

DRAINAGE REPORT

40 Brissette Avenue
Salisbury, Massachusetts



CIVIL DESIGN Consultants, Inc.

Survey - Design - Permitting - Construction Administration
344 North Main Street
Andover, MA 01810-2611

Tel: (978) 416-0920



OWNER / APPLICANT:

Father & Son Construction
c/o Todd Fitzgerald
85 South Main Street
Newton, NH 03858

SUBMITTED TO:

Salisbury Conservation Commission
5 Beach Road
Salisbury, MA 01952

MassDEP Northeast Region
205B Lowell Street
Wilmington, MA 01887

ISSUED:

November 16, 2021

DRAINAGE REPORT

Drainage Narrative

TAB 1

Existing Conditions

TAB 2

- 2-Yr Storm Event
- 10-Yr Storm Event
- 25-Yr Storm Event
- 50-Yr Storm Event
- 100-Yr Storm Event

Proposed Conditions

TAB 3

- 2-Yr Storm Event
- 10-Yr Storm Event
- 25-Yr Storm Event
- 50-Yr Storm Event
- 100-Yr Storm Event

Supplemental Information

TAB 4

- Check List for Stormwater Report
- Stormwater Management Calculations
- Operations and Maintenance Plan

DRAINAGE REPORT

40 Brissette Avenue
Salisbury, Massachusetts

TAB 1

DRAINAGE REPORT

40 Brissette Avenue
Salisbury, Massachusetts

PROJECT DESCRIPTION

The applicant proposes to re-develop 40 Brissette Avenue in Salisbury, MA into a five-unit multifamily residential development. The parcel totals approximately 6,556-SF of land and contains an existing 14-unit motel. The project consists of construction of a new multifamily building along with associated infrastructure including driveways, landscaping, drainage facilities, and utilities. Project plans entitled *Site Development Plans for 40 Brissette Avenue*, dated October 7, 2021, revised November 16, 2021, have been prepared by this office and provided for your review. These plans illustrate the proposal in detail including zoning, easements, construction details, and provisions for utilities. Drainage will be collected and routed through best management practices sized to address the MADEP Stormwater Management Standards.

SITE DESCRIPTION

The total lot area of the project site is approximately 6,556-SF and provides 100-FT of frontage on Brissette Avenue. On-site resource areas consist of land subject to coastal storm flowage and coastal dune. The site is generally flat, with an elevation between 6 and 7-FT for the entire site.

According to the Natural Resource Conservation Service Soil Survey for Middlesex County, Massachusetts soils on the site are mapped as containing Udorthents, which are classified as excavated and filled soils. However, the mapping divide for Hooksan-Urban land complex is adjacent to the site, and indicates the presence of sandy soils with a hydrologic soil rating of A. For the purposes of drainage calculations, the site has been assumed to contain soils with an HSG-A.

SURFACE DRAINAGE

Pre-Development Condition

The pre-development condition consists of a single watershed area contributing to a single design point. Design Point #1 (DP-1) receives runoff from drainage area EWA-1 and consists of overland flow to the east towards Brissette Avenue. Contributing areas to the Design Points are detailed in the following Table 1.

TABLE 1: EXISTING WATERSHED DESIGN POINT DETAILS

DESIGN POINT	AREA NAME	AREA (SF)	Tc (min.)	CN
DP-1	EWA-1	6,556	6.0	85

Post-Development Condition

The proposed project includes the construction of a 5-unit multifamily residential building. Other components include construction of a new driveway along with landscaping, drainage, utilities, and associated appurtenances. Drainage will be routed through a porous paver driveway sized to address the MADEP Stormwater Management Standards. Impervious area will include the roof and dumpster pad, while the driveway is proposed to be porous pavers. The proposed site will result in a net reduction in impervious area of 1,787-SF, or a 35% reduction.

The proposed construction results in a single sub-watershed discharging to DP-1. DP-1 receives flow from PWA-1, which consists of overland flow that is routed through the porous pavers. The design points are summarized in Table 2 below.

TABLE 2: PROPOSED WATERSHED DESIGN POINT DETAILS

DESIGN POINT	AREA NAME	AREA (SF)	Tc (min.)	CN
DP-1	PWA-1	6,556	6.0	69

DRAINAGE REPORT

40 Brissette Avenue
Salisbury, Massachusetts

Peak Discharge Comparison

As illustrated in the following tables, the impact of the proposed improvements has been mitigated through the use of porous pavement for up to and including the 100-year, 24-hour storm event.

Design Point #1

Peak Flow:

	2-YR	10-YR	25-YR	50-YR	100-YR
	(3.1-IN)	(4.5-IN)	(5.3-IN)	(5.9-IN)	(6.5-IN)
	CFS	CFS	CFS	CFS	CFS
Pre-Development	0.3	0.5	0.6	0.7	0.8
Post-Development	0.0	0.0	0.0	0.0	0.0

Peak Volume:

	2-YR	10-YR	25-YR	50-YR	100-YR
	(3.1-IN)	(4.5-IN)	(5.3-IN)	(5.9-IN)	(6.5-IN)
	AC-FT	AC-FT	AC-FT	AC-FT	AC-FT
Pre-Development	0.021	0.036	0.046	0.053	0.060
Post-Development	0.0	0.0	0.0	0.0	0.0

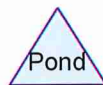
METHODOLOGY

Drainage calculations were performed using the computer program HydroCAD by HydroCAD Software Solutions, LLC based upon Technical Release 20 (TR-20), developed by the NRCS, formerly the Soils Conservation Service. Drainage calculations were prepared for the 2-YR, 10-YR, 25-YR, 50-YR, and 100-YR Type III 24-hour storm events. Rainfall data corresponds with National Weather Service Technical Paper 40 (TP-40) used in Technical Release 55 (TR-55). Curve numbers were generated using the information provided in TR-55 and the SCS Soils Survey.

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40 Brissette Avenue
Salisbury, Massachusetts

TAB 2



21-10289 - Pre-Post*Type III 24-hr 2-Year Rainfall=3.10"*

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EWA-1:

Runoff Area=6,556 sf 78.80% Impervious Runoff Depth=1.67"

Tc=6.0 min CN=85 Runoff=0.3 cfs 0.021 af

Reach EDP-1:

Inflow=0.3 cfs 0.021 af

Outflow=0.3 cfs 0.021 af

Total Runoff Area = 0.151 ac Runoff Volume = 0.021 af Average Runoff Depth = 1.67"
21.20% Pervious = 0.032 ac 78.80% Impervious = 0.119 ac

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Type III 24-hr 2-Year Rainfall=3.10"

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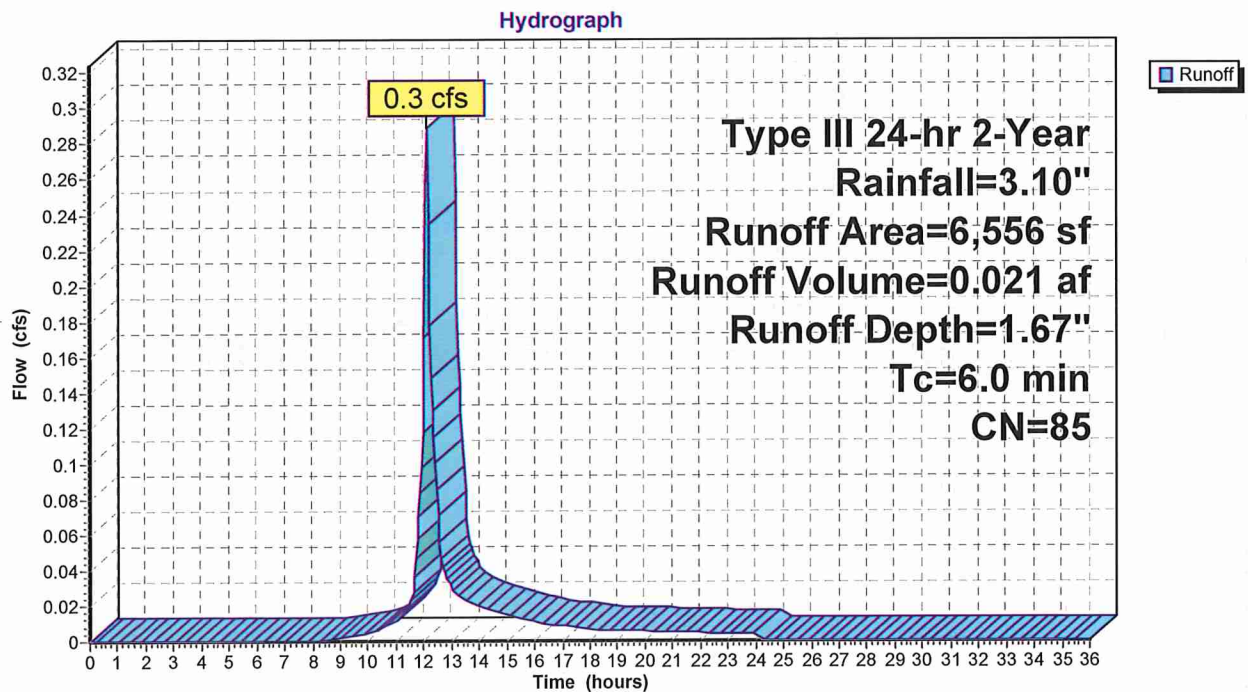
Summary for Subcatchment EWA-1:

Runoff = 0.3 cfs @ 12.09 hrs, Volume= 0.021 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
1,390	39	>75% Grass cover, Good, HSG A
2,573	98	Roofs, HSG A
2,593	98	Paved parking, HSG A
6,556	85	Weighted Average
1,390		21.20% Pervious Area
5,166		78.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6

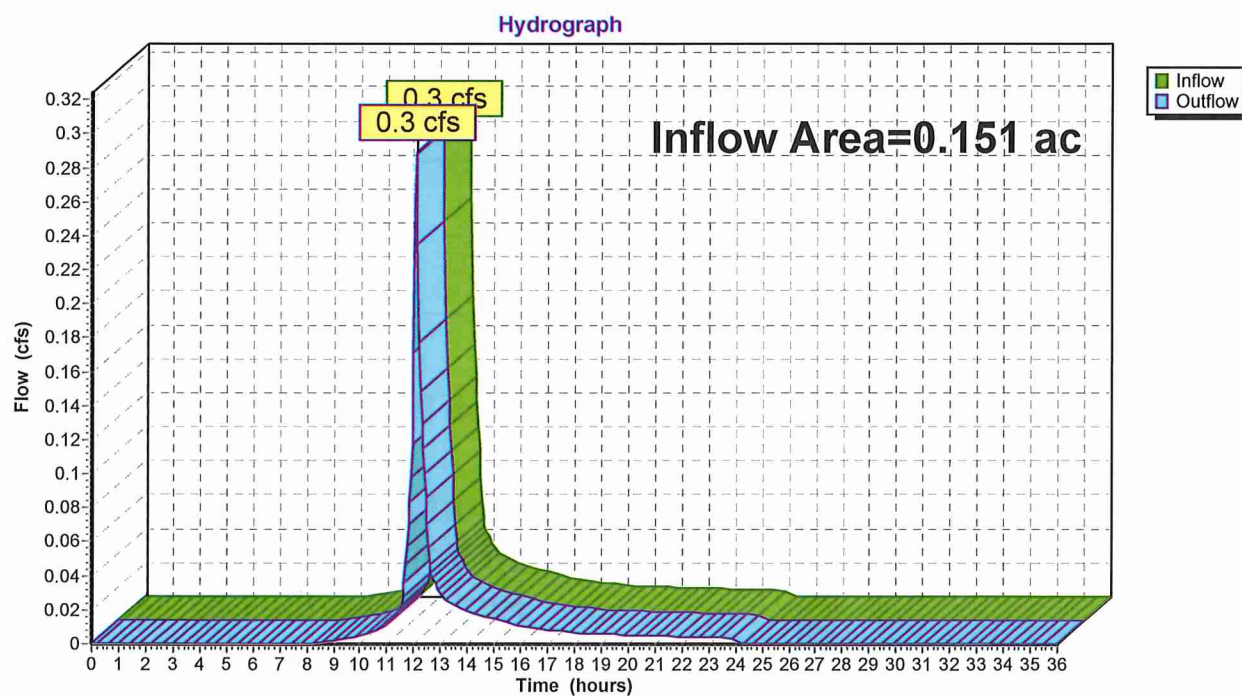
Subcatchment EWA-1:

Summary for Reach EDP-1:

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

Inflow Area = 0.151 ac, 78.80% Impervious, Inflow Depth = 1.67" for 2-Year event
Inflow = 0.3 cfs @ 12.09 hrs, Volume= 0.021 af
Outflow = 0.3 cfs @ 12.09 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach EDP-1:

21-10289 - Pre-Post*Type III 24-hr 10-Year Rainfall=4.50"*

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EWA-1:

Runoff Area=6,556 sf 78.80% Impervious Runoff Depth=2.91"

Tc=6.0 min CN=85 Runoff=0.5 cfs 0.036 af

Reach EDP-1:

Inflow=0.5 cfs 0.036 af

Outflow=0.5 cfs 0.036 af

Total Runoff Area = 0.151 ac Runoff Volume = 0.036 af Average Runoff Depth = 2.91"
21.20% Pervious = 0.032 ac 78.80% Impervious = 0.119 ac

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Type III 24-hr 10-Year Rainfall=4.50"

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Page 6

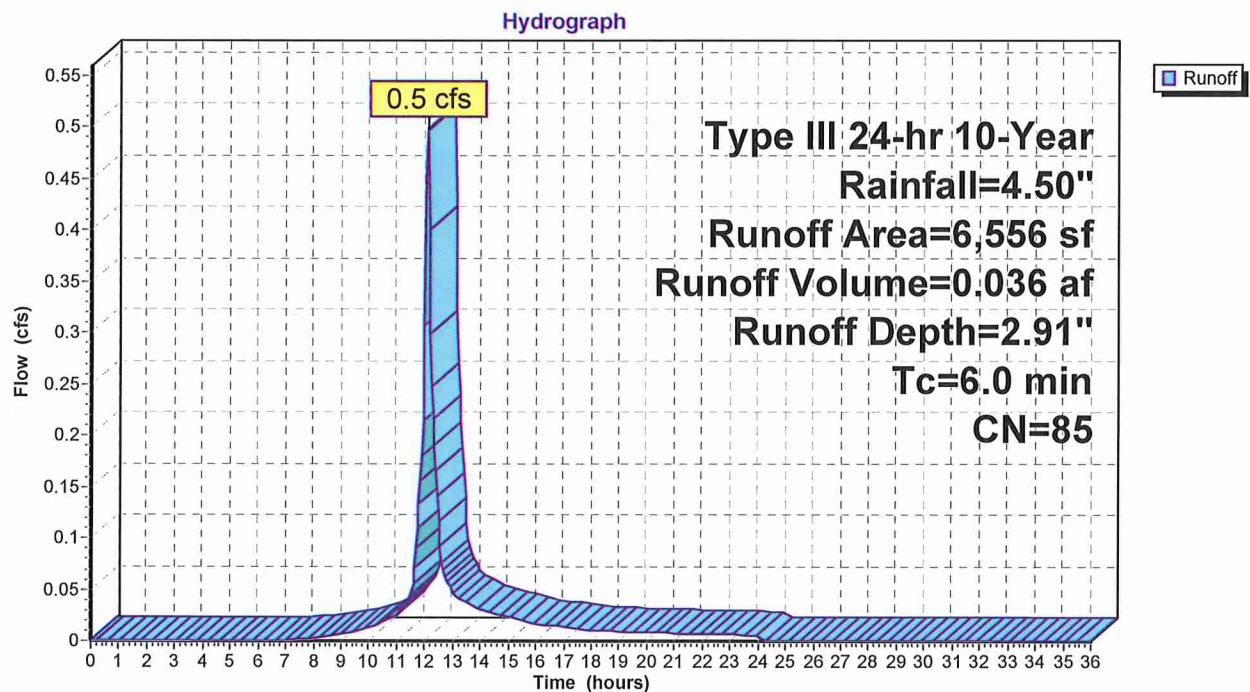
Summary for Subcatchment EWA-1:

Runoff = 0.5 cfs @ 12.09 hrs, Volume= 0.036 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
1,390	39	>75% Grass cover, Good, HSG A
2,573	98	Roofs, HSG A
2,593	98	Paved parking, HSG A
6,556	85	Weighted Average
1,390		21.20% Pervious Area
5,166		78.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6

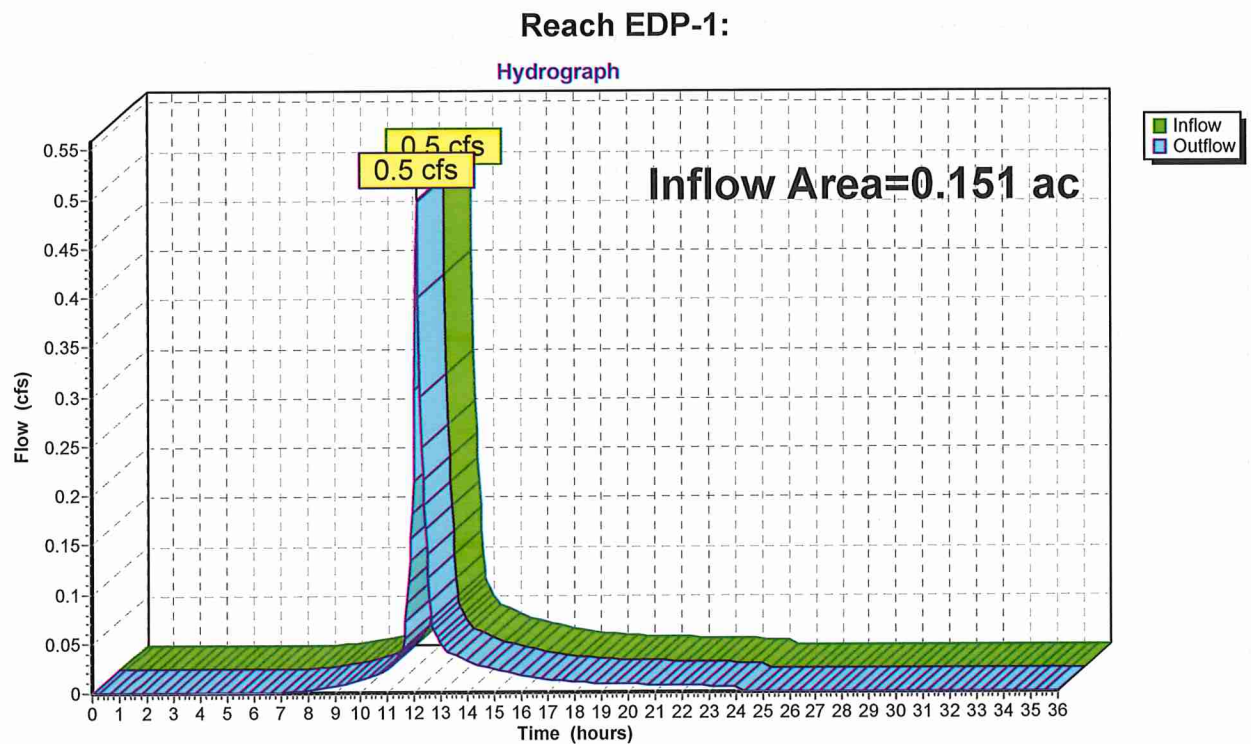
Subcatchment EWA-1:

Summary for Reach EDP-1:

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

Inflow Area = 0.151 ac, 78.80% Impervious, Inflow Depth = 2.91" for 10-Year event
Inflow = 0.5 cfs @ 12.09 hrs, Volume= 0.036 af
Outflow = 0.5 cfs @ 12.09 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs



21-10289 - Pre-Post*Type III 24-hr 25-Year Rainfall=5.30"*

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEWA-1:

Runoff Area=6,556 sf 78.80% Impervious Runoff Depth=3.65"

Tc=6.0 min CN=85 Runoff=0.6 cfs 0.046 af

Reach EDP-1:

Inflow=0.6 cfs 0.046 af

Outflow=0.6 cfs 0.046 af

Total Runoff Area = 0.151 ac Runoff Volume = 0.046 af Average Runoff Depth = 3.65"
21.20% Pervious = 0.032 ac 78.80% Impervious = 0.119 ac

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Type III 24-hr 25-Year Rainfall=5.30"

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Page 9

Summary for Subcatchment EWA-1:

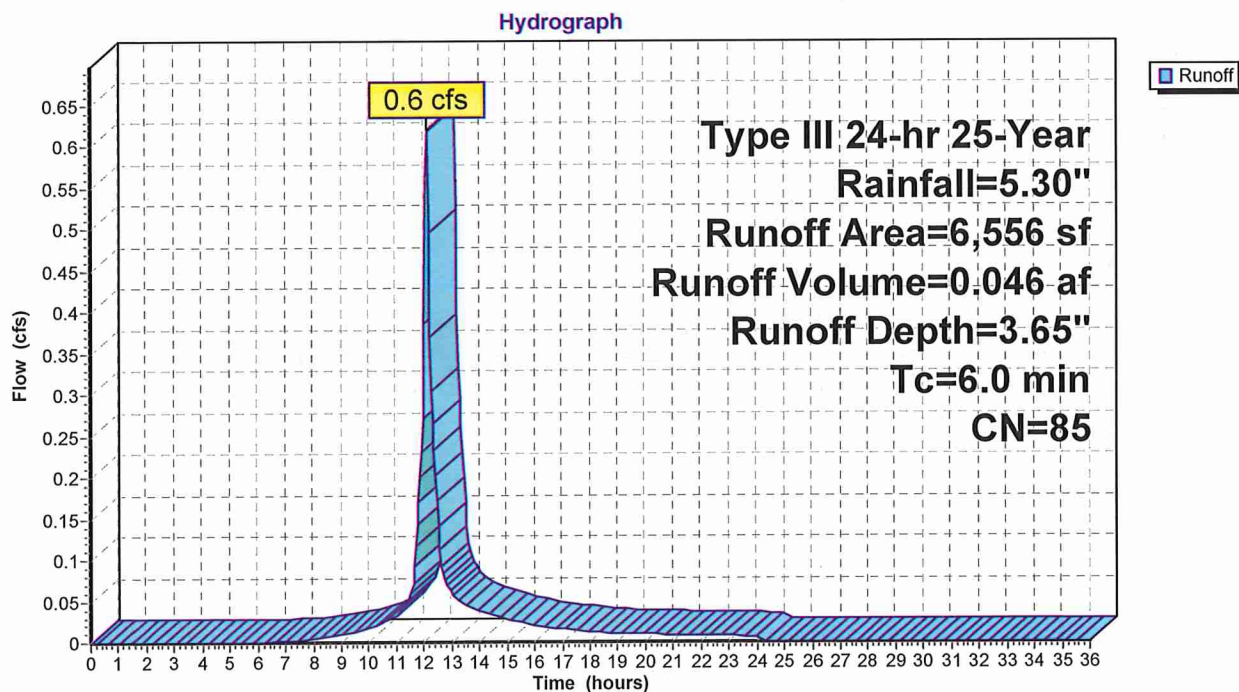
Runoff = 0.6 cfs @ 12.09 hrs, Volume= 0.046 af, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
1,390	39	>75% Grass cover, Good, HSG A
2,573	98	Roofs, HSG A
2,593	98	Paved parking, HSG A
6,556	85	Weighted Average
1,390		21.20% Pervious Area
5,166		78.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6

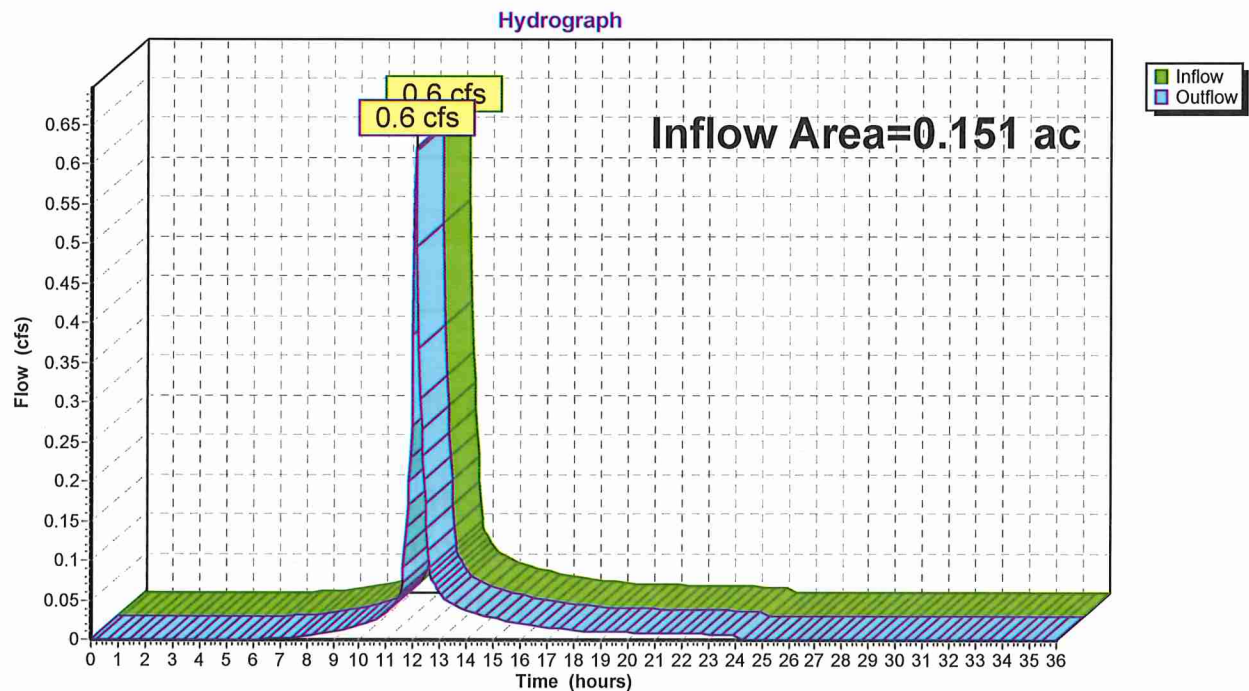
Subcatchment EWA-1:

Summary for Reach EDP-1:

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

Inflow Area = 0.151 ac, 78.80% Impervious, Inflow Depth = 3.65" for 25-Year event
Inflow = 0.6 cfs @ 12.09 hrs, Volume= 0.046 af
Outflow = 0.6 cfs @ 12.09 hrs, Volume= 0.046 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach EDP-1:

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EWA-1:

Runoff Area=6,556 sf 78.80% Impervious Runoff Depth=4.21"

Tc=6.0 min CN=85 Runoff=0.7 cfs 0.053 af

Reach EDP-1:

Inflow=0.7 cfs 0.053 af

Outflow=0.7 cfs 0.053 af

Total Runoff Area = 0.151 ac Runoff Volume = 0.053 af Average Runoff Depth = 4.21"
21.20% Pervious = 0.032 ac 78.80% Impervious = 0.119 ac

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Type III 24-hr 50-Year Rainfall=5.90"

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Page 12

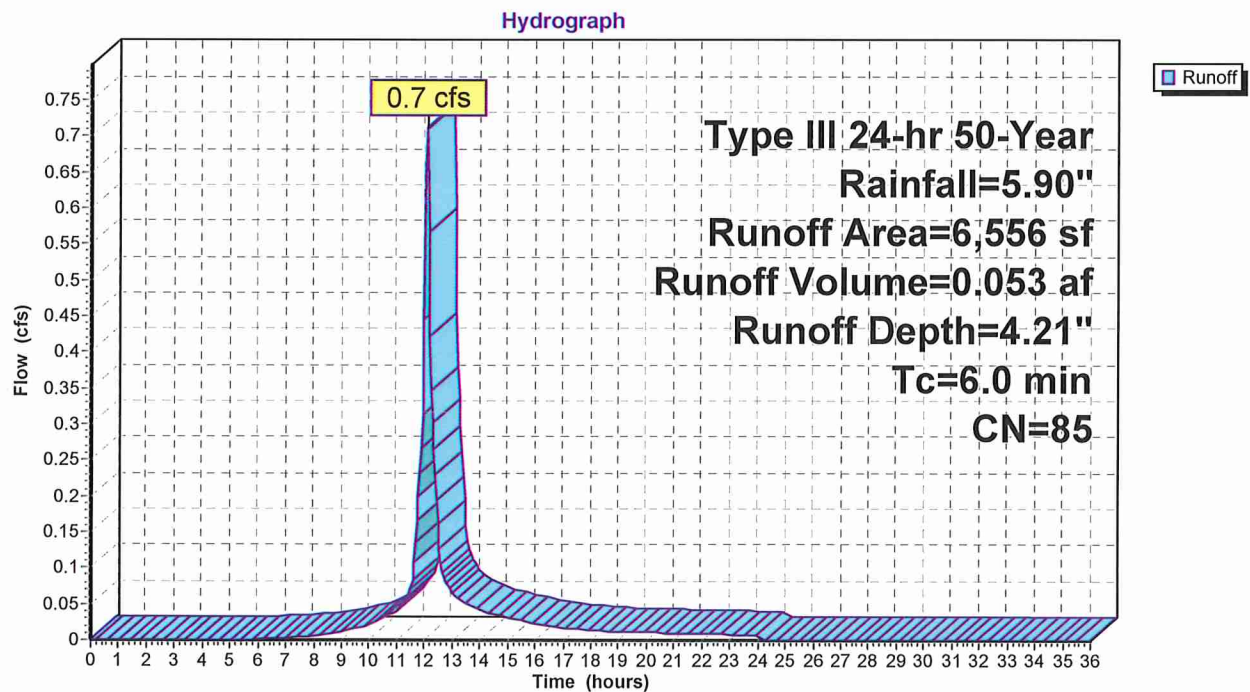
Summary for Subcatchment EWA-1:

Runoff = 0.7 cfs @ 12.09 hrs, Volume= 0.053 af, Depth= 4.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=5.90"

Area (sf)	CN	Description
1,390	39	>75% Grass cover, Good, HSG A
2,573	98	Roofs, HSG A
2,593	98	Paved parking, HSG A
6,556	85	Weighted Average
1,390		21.20% Pervious Area
5,166		78.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6

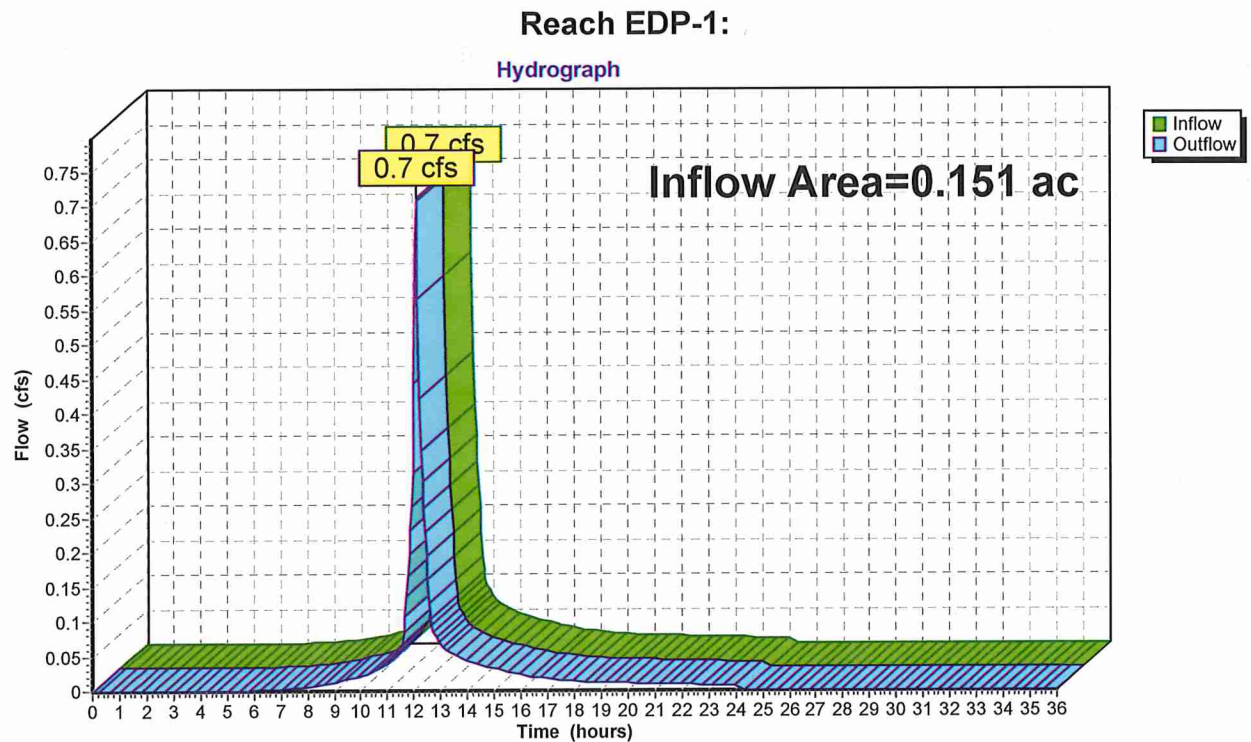
Subcatchment EWA-1:

Summary for Reach EDP-1:

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

Inflow Area = 0.151 ac, 78.80% Impervious, Inflow Depth = 4.21" for 50-Year event
 Inflow = 0.7 cfs @ 12.09 hrs, Volume= 0.053 af
 Outflow = 0.7 cfs @ 12.09 hrs, Volume= 0.053 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs



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Page 14

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEWA-1:

Runoff Area=6,556 sf 78.80% Impervious Runoff Depth=4.78"

Tc=6.0 min CN=85 Runoff=0.8 cfs 0.060 af

Reach EDP-1:

Inflow=0.8 cfs 0.060 af

Outflow=0.8 cfs 0.060 af

Total Runoff Area = 0.151 ac Runoff Volume = 0.060 af Average Runoff Depth = 4.78"
21.20% Pervious = 0.032 ac 78.80% Impervious = 0.119 ac

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Type III 24-hr 100-Year Rainfall=6.50"

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Page 15

Summary for Subcatchment EWA-1:

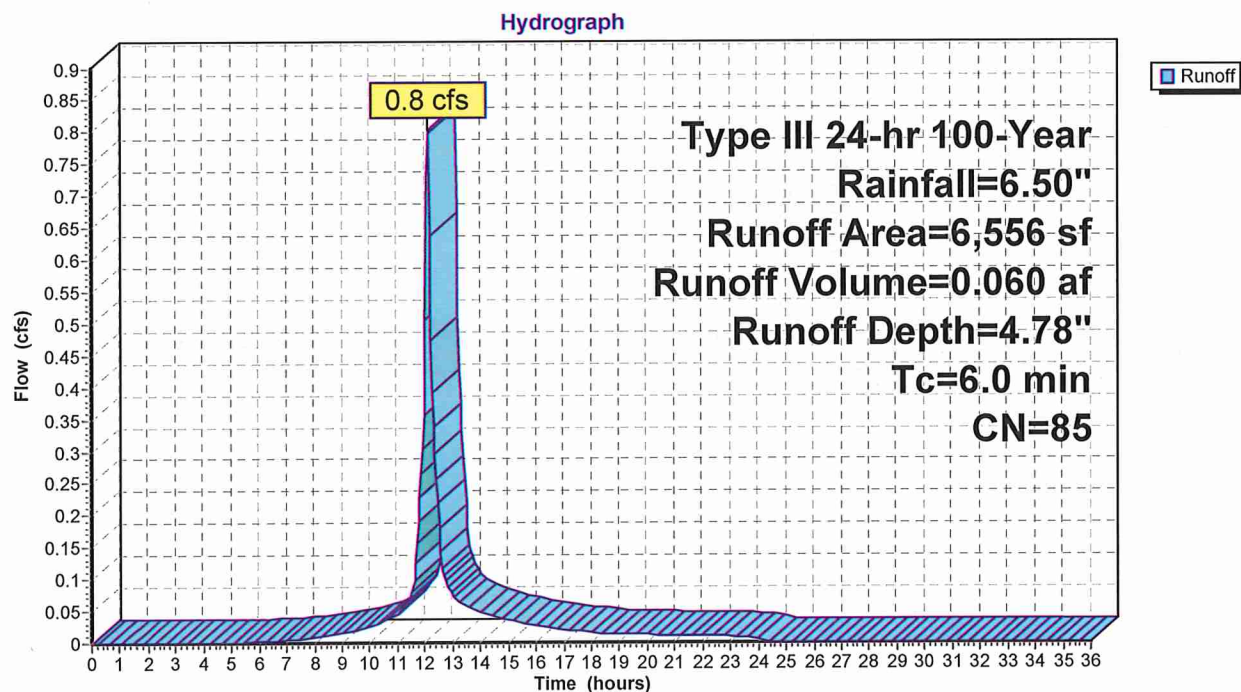
Runoff = 0.8 cfs @ 12.09 hrs, Volume= 0.060 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
1,390	39	>75% Grass cover, Good, HSG A
2,573	98	Roofs, HSG A
2,593	98	Paved parking, HSG A
6,556	85	Weighted Average
1,390		21.20% Pervious Area
5,166		78.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6

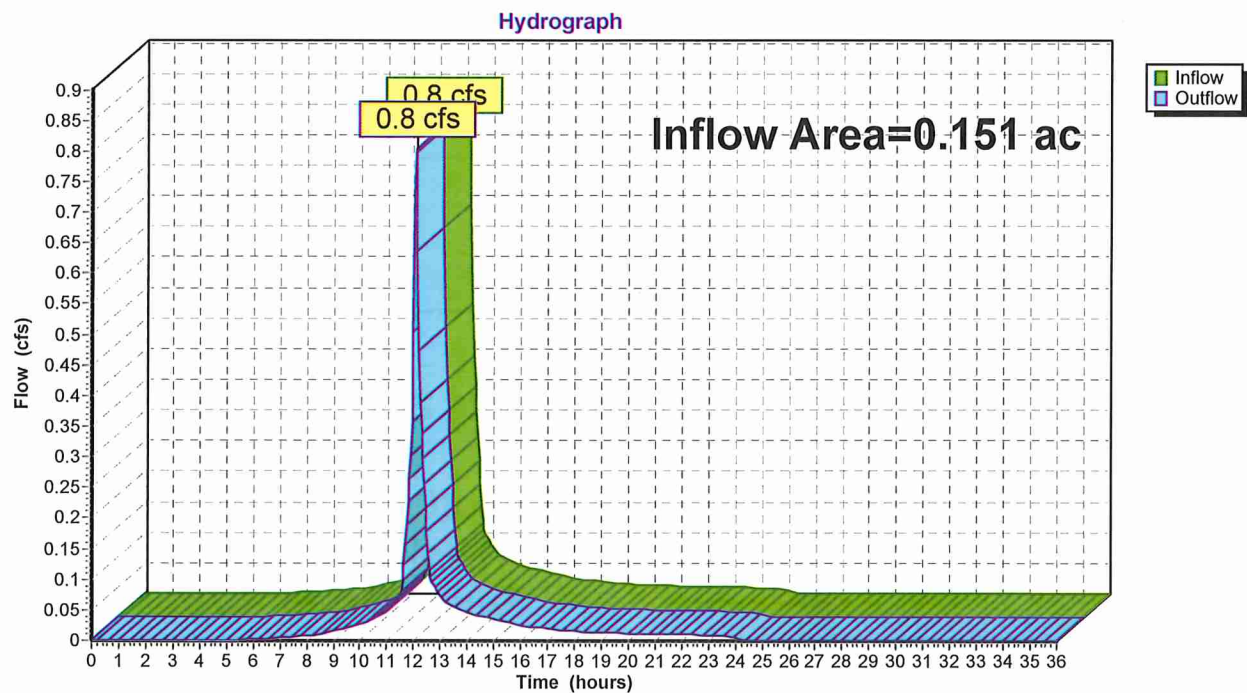
Subcatchment EWA-1:

Summary for Reach EDP-1:

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

Inflow Area = 0.151 ac, 78.80% Impervious, Inflow Depth = 4.78" for 100-Year event
Inflow = 0.8 cfs @ 12.09 hrs, Volume= 0.060 af
Outflow = 0.8 cfs @ 12.09 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min

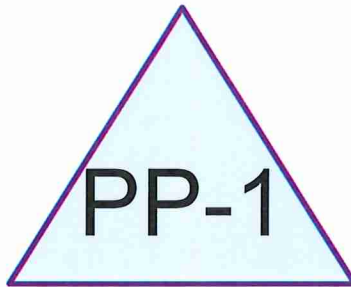
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach EDP-1:

DRAINAGE REPORT

40 Brissette Avenue
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TAB 3



P-1



Drainage Diagram for 21-10289 - Pre-Post

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Page 2

Project Notes

Rainfall events imported from "19-6813 Pre-Development.hcp"

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPWA-1:

Runoff Area=6,556 sf 50.21% Impervious Runoff Depth=0.72"

Tc=6.0 min CN=69 Runoff=0.1 cfs 0.009 af

Pond PP-1: P-1

Peak Elev=4.16' Storage=9 cf Inflow=0.1 cfs 0.009 af

Outflow=0.1 cfs 0.009 af

Total Runoff Area = 0.151 ac Runoff Volume = 0.009 af Average Runoff Depth = 0.72"
49.79% Pervious = 0.075 ac 50.21% Impervious = 0.076 ac

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Type III 24-hr 2-Year Rainfall=3.10"

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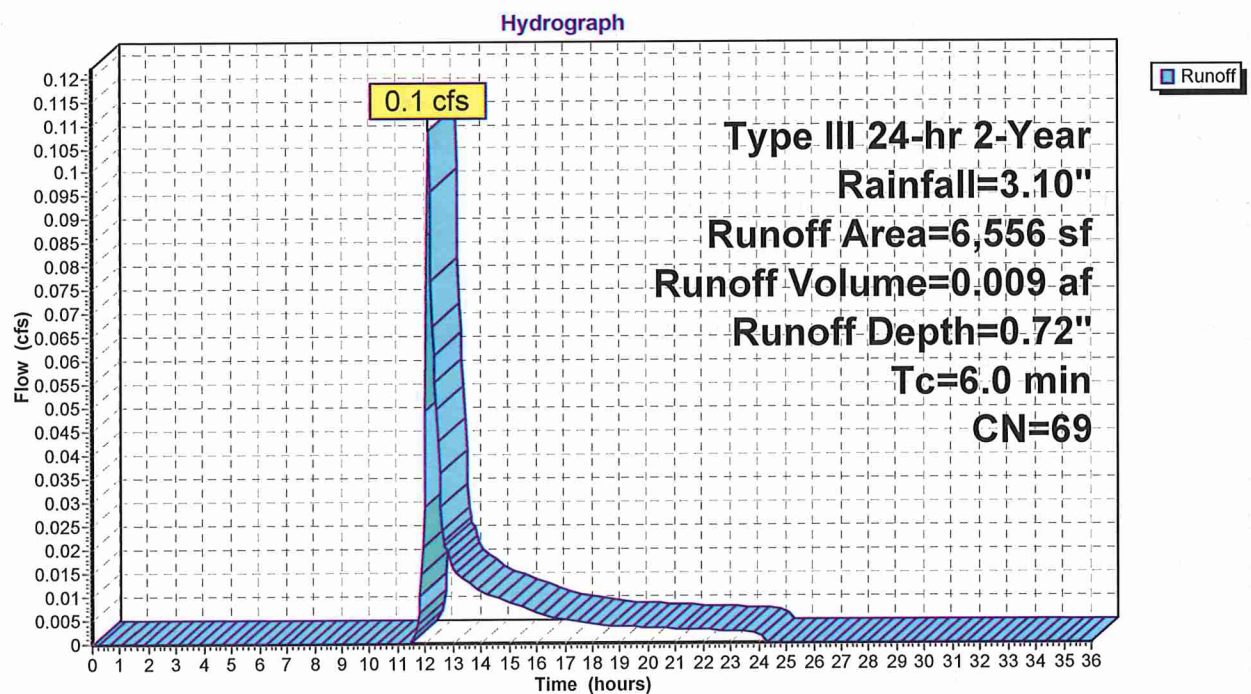
Summary for Subcatchment PWA-1:

Runoff = 0.1 cfs @ 12.11 hrs, Volume= 0.009 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
3,264	39	>75% Grass cover, Good, HSG A
3,228	98	Roofs, HSG A
64	98	Paved parking, HSG A
6,556	69	Weighted Average
3,264		49.79% Pervious Area
3,292		50.21% Impervious Area

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

Subcatchment PWA-1:

21-10289 - Pre-Post

Type III 24-hr 2-Year Rainfall=3.10"

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Page 5

Summary for Pond PP-1: P-1

Inflow Area = 0.151 ac, 50.21% Impervious, Inflow Depth = 0.72" for 2-Year event
 Inflow = 0.1 cfs @ 12.11 hrs, Volume= 0.009 af
 Outflow = 0.1 cfs @ 12.13 hrs, Volume= 0.009 af, Atten= 11%, Lag= 1.2 min
 Discarded = 0.1 cfs @ 12.13 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Peak Elev= 4.16' @ 12.14 hrs Surf.Area= 1,728 sf Storage= 9 cf

Plug-Flow detention time= 1.2 min calculated for 0.009 af (100% of inflow)
 Center-of-Mass det. time= 1.2 min (883.1 - 881.9)

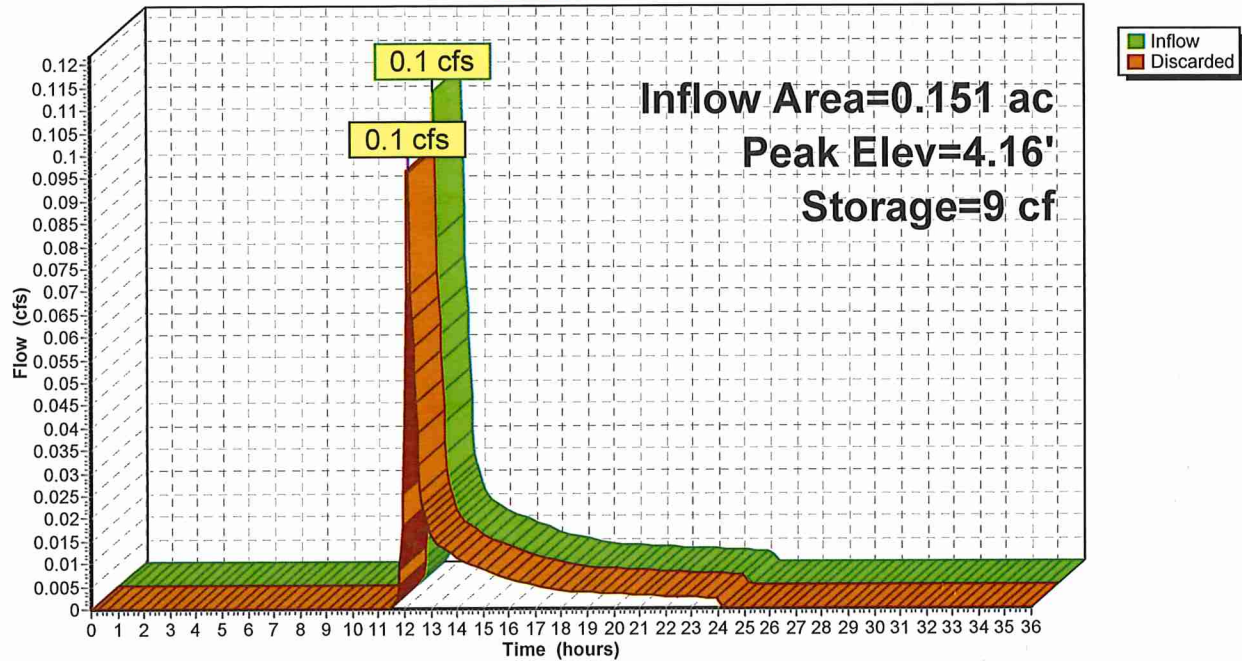
Volume	Invert	Avail.Storage	Storage Description	
#1	4.15'	1,258 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.15	1,728	0.0	0	0
4.16	1,728	40.0	7	7
4.90	1,728	40.0	511	518
4.91	1,728	30.0	5	524
6.24	1,728	30.0	689	1,213
6.25	1,728	10.0	2	1,215
6.50	1,728	10.0	43	1,258

Device	Routing	Invert	Outlet Devices
#1	Discarded	4.15'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.1 cfs @ 12.13 hrs HW=4.16' (Free Discharge)
 ↑1=Exfiltration (Controls 0.1 cfs)

Pond PP-1: P-1

Hydrograph



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Type III 24-hr 2-Year Rainfall=3.10"

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Page 7

Stage-Area-Storage for Pond PP-1: P-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
4.15	1,728	0
4.20	1,728	35
4.25	1,728	69
4.30	1,728	104
4.35	1,728	138
4.40	1,728	173
4.45	1,728	207
4.50	1,728	242
4.55	1,728	276
4.60	1,728	311
4.65	1,728	346
4.70	1,728	380
4.75	1,728	415
4.80	1,728	449
4.85	1,728	484
4.90	1,728	518
4.95	1,728	544
5.00	1,728	570
5.05	1,728	596
5.10	1,728	622
5.15	1,728	648
5.20	1,728	674
5.25	1,728	700
5.30	1,728	726
5.35	1,728	752
5.40	1,728	778
5.45	1,728	804
5.50	1,728	829
5.55	1,728	855
5.60	1,728	881
5.65	1,728	907
5.70	1,728	933
5.75	1,728	959
5.80	1,728	985
5.85	1,728	1,011
5.90	1,728	1,037
5.95	1,728	1,063
6.00	1,728	1,089
6.05	1,728	1,115
6.10	1,728	1,140
6.15	1,728	1,166
6.20	1,728	1,192
6.25	1,728	1,215
6.30	1,728	1,223
6.35	1,728	1,232
6.40	1,728	1,241
6.45	1,728	1,249
6.50	1,728	1,258

21-10289 - Pre-Post*Type III 24-hr 10-Year Rainfall=4.50"*

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Page 8

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWA-1:

Runoff Area=6,556 sf 50.21% Impervious Runoff Depth=1.60"

Tc=6.0 min CN=69 Runoff=0.3 cfs 0.020 af

Pond PP-1: P-1

Peak Elev=4.33' Storage=125 cf Inflow=0.3 cfs 0.020 af

Outflow=0.1 cfs 0.020 af

Total Runoff Area = 0.151 ac Runoff Volume = 0.020 af Average Runoff Depth = 1.60"
49.79% Pervious = 0.075 ac 50.21% Impervious = 0.076 ac

21-10289 - Pre-Post

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Type III 24-hr 10-Year Rainfall=4.50"

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Page 9

Summary for Subcatchment PWA-1:

Runoff = 0.3 cfs @ 12.10 hrs, Volume= 0.020 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

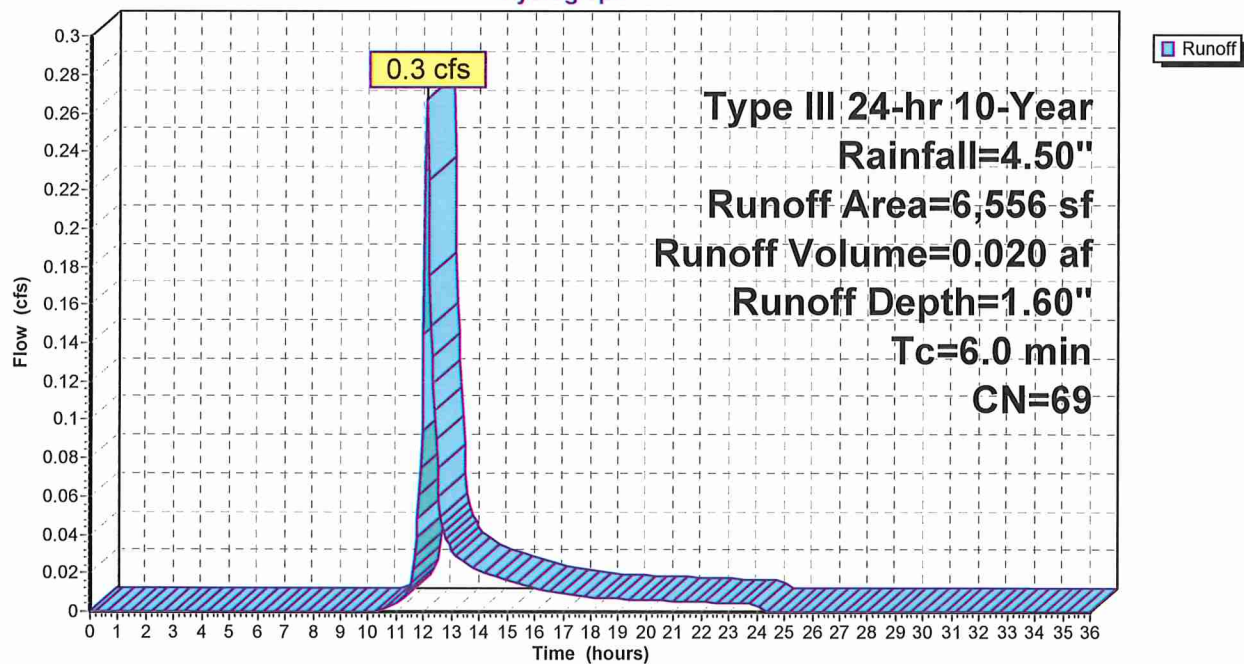
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
3,264	39	>75% Grass cover, Good, HSG A
3,228	98	Roofs, HSG A
64	98	Paved parking, HSG A
6,556	69	Weighted Average
3,264		49.79% Pervious Area
3,292		50.21% Impervious Area

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

Subcatchment PWA-1:

Hydrograph



21-10289 - Pre-Post

Type III 24-hr 10-Year Rainfall=4.50"

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Page 10

Summary for Pond PP-1: P-1

Inflow Area = 0.151 ac, 50.21% Impervious, Inflow Depth = 1.60" for 10-Year event
 Inflow = 0.3 cfs @ 12.10 hrs, Volume= 0.020 af
 Outflow = 0.1 cfs @ 12.41 hrs, Volume= 0.020 af, Atten= 62%, Lag= 18.9 min
 Discarded = 0.1 cfs @ 12.41 hrs, Volume= 0.020 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Peak Elev= 4.33' @ 12.41 hrs Surf.Area= 1,728 sf Storage= 125 cf

Plug-Flow detention time= 6.5 min calculated for 0.020 af (100% of inflow)
 Center-of-Mass det. time= 6.5 min (862.8 - 856.3)

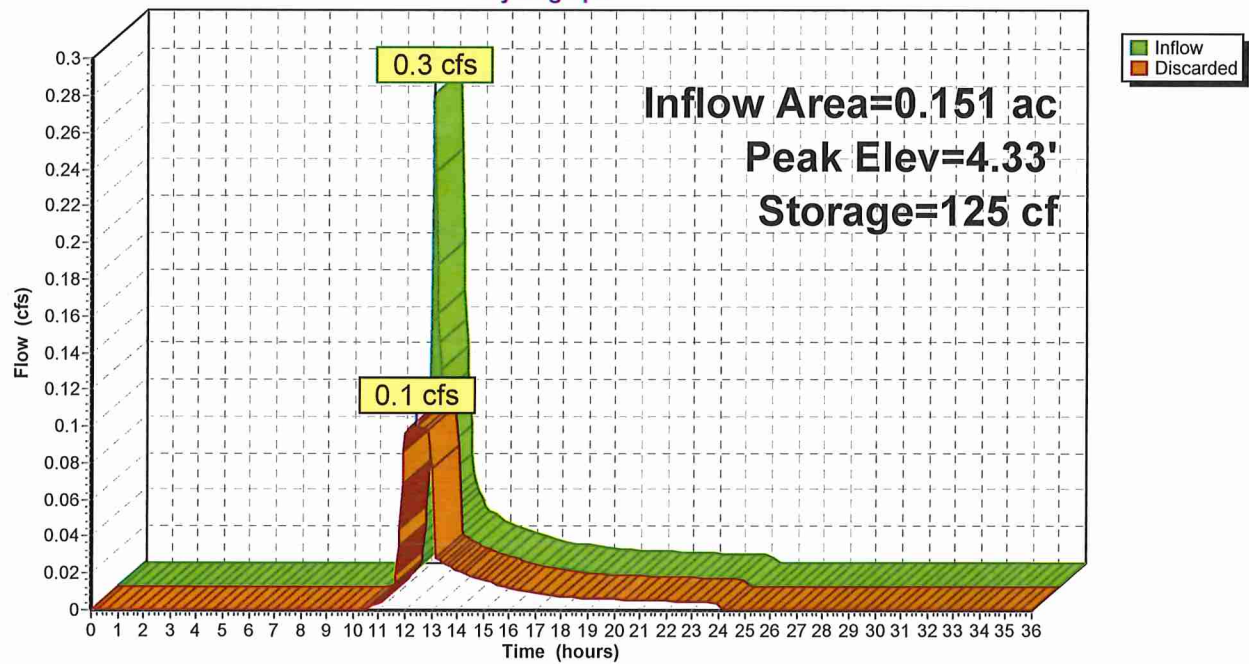
Volume	Invert	Avail.Storage	Storage Description	
#1	4.15'	1,258 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.15	1,728	0.0	0	0
4.16	1,728	40.0	7	7
4.90	1,728	40.0	511	518
4.91	1,728	30.0	5	524
6.24	1,728	30.0	689	1,213
6.25	1,728	10.0	2	1,215
6.50	1,728	10.0	43	1,258

Device	Routing	Invert	Outlet Devices
#1	Discarded	4.15'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.1 cfs @ 12.41 hrs HW=4.33' (Free Discharge)
 ↑1=Exfiltration (Controls 0.1 cfs)

Pond PP-1: P-1

Hydrograph



21-10289 - Pre-Post*Type III 24-hr 10-Year Rainfall=4.50"*

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Page 12

Stage-Area-Storage for Pond PP-1: P-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
4.15	1,728	0
4.20	1,728	35
4.25	1,728	69
4.30	1,728	104
4.35	1,728	138
4.40	1,728	173
4.45	1,728	207
4.50	1,728	242
4.55	1,728	276
4.60	1,728	311
4.65	1,728	346
4.70	1,728	380
4.75	1,728	415
4.80	1,728	449
4.85	1,728	484
4.90	1,728	518
4.95	1,728	544
5.00	1,728	570
5.05	1,728	596
5.10	1,728	622
5.15	1,728	648
5.20	1,728	674
5.25	1,728	700
5.30	1,728	726
5.35	1,728	752
5.40	1,728	778
5.45	1,728	804
5.50	1,728	829
5.55	1,728	855
5.60	1,728	881
5.65	1,728	907
5.70	1,728	933
5.75	1,728	959
5.80	1,728	985
5.85	1,728	1,011
5.90	1,728	1,037
5.95	1,728	1,063
6.00	1,728	1,089
6.05	1,728	1,115
6.10	1,728	1,140
6.15	1,728	1,166
6.20	1,728	1,192
6.25	1,728	1,215
6.30	1,728	1,223
6.35	1,728	1,232
6.40	1,728	1,241
6.45	1,728	1,249
6.50	1,728	1,258

21-10289 - Pre-Post*Type III 24-hr 25-Year Rainfall=5.30"*

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Page 13

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWA-1:

Runoff Area=6,556 sf 50.21% Impervious Runoff Depth=2.18"

Tc=6.0 min CN=69 Runoff=0.4 cfs 0.027 af

Pond PP-1: P-1

Peak Elev=4.49' Storage=237 cf Inflow=0.4 cfs 0.027 af

Outflow=0.1 cfs 0.027 af

Total Runoff Area = 0.151 ac Runoff Volume = 0.027 af Average Runoff Depth = 2.18"
49.79% Pervious = 0.075 ac 50.21% Impervious = 0.076 ac

21-10289 - Pre-Post

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Type III 24-hr 25-Year Rainfall=5.30"

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Page 14

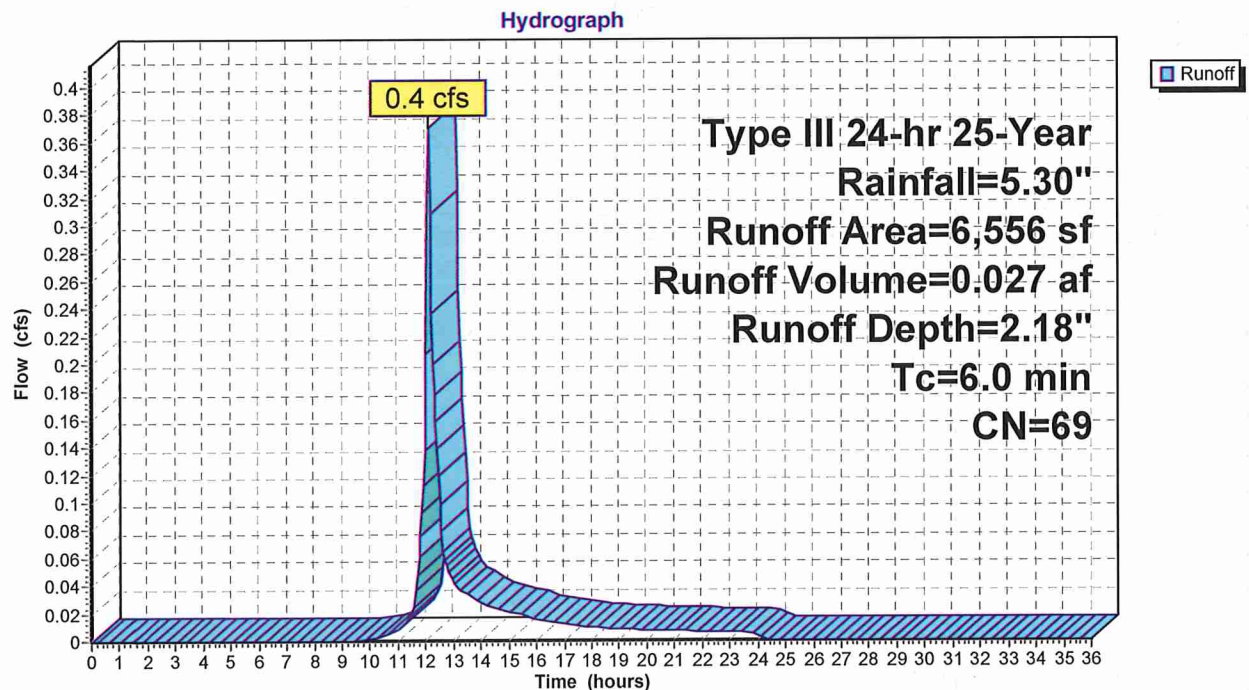
Summary for Subcatchment PWA-1:

Runoff = 0.4 cfs @ 12.10 hrs, Volume= 0.027 af, Depth= 2.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
3,264	39	>75% Grass cover, Good, HSG A
3,228	98	Roofs, HSG A
64	98	Paved parking, HSG A
6,556	69	Weighted Average
3,264		49.79% Pervious Area
3,292		50.21% Impervious Area

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

Subcatchment PWA-1:

21-10289 - Pre-Post

Type III 24-hr 25-Year Rainfall=5.30"

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Page 15

Summary for Pond PP-1: P-1

Inflow Area = 0.151 ac, 50.21% Impervious, Inflow Depth = 2.18" for 25-Year event
 Inflow = 0.4 cfs @ 12.10 hrs, Volume= 0.027 af
 Outflow = 0.1 cfs @ 12.49 hrs, Volume= 0.027 af, Atten= 72%, Lag= 23.4 min
 Discarded = 0.1 cfs @ 12.49 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Peak Elev= 4.49' @ 12.49 hrs Surf.Area= 1,728 sf Storage= 237 cf

Plug-Flow detention time= 12.7 min calculated for 0.027 af (100% of inflow)
 Center-of-Mass det. time= 12.7 min (859.7 - 847.1)

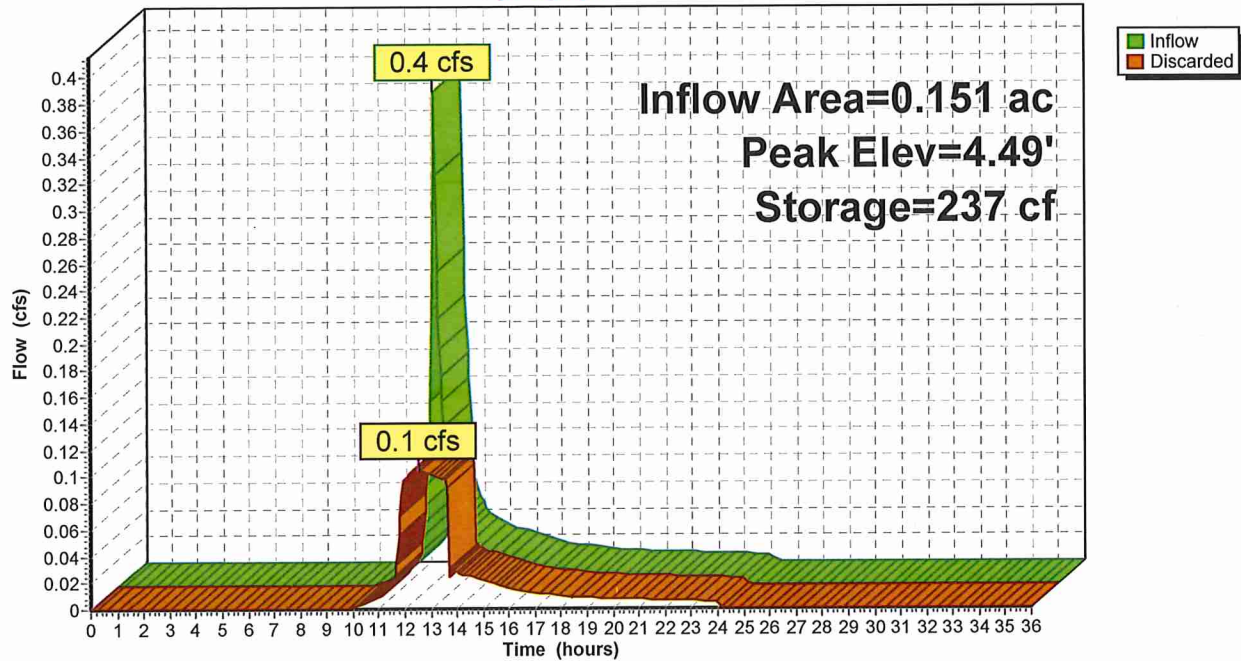
Volume	Invert	Avail.Storage	Storage Description	
#1	4.15'	1,258 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.15	1,728	0.0	0	0
4.16	1,728	40.0	7	7
4.90	1,728	40.0	511	518
4.91	1,728	30.0	5	524
6.24	1,728	30.0	689	1,213
6.25	1,728	10.0	2	1,215
6.50	1,728	10.0	43	1,258

Device	Routing	Invert	Outlet Devices
#1	Discarded	4.15'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.1 cfs @ 12.49 hrs HW=4.49' (Free Discharge)
 ↑1=Exfiltration (Controls 0.1 cfs)

Pond PP-1: P-1

Hydrograph



21-10289 - Pre-Post*Type III 24-hr 25-Year Rainfall=5.30"*

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Page 17

Stage-Area-Storage for Pond PP-1: P-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
4.15	1,728	0
4.20	1,728	35
4.25	1,728	69
4.30	1,728	104
4.35	1,728	138
4.40	1,728	173
4.45	1,728	207
4.50	1,728	242
4.55	1,728	276
4.60	1,728	311
4.65	1,728	346
4.70	1,728	380
4.75	1,728	415
4.80	1,728	449
4.85	1,728	484
4.90	1,728	518
4.95	1,728	544
5.00	1,728	570
5.05	1,728	596
5.10	1,728	622
5.15	1,728	648
5.20	1,728	674
5.25	1,728	700
5.30	1,728	726
5.35	1,728	752
5.40	1,728	778
5.45	1,728	804
5.50	1,728	829
5.55	1,728	855
5.60	1,728	881
5.65	1,728	907
5.70	1,728	933
5.75	1,728	959
5.80	1,728	985
5.85	1,728	1,011
5.90	1,728	1,037
5.95	1,728	1,063
6.00	1,728	1,089
6.05	1,728	1,115
6.10	1,728	1,140
6.15	1,728	1,166
6.20	1,728	1,192
6.25	1,728	1,215
6.30	1,728	1,223
6.35	1,728	1,232
6.40	1,728	1,241
6.45	1,728	1,249
6.50	1,728	1,258

21-10289 - Pre-Post*Type III 24-hr 50-Year Rainfall=5.90"*

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Page 18

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWA-1:

Runoff Area=6,556 sf 50.21% Impervious Runoff Depth=2.63"

Tc=6.0 min CN=69 Runoff=0.5 cfs 0.033 af

Pond PP-1: P-1

Peak Elev=4.64' Storage=335 cf Inflow=0.5 cfs 0.033 af

Outflow=0.1 cfs 0.033 af

Total Runoff Area = 0.151 ac Runoff Volume = 0.033 af Average Runoff Depth = 2.63"
49.79% Pervious = 0.075 ac 50.21% Impervious = 0.076 ac

21-10289 - Pre-Post

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Type III 24-hr 50-Year Rainfall=5.90"

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Page 19

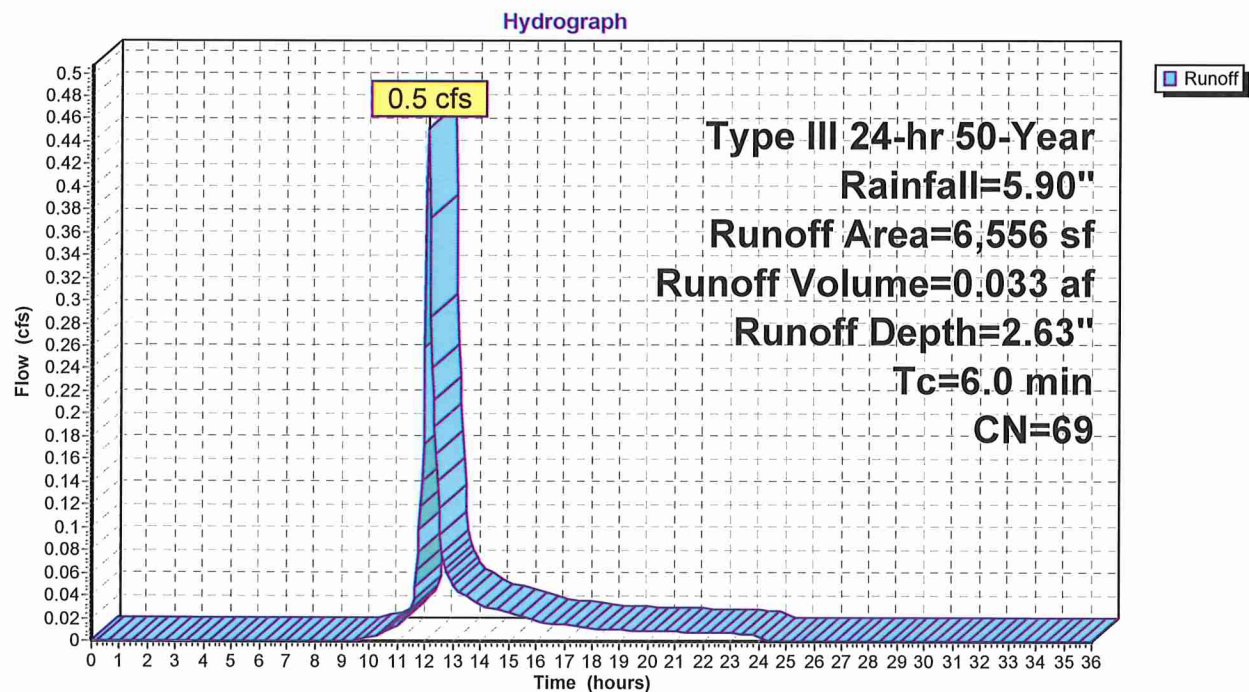
Summary for Subcatchment PWA-1:

Runoff = 0.5 cfs @ 12.10 hrs, Volume= 0.033 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=5.90"

Area (sf)	CN	Description
3,264	39	>75% Grass cover, Good, HSG A
3,228	98	Roofs, HSG A
64	98	Paved parking, HSG A
6,556	69	Weighted Average
3,264		49.79% Pervious Area
3,292		50.21% Impervious Area

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

Subcatchment PWA-1:

21-10289 - Pre-Post

Type III 24-hr 50-Year Rainfall=5.90"

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Page 20

Summary for Pond PP-1: P-1

Inflow Area = 0.151 ac, 50.21% Impervious, Inflow Depth = 2.63" for 50-Year event
 Inflow = 0.5 cfs @ 12.10 hrs, Volume= 0.033 af
 Outflow = 0.1 cfs @ 12.52 hrs, Volume= 0.033 af, Atten= 76%, Lag= 25.5 min
 Discarded = 0.1 cfs @ 12.52 hrs, Volume= 0.033 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Peak Elev= 4.64' @ 12.52 hrs Surf.Area= 1,728 sf Storage= 335 cf

Plug-Flow detention time= 18.7 min calculated for 0.033 af (100% of inflow)
 Center-of-Mass det. time= 18.7 min (860.1 - 841.5)

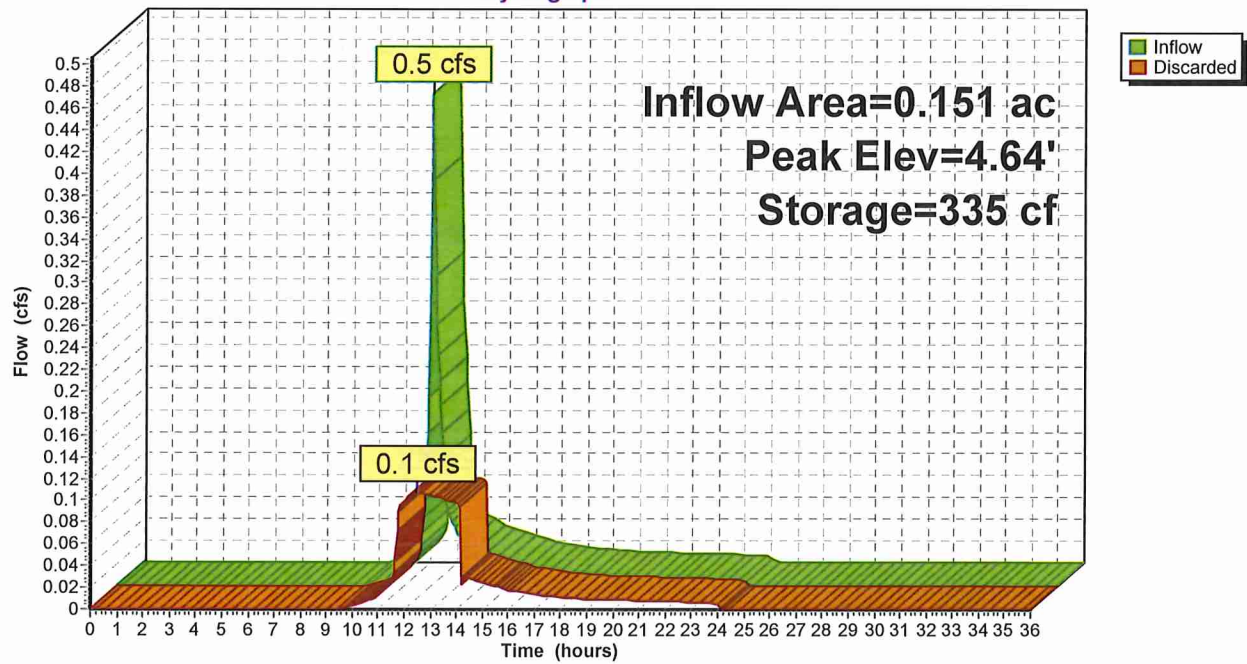
Volume	Invert	Avail.Storage	Storage Description	
#1	4.15'	1,258 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.15	1,728	0.0	0	0
4.16	1,728	40.0	7	7
4.90	1,728	40.0	511	518
4.91	1,728	30.0	5	524
6.24	1,728	30.0	689	1,213
6.25	1,728	10.0	2	1,215
6.50	1,728	10.0	43	1,258

Device	Routing	Invert	Outlet Devices
#1	Discarded	4.15'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.1 cfs @ 12.52 hrs HW=4.63' (Free Discharge)
 ↑1=Exfiltration (Controls 0.1 cfs)

Pond PP-1: P-1

Hydrograph



Stage-Area-Storage for Pond PP-1: P-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
4.15	1,728	0
4.20	1,728	35
4.25	1,728	69
4.30	1,728	104
4.35	1,728	138
4.40	1,728	173
4.45	1,728	207
4.50	1,728	242
4.55	1,728	276
4.60	1,728	311
4.65	1,728	346
4.70	1,728	380
4.75	1,728	415
4.80	1,728	449
4.85	1,728	484
4.90	1,728	518
4.95	1,728	544
5.00	1,728	570
5.05	1,728	596
5.10	1,728	622
5.15	1,728	648
5.20	1,728	674
5.25	1,728	700
5.30	1,728	726
5.35	1,728	752
5.40	1,728	778
5.45	1,728	804
5.50	1,728	829
5.55	1,728	855
5.60	1,728	881
5.65	1,728	907
5.70	1,728	933
5.75	1,728	959
5.80	1,728	985
5.85	1,728	1,011
5.90	1,728	1,037
5.95	1,728	1,063
6.00	1,728	1,089
6.05	1,728	1,115
6.10	1,728	1,140
6.15	1,728	1,166
6.20	1,728	1,192
6.25	1,728	1,215
6.30	1,728	1,223
6.35	1,728	1,232
6.40	1,728	1,241
6.45	1,728	1,249
6.50	1,728	1,258

21-10289 - Pre-Post*Type III 24-hr 100-Year Rainfall=6.50"*

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Page 23

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPWA-1:

Runoff Area=6,556 sf 50.21% Impervious Runoff Depth=3.11"

Tc=6.0 min CN=69 Runoff=0.5 cfs 0.039 af

Pond PP-1: P-1

Peak Elev=4.79' Storage=442 cf Inflow=0.5 cfs 0.039 af

Outflow=0.1 cfs 0.039 af

Total Runoff Area = 0.151 ac Runoff Volume = 0.039 af Average Runoff Depth = 3.11"
49.79% Pervious = 0.075 ac 50.21% Impervious = 0.076 ac

21-10289 - Pre-Post

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Type III 24-hr 100-Year Rainfall=6.50"

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Page 24

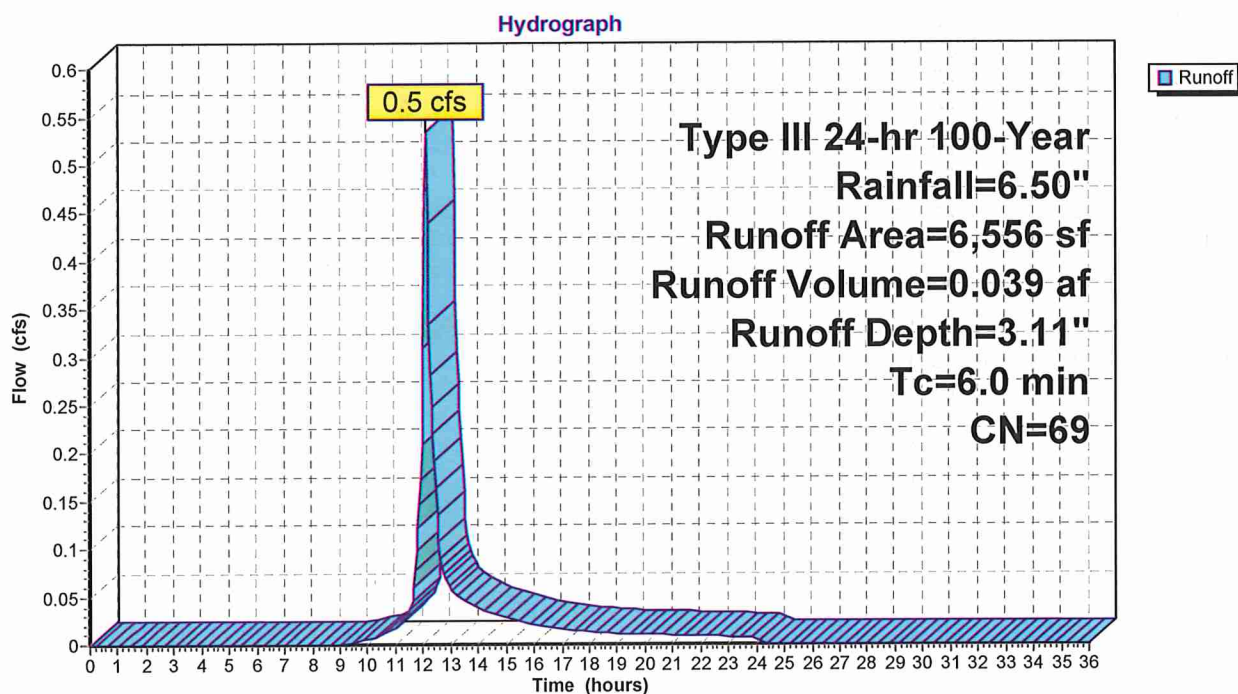
Summary for Subcatchment PWA-1:

Runoff = 0.5 cfs @ 12.09 hrs, Volume= 0.039 af, Depth= 3.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
3,264	39	>75% Grass cover, Good, HSG A
3,228	98	Roofs, HSG A
64	98	Paved parking, HSG A
6,556	69	Weighted Average
3,264		49.79% Pervious Area
3,292		50.21% Impervious Area

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

Subcatchment PWA-1:

21-10289 - Pre-Post

Type III 24-hr 100-Year Rainfall=6.50"

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Page 25

Summary for Pond PP-1: P-1

Inflow Area = 0.151 ac, 50.21% Impervious, Inflow Depth = 3.11" for 100-Year event
 Inflow = 0.5 cfs @ 12.09 hrs, Volume= 0.039 af
 Outflow = 0.1 cfs @ 12.55 hrs, Volume= 0.039 af, Atten= 79%, Lag= 27.2 min
 Discarded = 0.1 cfs @ 12.55 hrs, Volume= 0.039 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Peak Elev= 4.79' @ 12.55 hrs Surf.Area= 1,728 sf Storage= 442 cf

Plug-Flow detention time= 25.6 min calculated for 0.039 af (100% of inflow)
 Center-of-Mass det. time= 25.6 min (862.2 - 836.6)

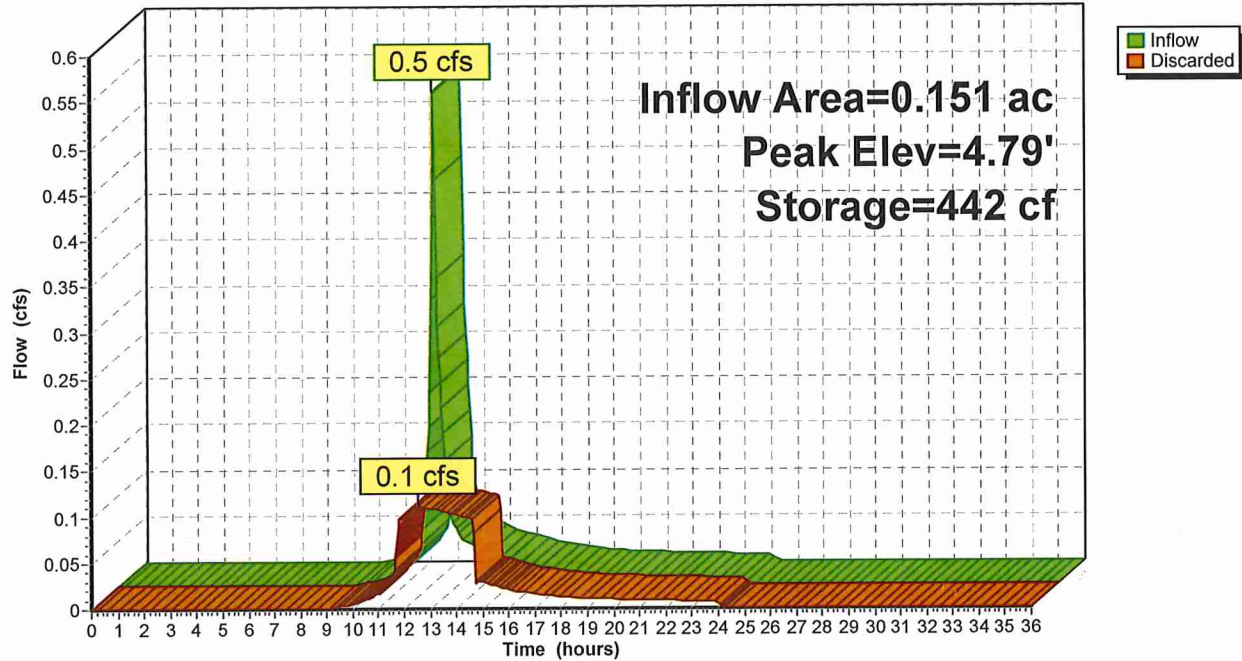
Volume	Invert	Avail.Storage	Storage Description	
#1	4.15'	1,258 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.15	1,728	0.0	0	0
4.16	1,728	40.0	7	7
4.90	1,728	40.0	511	518
4.91	1,728	30.0	5	524
6.24	1,728	30.0	689	1,213
6.25	1,728	10.0	2	1,215
6.50	1,728	10.0	43	1,258

Device	Routing	Invert	Outlet Devices
#1	Discarded	4.15'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 0.00'

Discarded OutFlow Max=0.1 cfs @ 12.55 hrs HW=4.79' (Free Discharge)
 ↑1=Exfiltration (Controls 0.1 cfs)

Pond PP-1: P-1

Hydrograph



21-10289 - Pre-Post*Type III 24-hr 100-Year Rainfall=6.50"*

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Page 27

Stage-Area-Storage for Pond PP-1: P-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
4.15	1,728	0
4.20	1,728	35
4.25	1,728	69
4.30	1,728	104
4.35	1,728	138
4.40	1,728	173
4.45	1,728	207
4.50	1,728	242
4.55	1,728	276
4.60	1,728	311
4.65	1,728	346
4.70	1,728	380
4.75	1,728	415
4.80	1,728	449
4.85	1,728	484
4.90	1,728	518
4.95	1,728	544
5.00	1,728	570
5.05	1,728	596
5.10	1,728	622
5.15	1,728	648
5.20	1,728	674
5.25	1,728	700
5.30	1,728	726
5.35	1,728	752
5.40	1,728	778
5.45	1,728	804
5.50	1,728	829
5.55	1,728	855
5.60	1,728	881
5.65	1,728	907
5.70	1,728	933
5.75	1,728	959
5.80	1,728	985
5.85	1,728	1,011
5.90	1,728	1,037
5.95	1,728	1,063
6.00	1,728	1,089
6.05	1,728	1,115
6.10	1,728	1,140
6.15	1,728	1,166
6.20	1,728	1,192
6.25	1,728	1,215
6.30	1,728	1,223
6.35	1,728	1,232
6.40	1,728	1,241
6.45	1,728	1,249
6.50	1,728	1,258

DRAINAGE REPORT

40 Brissette Avenue
Salisbury, Massachusetts

TAB 4



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 8²
- 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.



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

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): Porous Pavers

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.

Project: 40 Brissette Avenue
Location: Salisbury, MA
Client: Father & Son Construction

Project Number: 21-10289
Prepared By: William Hall, P.E.
Date: November 16, 2021

STORMWATER MANAGEMENT STANDARDS CALCULATIONS

Standard 1: Velocity & Rip-Rap Apron Sizing and Gradation Calculations

- Not Applicable, no outlets proposed.

Conclusion: No stormwater discharges are proposed, the Stormwater Management System conforms to Standard 1.

Standard 2: Peak Discharge Summary (CFS)

	2-Year (3.1-IN)	10-Year (4.5-IN)	25-Year (5.3-IN)	50-Year (5.9-IN)	100-Year (6.5-IN)
Design Point 1					
Pre-Development Conditions:	0.3	0.5	0.6	0.7	0.8
Post Development Conditions:	0.0	0.0	0.0	0.0	0.0

Peak Volume Summary (AC.-FT)

	2-Year (3.1-IN)	10-Year (4.5-IN)	25-Year (5.3-IN)	50-Year (5.9-IN)	100-Year (6.5-IN)
Design Point 1					
Pre-Development Conditions:	0.021	0.036	0.046	0.053	0.060
Post Development Conditions:	0.00	0.00	0.00	0.00	0.00

Conclusion: The Stormwater Management System conforms to Standard 2.

Standard 3: Recharge Calculations (Static Method)

Porous Pavers

Hydrologic Soils Group:	A	B	C	D	
Total Proposed Impervious Area:	0.08	0.00	0.00	0.00	0.08
Target Factor:	0.60	0.35	0.25	0.10	
Required Recharge Volume:	165	0	0	0	165 CF
Volume Provided:					1,258 CF

Determine Drawdown Time

Saturated Hydraulic Conductivity (Rawls Rate):	2.41 IN/HR
Bottom Area of Infiltration Basin:	1,728 SF
Drawdown Time:	3.6 HRS

Conclusion: The volume provided in the porous pavers exceeds the minimum recharge volume required. In addition, the pavers drain within 72-HRS to comply with DEP regulations. The Stormwater Management System conforms to Standard 3.

Standard 4: Water Quality Volume Calculations

Porous Pavers

Water Quality Depth:	1.0 IN
Total Proposed Impervious Area:	0.08 Acres
Required Water Quality Volume:	274 CF
Provided Water Quality Volume:	1,258 CF

TSS Removal Rate Calculations

Treatment Provided From Porous Pavers

	TSS Removal Rate	Starting TSS Load	Amount Removed	Remaining Load
Street Sweeping:	80%	1.00	0.80	0.20
TSS Removed at Discharge from Pond:				80.0%

Conclusion: The volume provided by the storage course of the pavers (346-CF) exceeds the Water Quality Volume, therefore the TSS Removal Rate meets 80%. The Stormwater Management System conforms to Standard 4.

Standard 5: Land Uses With Higher Potential Pollutant Loads

Conclusion: The proposed use is not considered a Land Use with Higher Potential Pollutant Loads. This Standard is NOT Applicable.

Standard 6: Critical Areas


Conclusion: The proposal is not located within a Critical Area. This Standard is NOT Applicable.

Standard 7: Redevelopment

Conclusion: The development does meet the criteria for Redevelopment. All standards have been met through the use of porous pavers.


Standard 8: Construction Period Controls

Conclusion: The project is not covered by a NPDES Construction General Permit. An erosion and sedimentation control plan has been submitted to address construction period pollution prevention measures and to reduce the potential for erosion and sedimentation. The Stormwater Management System Conforms to Standard 8.




Standard 9: Operations and Maintenance Plan

Conclusion: An Operations and Maintenance Plan has been prepared and provided with this summary. The Stormwater Management System Conforms to Standard 9.



Standard 10: Illicit Discharges to Drainage System

Conclusion: All off-site discharges are comprised entirely of stormwater. The Stormwater Management System Conforms to Standard 10.



OPERATIONS AND MAINTENANCE PLAN

November 16, 2021

This Operations and Maintenance (O&M) Plan has been prepared in accordance with the Stormwater Management Policy issued by the Department of Environmental Protection (DEP) for 40 Brissette Avenue in Salisbury, MA.

Porous pavers are an effective BMP used for stormwater mitigation. However, due to the nature of the permeable surface of the pavers, an aggressive maintenance and inspection schedule is required. Upon a period beginning twelve months after the completion of the roadway, the porous pavers shall be inspected annually. Maintenance and inspection shall be performed as indicated below:

Visual Inspection

The surface must be inspected annually for signs of degradation and spalling of the pavers. Regularly monitor the surface after storm events to make sure that the surface drains properly. Puddling could be an indication of clogging of the pavement or subsurface drainage system. Pavers shall be weeded and mowed as required to control vegetation.

Snow Storage / Removal

Snow plowed from the proposed driveway will be placed or disposed of in accordance with the policy developed by DEP. Under no circumstances shall snow plowed or removed from the road be stockpiled within the Town right-of-way. If conditions arise where snow storage areas are at capacity the Operator is required to remove and dispose of snow off site in conformance with all local, state and federal regulations.

Property Applicant / Responsible Party During Construction:

Father & Son Construction
Todd Fitzgerald
85 South Main Street
Newton, NH 03858

Responsible Party After Construction:

40 Brissette Avenue Homeowners Association

Construction Period Pollution Prevention Plan:

See Sheet C-4 for construction period erosion and sedimentation control measure.

System Map:

See Sheet C-3 for the location of all stormwater management facilities.

Estimated Operations and Maintenance Budget

It is anticipated that the pervious pavement system will be maintained by the homeowners association. All maintenance will be performed as required. An annual budget of \$1,500 a year should be specified in the homeowners documents for operations and maintenance of the obligations.

