall=5.98"

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Summary for Subcatchment R-1: Building Roof Area

Runoff = 0.61 cfs @ 12.08 hrs, Volume= 2,156 cf, Depth= 5.74"

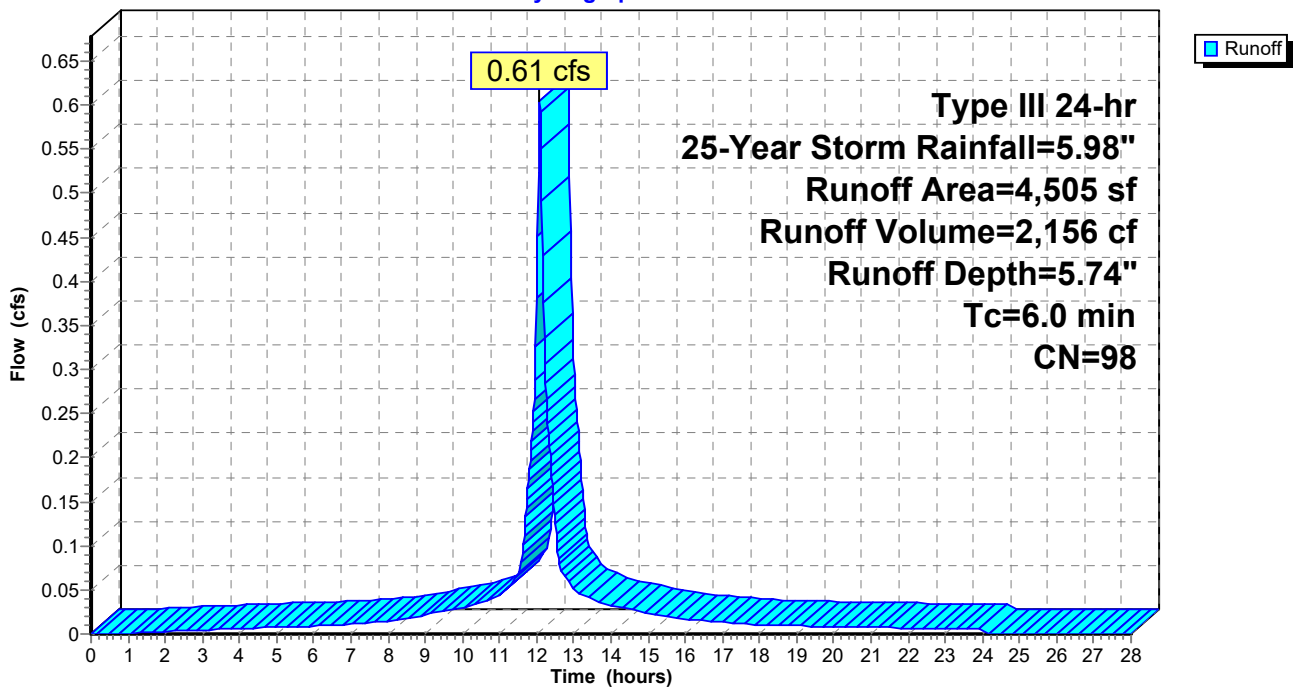
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Storm Rainfall=5.98"

Area (sf)	CN	Description
4,505	98	Roofs, HSG B
4,505		100.00% Impervious Area

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

Subcatchment R-1: Building Roof Area

Hydrograph



Post-Development Condition

Type III 24-hr 25-Year Storm Rainfall=5.98"

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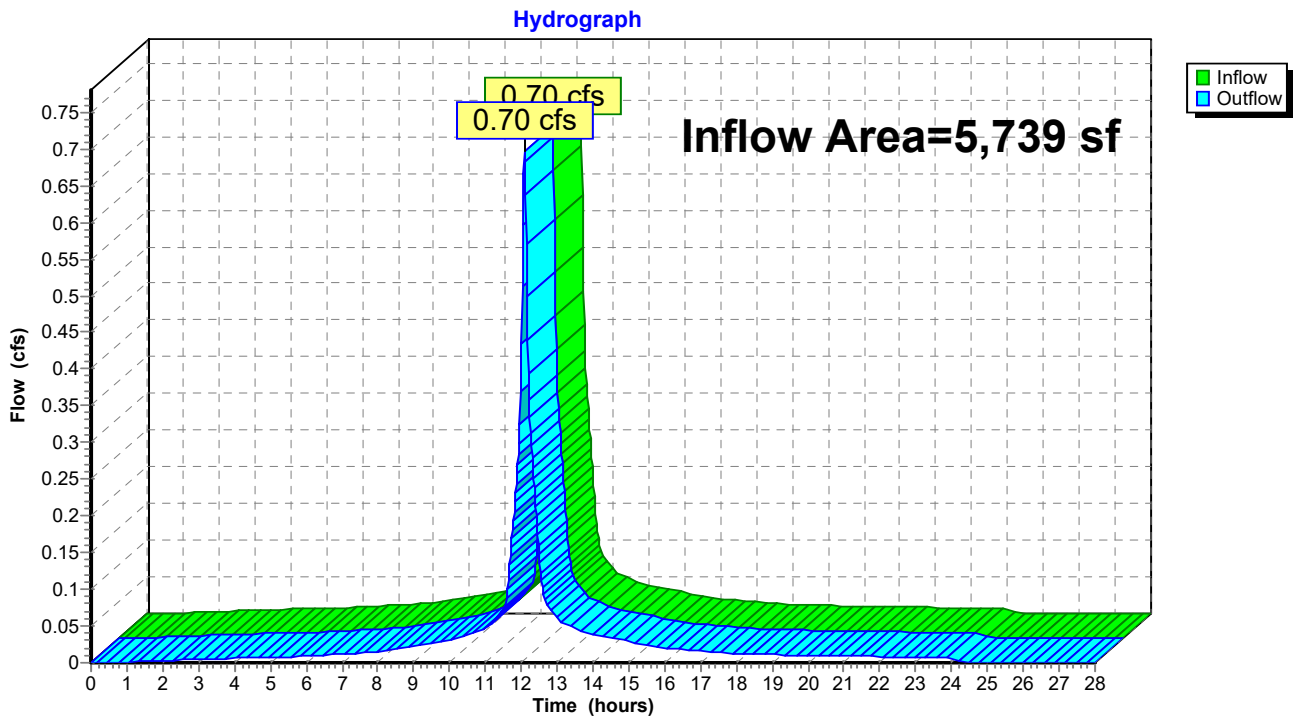
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Summary for Reach DP-1: Green Street Closed Drainage System

Inflow Area = 5,739 sf, 83.93% Impervious, Inflow Depth = 5.11" for 25-Year Storm event
Inflow = 0.70 cfs @ 12.08 hrs, Volume= 2,442 cf
Outflow = 0.70 cfs @ 12.08 hrs, Volume= 2,442 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs

Reach DP-1: Green Street Closed Drainage System



Post-Development Condition

Type III 24-hr 100-Year Storm Rainfall=7.65"

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Time span=0.00-28.00 hrs, dt=0.02 hrs, 1401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWS-1: Site Area

Runoff Area=1,234 sf 25.28% Impervious Runoff Depth=4.17"
Tc=6.0 min CN=70 Runoff=0.14 cfs 428 cf

Subcatchment R-1: Building Roof Area

Runoff Area=4,505 sf 100.00% Impervious Runoff Depth=7.41"
Tc=6.0 min CN=98 Runoff=0.78 cfs 2,782 cf

Reach DP-1: Green Street Closed Drainage System

Inflow=0.91 cfs 3,210 cf
Outflow=0.91 cfs 3,210 cf

Total Runoff Area = 5,739 sf Runoff Volume = 3,210 cf Average Runoff Depth = 6.71"
16.07% Pervious = 922 sf 83.93% Impervious = 4,817 sf

Post-Development Condition

Type III 24-hr 100-Year Storm Rainfall=7.65"

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Summary for Subcatchment PWS-1: Site Area

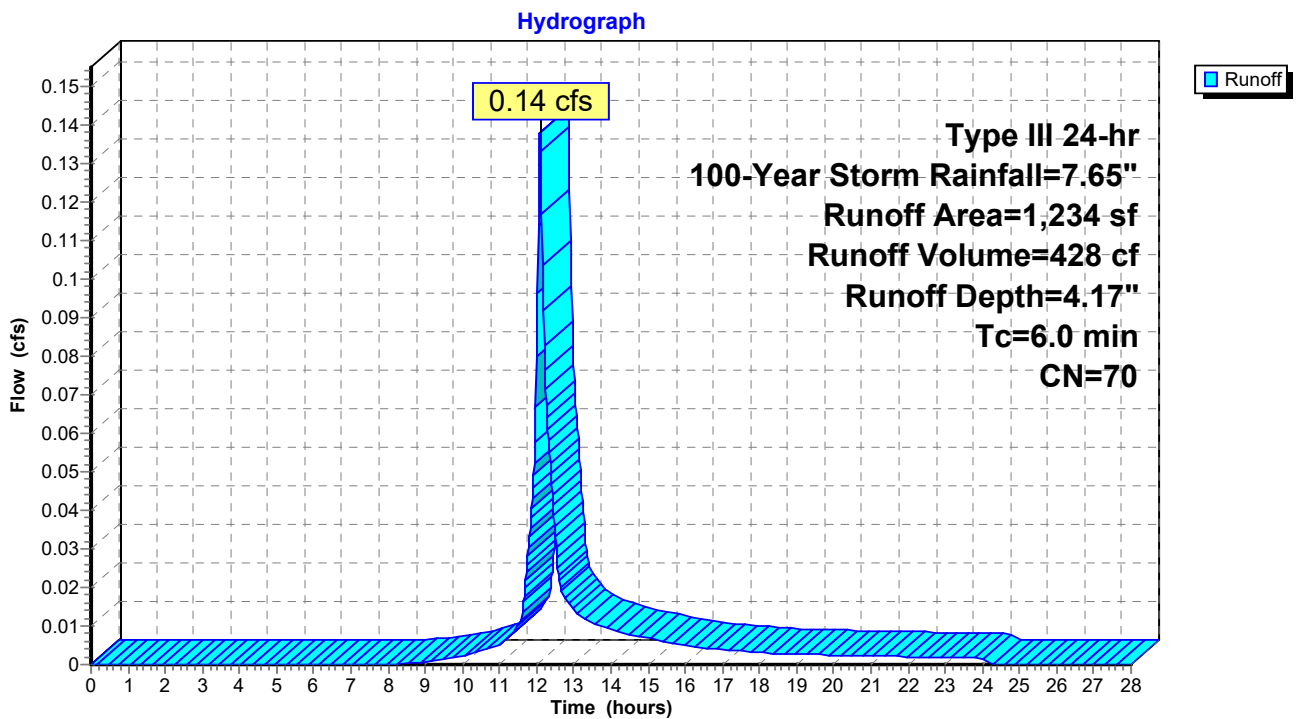
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 428 cf, Depth= 4.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Storm Rainfall=7.65"

Area (sf)	CN	Description
312	98	Walkways & Walls, HSG B
922	61	>75% Grass cover, Good, HSG B
1,234	70	Weighted Average
922		74.72% Pervious Area
312		25.28% Impervious Area

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

Subcatchment PWS-1: Site Area



Post-Development Condition

Type III 24-hr 100-Year Storm Rainfall=7.65"

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Summary for Subcatchment R-1: Building Roof Area

Runoff = 0.78 cfs @ 12.08 hrs, Volume= 2,782 cf, Depth= 7.41"

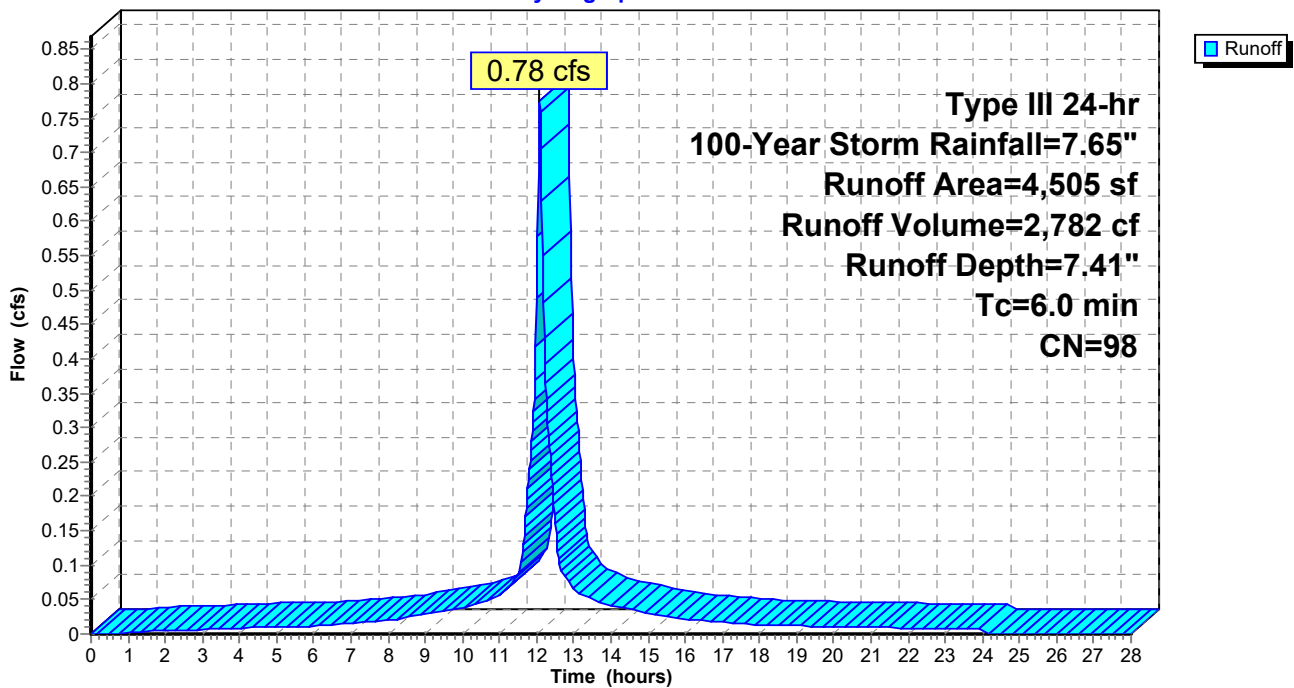
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Storm Rainfall=7.65"

Area (sf)	CN	Description
4,505	98	Roofs, HSG B
4,505		100.00% Impervious Area

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

Subcatchment R-1: Building Roof Area

Hydrograph



Post-Development Condition

Type III 24-hr 100-Year Storm Rainfall=7.65"

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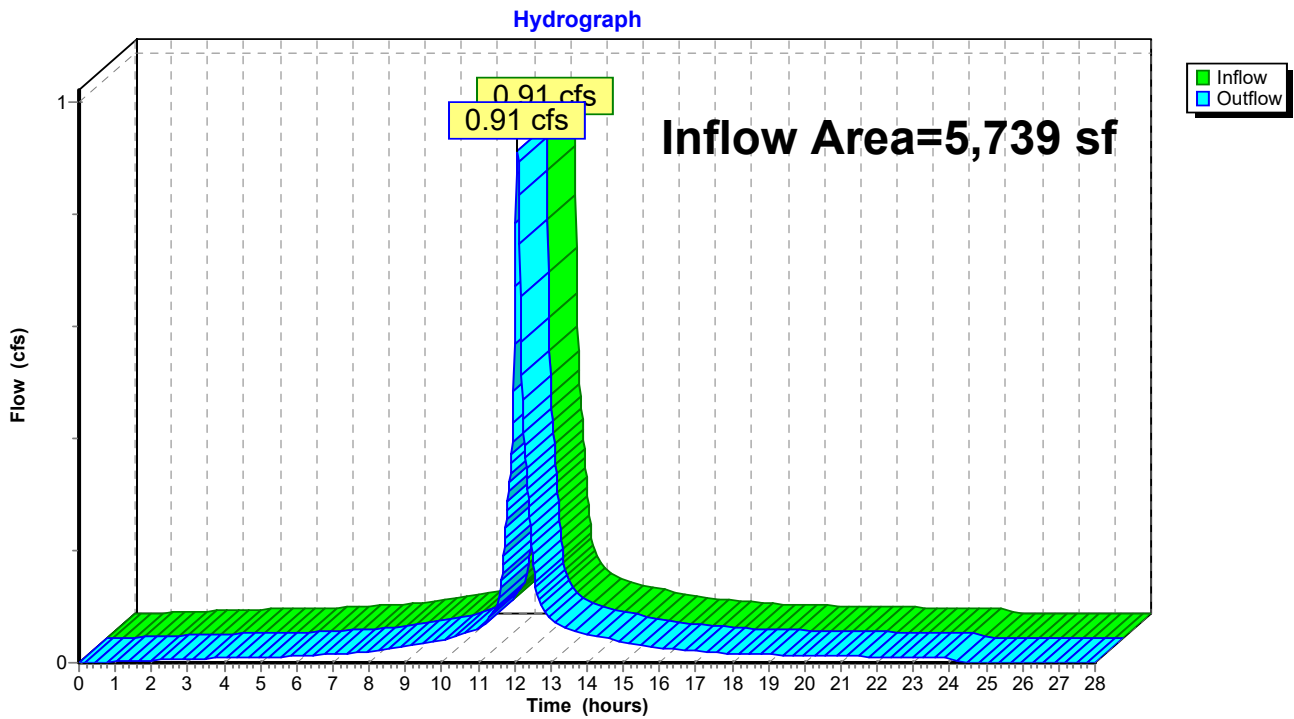
Page 21

Summary for Reach DP-1: Green Street Closed Drainage System

Inflow Area = 5,739 sf, 83.93% Impervious, Inflow Depth = 6.71" for 100-Year Storm event
Inflow = 0.91 cfs @ 12.08 hrs, Volume= 3,210 cf
Outflow = 0.91 cfs @ 12.08 hrs, Volume= 3,210 cf, Atten= 0%, Lag= 0.0 min

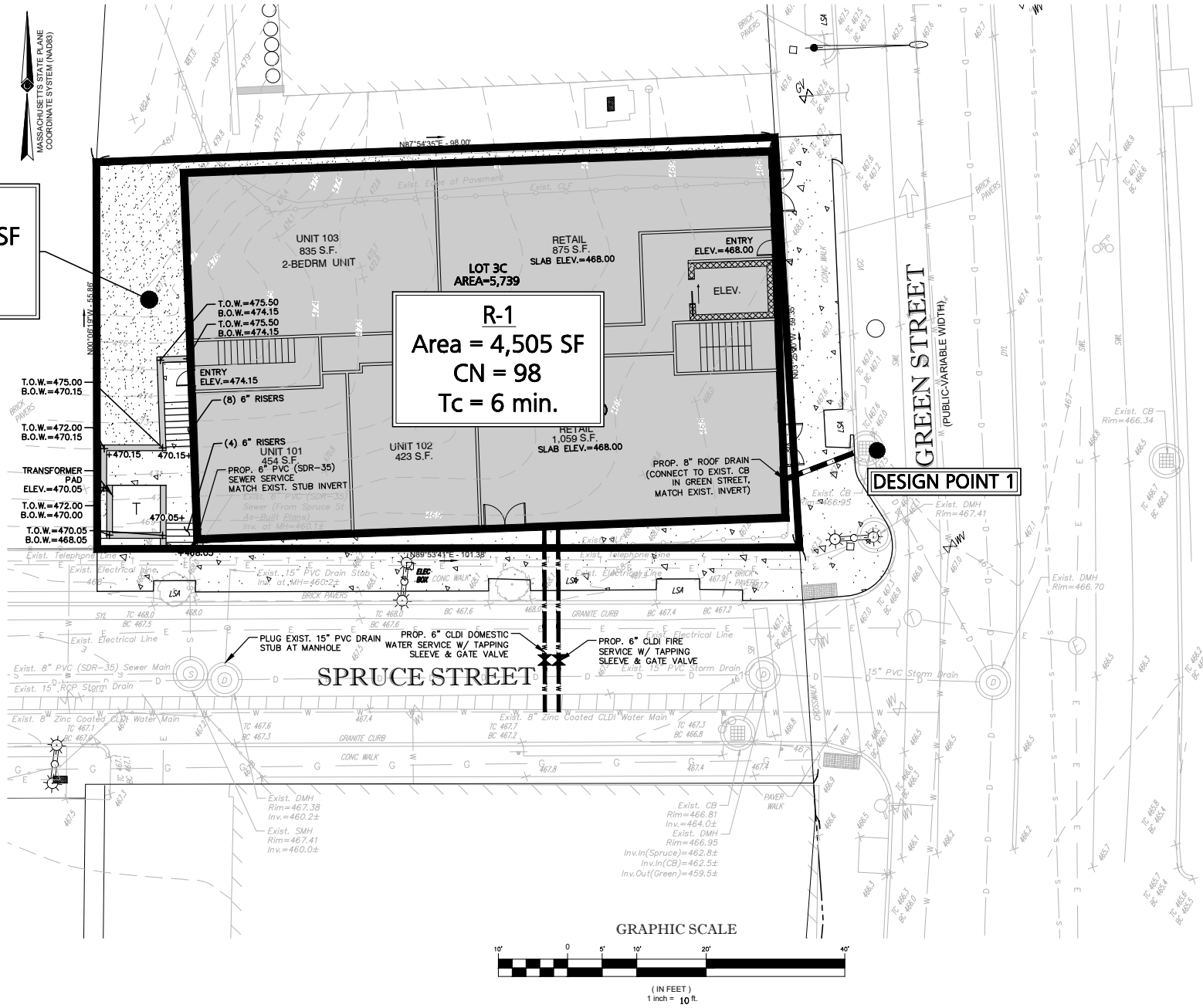
Routing by Stor-Ind+Trans method, Time Span= 0.00-28.00 hrs, dt= 0.02 hrs

Reach DP-1: Green Street Closed Drainage System



PWS-1
 Area = 1,234 SF
 CN = 78
 Tc = 6 min.

R-1
 Area = 4,505 SF
 CN = 98
 Tc = 6 min.



APPLICANT:

Rossi Development
 345 Boylston Street Suite 300
 Newton, MA 02459

DWG. NO.

PWS

DRAWING TITLE:

**Proposed
 Watershed Plan**

PROJECT:

Proposed Site Plan
Lot 3C Green Street
Worcester, Massachusetts

PROJECT #:

24-61423

SCALE: AS NOTED

DATE:

December 9, 2024

DWG FILE NAME:

24-61423.dwg

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DESCRIPTION OF REVISION

DATE

BEST MANAGEMENT PRACTICES OPERATION AND MAINTENANCE PLAN

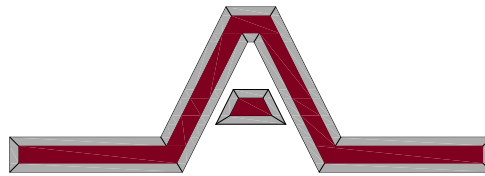
For The
Proposed Mixed-Use Development

located at
**Lot 3C Green Street
Worcester, Massachusetts**

Submitted to:
**City of Worcester
Planning Board
455 Main Street Room 404
Worcester, MA 01608**

Prepared for:
**Rossi Development
345 Boylston Street
Newton, MA 02459**

Prepared by



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December 9, 2024

BEST MANAGEMENT PRACTICES OPERATION AND MAINTENANCE PLAN

The purpose of this Best Management Practices Operation and Maintenance plan is to provide guidance for mandatory maintenance procedures of site preparation and pre and post construction activities for the project located at Lot 3C Green Street in Worcester, Massachusetts.

The Best Management Practices Operation and Maintenance Plan is summarized below and will be incorporated into the construction documents for this project. This plan is broken into two major sections. The first section is construction-related erosion and sedimentation controls. The second section is devoted to a post-development operation and maintenance plan.

Basic Information

Owner/Maintenance Responsibilities:

Rossi Development
345 Boylston Street
Newton, MA 02459
(617) 889-3389

Inspector:

Rossi Development
345 Boylston Street
Newton, MA 02459
(617) 889-3389

In the event that the property ownership changes, this Operation and Maintenance Plan shall continue to run with the land and apply to any successors or assigns. Upon the conveyance of land, the City of Worcester shall be notified in writing indicating the new ownership's contact information within 48 hours of the conveyance.

Prior to the conveyance of the property, an educational meeting shall be held between the current owner, the new owner and the parties responsible for the maintenance of the project site. The purpose of the meeting will be to educate the new owner on the maintenance responsibilities for property including, but not limited to:

- Required site maintenance
- Frequency of site maintenance

This document shall be updated to indicate the time and date of the meeting as well as the contact information for the new property owner.

Time and Date of Educational Meeting: _____

New Owner Information

Acknowledgement of Maintenance Responsibilities:

Owner Signature

Date

Acknowledgement of Maintenance Responsibilities:

Management Company Representative Signature

Date

Section 1 - Construction Activities & Erosion Controls

1. Contact the Worcester Planning Department at least three (3) days prior to start of construction.
2. The contractor shall only disturb the minimum area necessary in order to limit the impact on the surrounding area including the bordering vegetated wetlands and abutting residential developments.
3. A stabilized construction entrance shall be installed per the detail on the plan entitled "Erosion Control Plan" in the plan set entitled "Proposed Mixed-Use Development, Lot 3C Green Street, Worcester, Massachusetts". Vehicle wash down shall occur on the gravel surface that is adjacent to or part of the stabilized construction entrance.
 - a. Stabilized construction entrance will be installed from the existing pavement on site to minimize sediment track-out.
 - b. Entrance should be maintained in a condition that will prevent tracking or flowing of sediment off the project site. May require periodic topdressing with additional stone.
 - c. Entrance and sediment disposal area shall be inspected weekly and after heavy rains or heavy use.
 - d. Mud and sediment tracked or washed onto public road shall be immediately removed.
 - e. 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.
 - f. Pad shall be reshaped as needed for drainage and runoff control.
 - g. Broken road pavement as a result of construction activities on roadways immediately adjacent to the Project Site shall be repaired immediately.
4. Install haybales and silt fence around the proposed work zone to prevent sediment from leaving the subject property. Haybales and silt fence are to be inspected on a weekly basis. Any damaged or compromised erosion control measures are to be replaced immediately.
5. Proper erosion and sediment control must be employed around all material stockpile areas. Regular provisions for dust control must be used, via a water truck or other acceptable method. Erosion and sediment controls around material stockpile areas are to be inspected on a weekly basis. Any damaged or compromised erosion control measures are to be replaced immediately.
6. Waste material is to be stored in a dumpster on site and covered at all times. Waste material dumpster is to be maintained to ensure no overtopping or leaks will occur.
7. Construction materials are to be stored onsite and covered at all times. Upon completion of building framing, construction materials are to be stored inside building.
8. If necessary, dewatering shall include all necessary control, management, and disposal of groundwater on a 24-hour basis as appropriate during construction. Dewatering shall include the lowering of the groundwater table to relieve any hydrostatic head that could cause a decrease in the stability of the excavated subgrade. It shall also include the intercepting seepage which could otherwise emerge from the slope or sides of excavations which could cause a decrease in the stability of the excavated subgrade of the slopes or sides of the excavations.

Dewatering shall be performed during construction to temporarily protect against the following.

1. The loss of any material beneath the excavated subgrade or from the slopes or sides of the excavations or the movement of any fine particle materials from the soil.
2. Any increased vertical or lateral loads on the excavation support systems.
3. Any disturbance, rupture, instability, build, or heaving of the bottom of the excavated subgrade during excavation and trenching, placement of foundation or bedding materials, construction of slabs, footings, pipes, conduits, underdrains, and any other structures, and backfilling operations.

The dewatering systems and equipment shall be removed from the site when no longer required.

9. Slopes exceeding 3(H):1(V) shall be stabilized with temporary seeding. All slopes are to be checked periodically to see that vegetation is in good condition. Any damage from erosion or animal burrowing should be repaired immediately to prevent further damage. Areas requiring revegetation should be repaired immediately. Slopes should be limed and fertilized as necessary to keep vegetation healthy.

Control undesirable vegetation such as weeds and woody growth to avoid bank stability problems in the future.

10. The entire project area shall be swept upon completion of construction and prior to removal of the erosion control devices.
11. All disturbed areas of the worksite must be stabilized during the winter months (October 15th – April 15th) by placement of approximately six (6) inches of hay mulch or straw.
12. Refueling of machinery is to occur offsite whenever possible. Any necessary onsite refueling shall occur within the designated refueling area.

Construction Sequencing

1. Install erosion control measures per plan.
2. Clear and grub only where necessary.
3. Install building foundations.
4. Begin vertical building construction.
5. Install utilities.
6. Fine grade site.
7. Install top course.
8. Install landscaping.
9. Remove erosion control devices.

Spill Prevention and Response

Prevention:

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff:

1. An effort will be made to store only the amount of material required to do the job.
2. All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
3. Products will be kept in their original containers with the original manufacturer's label.
4. Substances will not be mixed with one another unless recommended by the manufacturer.
5. Whenever possible, all of a product will be used up before disposing of the container.
6. Manufacturer's recommendations for proper use and disposal will be followed.
7. The site superintendent will inspect daily to ensure proper use and disposal of materials onsite.
8. Products will be kept in the original containers unless they are not re-sealable.
9. Original labels and material safety data will be retained; they contain important product information.
10. If surplus product must be disposed of, manufacturers or local and State recommended methods for proper disposal will be followed.
11. Petroleum Products – All onsite vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers that are clearly labeled. Any asphalt substances used onsite will be applied according to the manufacturer's recommendations.
12. Paints – All containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewer system but will be properly disposed of according to the manufacturer's instructions or State and local regulations.
13. Fertilizers – Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to stormwater. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.
14. Concrete Trucks - Concrete Trucks will not be allowed to wash out or discharge surplus concrete or drum wash water on the site.

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and clean-up:

1. Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.
2. Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite.

Equipment and materials will include but not be limited to brooms, dustpans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.

3. All spills will be cleaned up immediately upon discovery.
4. The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
5. Spills of toxic or hazardous substances will be reported to the appropriate State or local government agency, regardless of the size.
6. The spill prevention plan will be adjusted to include measure to prevent this type of spill from reoccurring and how to clean up the spill if there should be another. A description of the spill, what caused it, and the cleanup measure will also be included.
7. The Site Superintendent responsible for the day-to-day site operation will be the spill prevention and cleanup coordinator.

Fueling and Maintenance of Equipment or Vehicles

General:

Vehicle and equipment fueling procedures are designed to prevent fuel spills and leaks in order to minimize the discharge of such pollutants into storm drains and waterways.

Implementation:

Offsite fueling stations should be used as much as possible. • When fueling offsite is not practicable, a designated fueling area away from drainage ways must be used. • Locate designated fueling areas a minimum of 50 feet away from concentrated flows of stormwater, drainage ways, and inlets. • An impermeable surface should be used at the designated fueling area. • Containment should be built around the designated fueling areas to prevent the release of spills, as well as runoff and runoff. • Absorbent spill cleanup materials should be available at all designated fueling areas. If absorbent materials are used on spills, the material is to be removed immediately and disposed of properly. • Fueling nozzles should be equipped with an automatic shutoff to control drips. • Topping off of fuel tanks should be discouraged. • A sign is to be installed adjacent to each fueling facility to inform equipment operators of the designated fueling location. • For larger equipment, such as cranes and excavators that are not able to travel to a designated fueling area, mobile fueling may be necessary. Absorbent spill cleanup materials and spill kits should be available on all fueling trucks. Drip pans or absorbent pads should be used in mobile fueling operations. • The contractor shall train his/her employees and subcontractors in proper fueling and cleanup procedures. These procedures must be documented.

Inspection/Maintenance:

The contractor should inspect vehicles and equipment for leaks each day they are used. Leaks are to be repaired immediately or the piece of equipment should be removed from the project site. • Designated fueling areas should be inspected for leaks and spills each day they are used. Any leaks or spills are to be cleaned up immediately. • Any leaks or spills discharged through a drainage system will require the preparation of an Incidence of Non-Compliance. • Update the SWPPP anytime a designated fueling location has been removed, relocated, added, modified, or required maintenance.

Washing of Equipment and Vehicles

Wash water from vehicle and equipment cleaning is not to be discharged from construction sites because the rinse water may contain contaminants such as sediment, petroleum/lubricant residues, soaps, or solvents that could enter storm drain systems or receiving waters.

Equipment/vehicle cleaning should be conducted offsite. All vehicles that regularly enter and leave the construction site must be cleaned offsite.

For equipment that must be cleaned on site, the cleaning operations must be fully contained and disposed of offsite. The vehicle wash area must be properly identified by sign and located away from storm drain inlets, drainage facilities, and watercourses. It must be paved with concrete or asphalt and have a berm to contain runoff and prevent run-on. It must be equipped with a sump for the collection and disposal of wash water.

Section 2 – Post Development Operation & Maintenance

1. Snow removal and storage - Plowed snow shall be placed in pervious areas adjacent to the parking lots where it can slowly infiltrate. Sediments shall be removed from this area every spring. When the amount of snow exceeds the capacity of the snow storage areas, it shall be removed from the site at the owner's expense.

2. Maintenance Responsibilities - All post construction maintenance activities shall be documented and kept on file and made available to the City of Worcester annually, or upon request. All post construction maintenance activities shall run with the title of the property in perpetuity.

APPENDIX D

**Stormwater Checklist
Illicit Discharge Statement**



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.

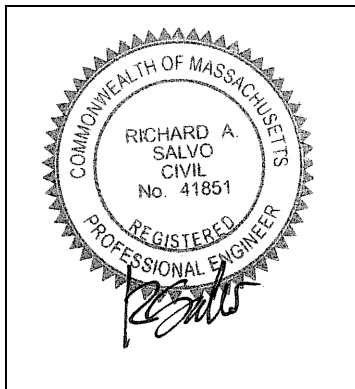
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



12-9-24

Signature and Date

Checklist

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

- New development
- Redevelopment
- Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

Standard 3: Recharge

- Soil Analysis provided.
- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - Static
 - Simple Dynamic
 - Dynamic Field¹
- 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.

ILLICIT DISCHARGE COMPLIANCE STATEMENT

In accordance with the Wetland Regulations found in 310 CMR 10.05(6) and the *Massachusetts Stormwater Handbook* published by the Massachusetts Department of Environmental Protection, the stormwater management system for the proposed project located at Lot 3C Green Street in Worcester, Massachusetts shall accept no illicit discharges. Illicit discharges are defined as discharges not entirely comprised of stormwater and include, but are not limited to, wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease.

Engineering Alliance, Inc. has performed an investigation of the existing site conditions and did not find any illicit discharges. Prior to construction, additional investigations will take place to identify and remove any and all illicit discharges currently onsite. These actions include, without limitation, visual screening, dye or smoke testing, and the removal of any sources of illicit discharges to the stormwater management system.

Should any illicit discharges enter the stormwater management system after construction has been completed, immediate steps to remove the discharges and their source shall be taken to return the system to its proper working state.



Richard Salvo, P.E.
for Engineering Alliance, Inc.

12-9-24

Date