STORM DRAINAGE MANAGEMENT REPORT

35 SAGATOGA BOULEVARD

Devens, Massachusetts

October 12, 2022

Prepared by:

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1.0 INTRODUCTION:

This Stormwater Report represents the hydraulic analysis for the proposed Industrial Building and associated site improvements for 35 Saratoga Boulevard, Devens, Massachusetts. New Stormwater systems components will be constructed to provide the ability to capture sediments, trap oil and grease, and use groundwater recharge principles through recharge thru porous pavement and a subsurface infiltration basin for the site. All new pavement run-off after the site improvements will be routed thru a deep sump catch basins and a Contechs water quality unit prior to discharge into the subsurface infiltration system. The purpose of this analysis is to demonstrate that the proposed project will not cause any adverse impact on the downstream site in accordance with the Department of Environmental Protection Regulations under the two, ten, twenty-five and one-hundred-year storm events.

The storm run-off management systems were analyzed using a 2-year, 10-year, 25-year, 50-year and 100-year frequency storm event. The rainfall data used in this study is based on NOAA Atlas 14. Based upon the Data, a 2-year frequency, 24-hour duration storm results in a precipitation of 3.13 inches, a 10-year frequency storm results in a precipitation of 4.68 inches, a 25-year frequency storm results in a precipitation of 5.88 inches, a 50-year frequency storm results in a precipitation of 7.00 inches, and a 100-year frequency storm results into a precipitation of 8.34 inches for the property location.

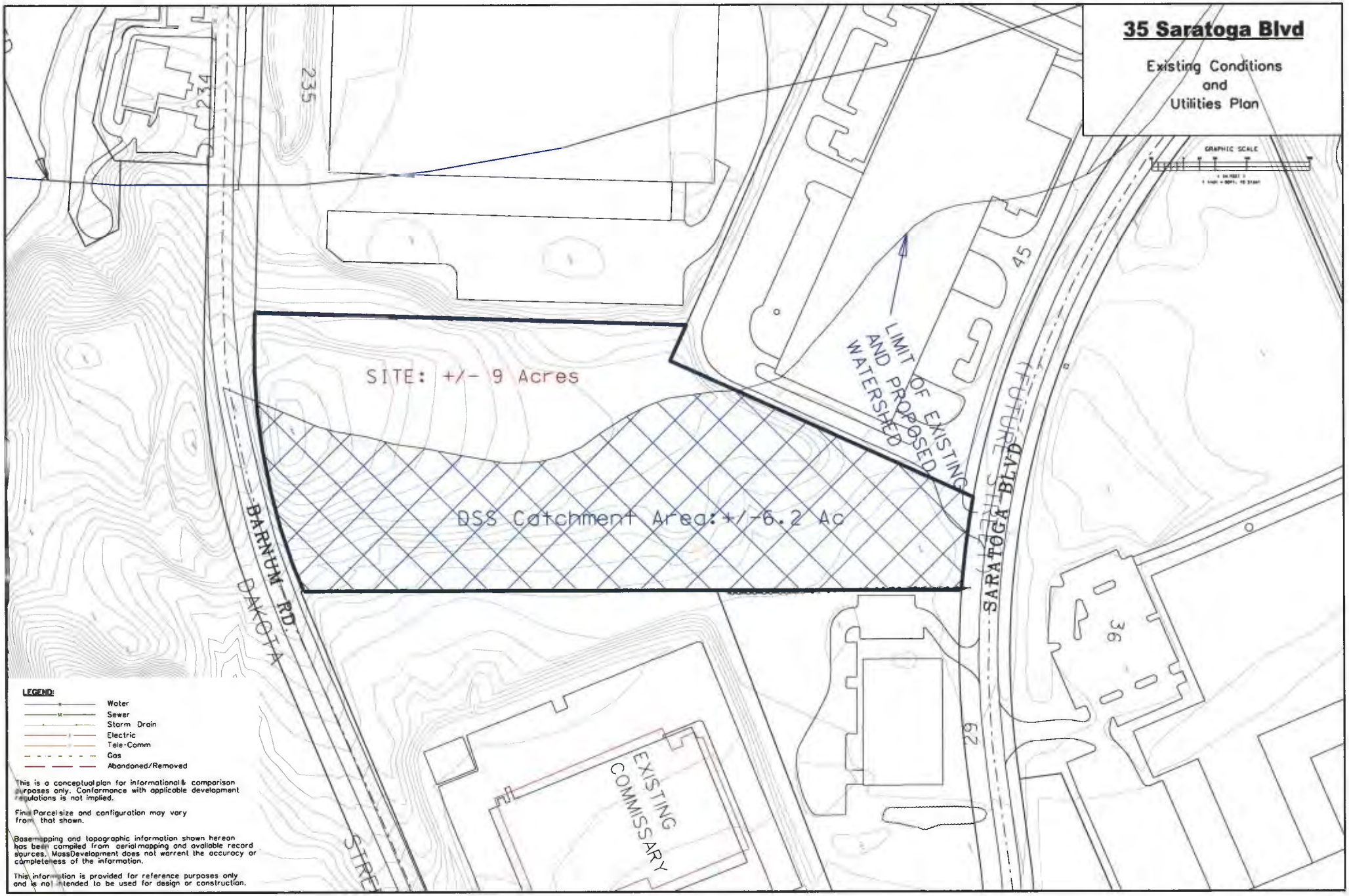
The Analysis was performed using the Hydro CAD Version 10.00-25 software. Using the USDA SCS method of estimated runoff, the program uses the measured hydraulic characteristics of drainage structures to predict hydrologic conditions in the various drainage areas of the site. The model computes runoff for the given rainfall events, produces runoffs hydrographs and routes the flow through the designated detention facilities to calculate one outflow hydrograph per drainage basin. The results generated by this analysis are used to evaluate the suitability of the proposed storm run-off management system.

The drainage areas boundaries are based upon a site survey and the proposed site plans for the project. Hydrologic soil groups and curve numbers [CN] were estimated using available soil information obtained from the NCRS Soil Maps and onsite Soil test pits. The soils are classified as sands [NCRS Hydrologic Soil Group “A”]. The infiltration rate of 8.27 inches per hour was taken from Volume 3, Documenting Compliance with the Massachusetts Stormwater Management Standards, Table 2.3.3 Rawls Rates.

2.0 EXISTING WATERSHED ANALYSIS

This parcel is located within the Devens Stormwater Southeast Quadrant. In March of 1996, Bradford, Saivetz & Associates, Inc. [BSA] prepared a comprehensive stormwater system design for the Southeast Quadrant. Part of this design was to provide a detention pond to ensure that the peak runoff in the watershed will not be increased over the pre-existing levels for all storm events up to including the 100-year storm event. There are existing drainage structures along Saratoga Boulevard on this property to convey runoff to the detention basin. The detention pond was designed to attenuate 6.2 acres of impervious area [see the attached plan].

The existing conditions stormwater runoff consists of five separate subcatchments. A portion of the existing site is directed towards an abutting property located to the southeast of the property. A portion of the existing site is directed towards an abutting property located to the northeast of the property. A portion of the existing site is directed towards an abutting property located to the southwest of the property. A portion of the existing site is directed towards an abutting property located to the northwest of the property. Finally, a portion of the site is directed towards the northwest draining into Saratoga Boulevard.


35 Saratoga Blvd
Existing Conditions
and
Utilities Plan
GRAPHIC SCALE
SITE: +/- 9 Acres
DSS Catchment Area: +/-6.2 Ac
LIMIT OF EXISTING AND PROPOSED WATERSHED
BARNUM RD.
DAKOTA
SARATOGA BLVD
EXISTING COMMISSARY
234
235
45
36
29
LEGEND:
Water
Sewer
Storm Drain
Electric
Tele-Comm
Gas
Abandoned/Removed
This is a conceptual plan for informational & comparison purposes only. Conformance with applicable development regulations is not implied.
Final Parcel size and configuration may vary from that shown.
Base mapping and topographic information shown hereon has been compiled from aerial mapping and available record sources. MassDevelopment does not warrent the accuracy or completeness of the information.
This information is provided for reference purposes only and is not intended to be used for design or construction.

lot1c.dgn

3.0 POST DEVELOPMENT WATERSHED ANALYSIS AND METHODLOGY

The existing site is permitted to discharge stormwater runoff from the site to drain manhole ST-9626, which is connected to the Devens Municipal Stormwater Management Facility, assuming that flow rates discharged to the DSS do not exceed those which would be generated by 75% impervious cover over the portion of the site included in the design calculations for the connected management facility.

The project has been designed to capture and recharge the required recharge volume for post-development stormwater runoff on-site. A HydroCAD report has been included demonstrating that the proposed stormwater system reduces peak rates of runoff below pre-development rates for all of the various subcatchments, including reducing rates as allowed to the DSS.

Subcatchment #1 – Abutting Property (southwest)

Storm	Existing	Proposed	Difference
2-Year (3.00")	0.02 cfs	0.00 cfs	-0.02 cfs
10-Year (4.46")	0.84 cfs	0.01 cfs	-0.83 cfs
25-Year (5.60")	2.69 cfs	0.04 cfs	-2.65 cfs
50-Year (6.66")	4.78 cfs	0.22 cfs	-4.56 cfs
100-Year (7.92")	7.61 cfs	0.57 cfs	-7.04 cfs

Subcatchment #2 – Abutting Property (northwest)

Storm	Existing	Proposed	Difference
2-Year (3.00")	0.00 cfs	0.00 cfs	-0.00 cfs
10-Year (4.46")	0.09 cfs	0.00 cfs	-0.09 cfs
25-Year (5.60")	0.29 cfs	0.01 cfs	-0.28 cfs
50-Year (6.66")	0.52 cfs	0.07 cfs	-0.45 cfs
100-Year (7.92")	0.83 cfs	0.19 cfs	-0.64 cfs

Subcatchment #3 – Abutting Property (southeast)

Storm	Existing	Proposed	Difference
2-Year (3.00")	0.03 cfs	0.00 cfs	-0.03 cfs
10-Year (4.46")	1.02 cfs	0.01 cfs	-1.01 cfs
25-Year (5.60")	3.26 cfs	0.04 cfs	-3.22 cfs
50-Year (6.66")	5.80 cfs	0.21 cfs	-5.59 cfs
100-Year (7.92")	9.23 cfs	0.56 cfs	-8.67 cfs

Subcatchment #4 – Abutting Property (northeast)

Storm	Existing	Proposed	Difference
2-Year (3.00")	0.02 cfs	0.00 cfs	-0.02 cfs
10-Year (4.46")	0.70 cfs	0.00 cfs	-0.70 cfs
25-Year (5.60")	2.25 cfs	0.01 cfs	-2.24 cfs
50-Year (6.66")	4.00 cfs	0.07 cfs	-3.93 cfs
100-Year (7.92")	6.36 cfs	0.18 cfs	-6.18 cfs

Subcatchment #5 – Saratoga Blvd. (northwest)

Storm	Existing	Proposed	Difference
2-Year (3.00")	0.00 cfs	0.00 cfs	-0.00 cfs
10-Year (4.46")	0.02 cfs	0.00 cfs	-0.02 cfs
25-Year (5.60")	0.06 cfs	0.00 cfs	-0.06 cfs
50-Year (6.66")	0.11 cfs	0.00 cfs	-0.11 cfs
100-Year (7.92")	0.17 cfs	0.01 cfs	-0.16 cfs

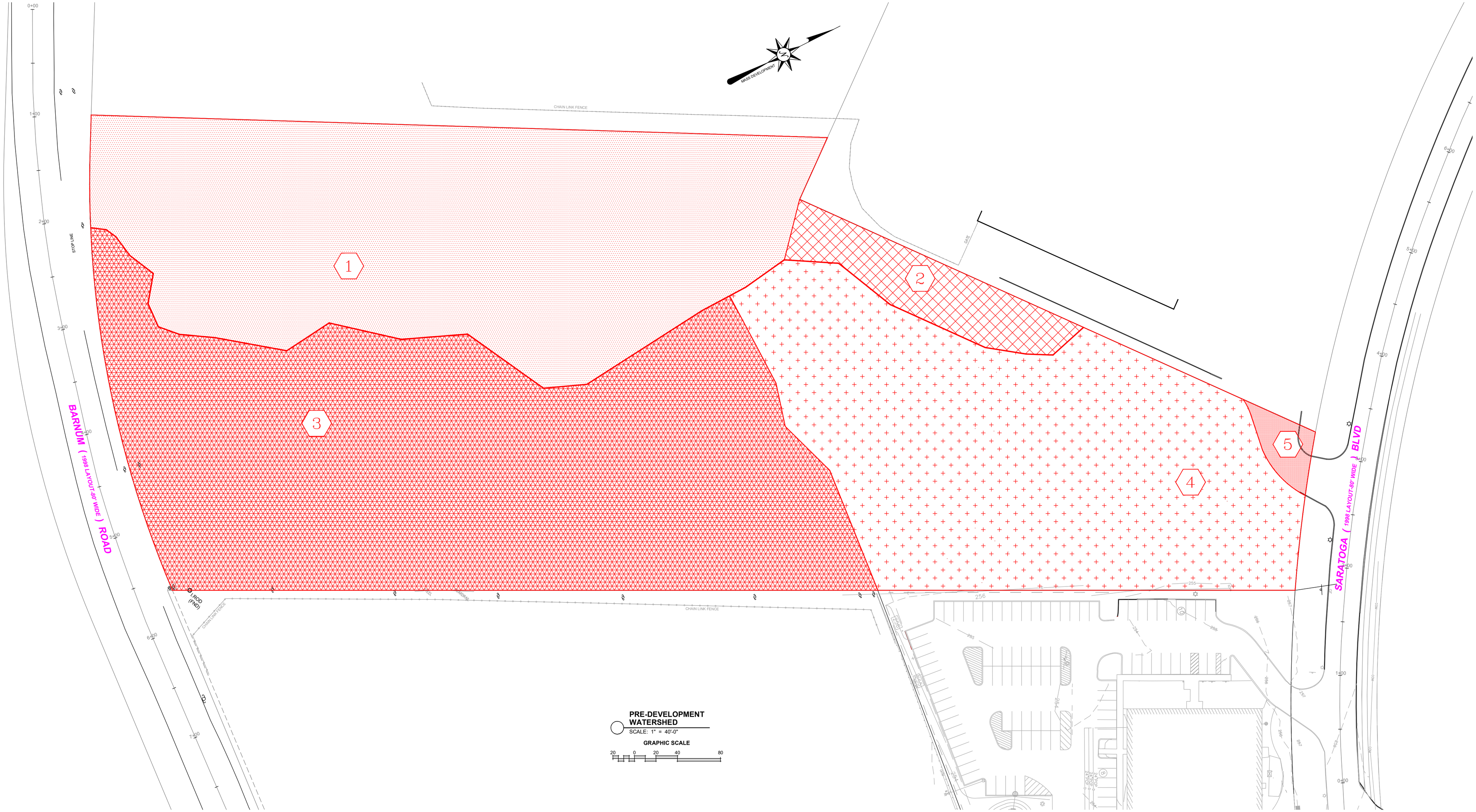
Subcatchment #6 – Existing Drain Manhole (Saratoga) - DSS

Storm	DSS	Proposed	Difference
2-Year (3.00")	14.75 cfs	6.07 cfs	-8.68 cfs
10-Year (4.46")	22.09 cfs	10.61 cfs	-11.48 cfs
25-Year (5.60")	27.80 cfs	14.18 cfs	-13.62 cfs
50-Year (6.66")	33.10 cfs	22.93 cfs	-10.17 cfs
100-Year (7.92")	39.40 cfs	34.37 cfs	-5.03 cfs

4.0 SUMMARY:

In conclusion, the Post-Development Impervious Area [6.12 acres] is less than the allowable impervious area that the watershed detention pond is designed to attenuate. The proposed drainage system will provide the ability to capture sediments, trap oil and grease, and provide groundwater recharge through the subsurface infiltration basin.

PRE-DEVELOPMENT CALCULATIONS



PRE-DEVELOPMENT WATERSHED
SCALE: 1" = 40'-0"

GRAPHIC SCALE
20 0 20 40 80

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Consulting Engineers
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NO	DATE	REVISIONS

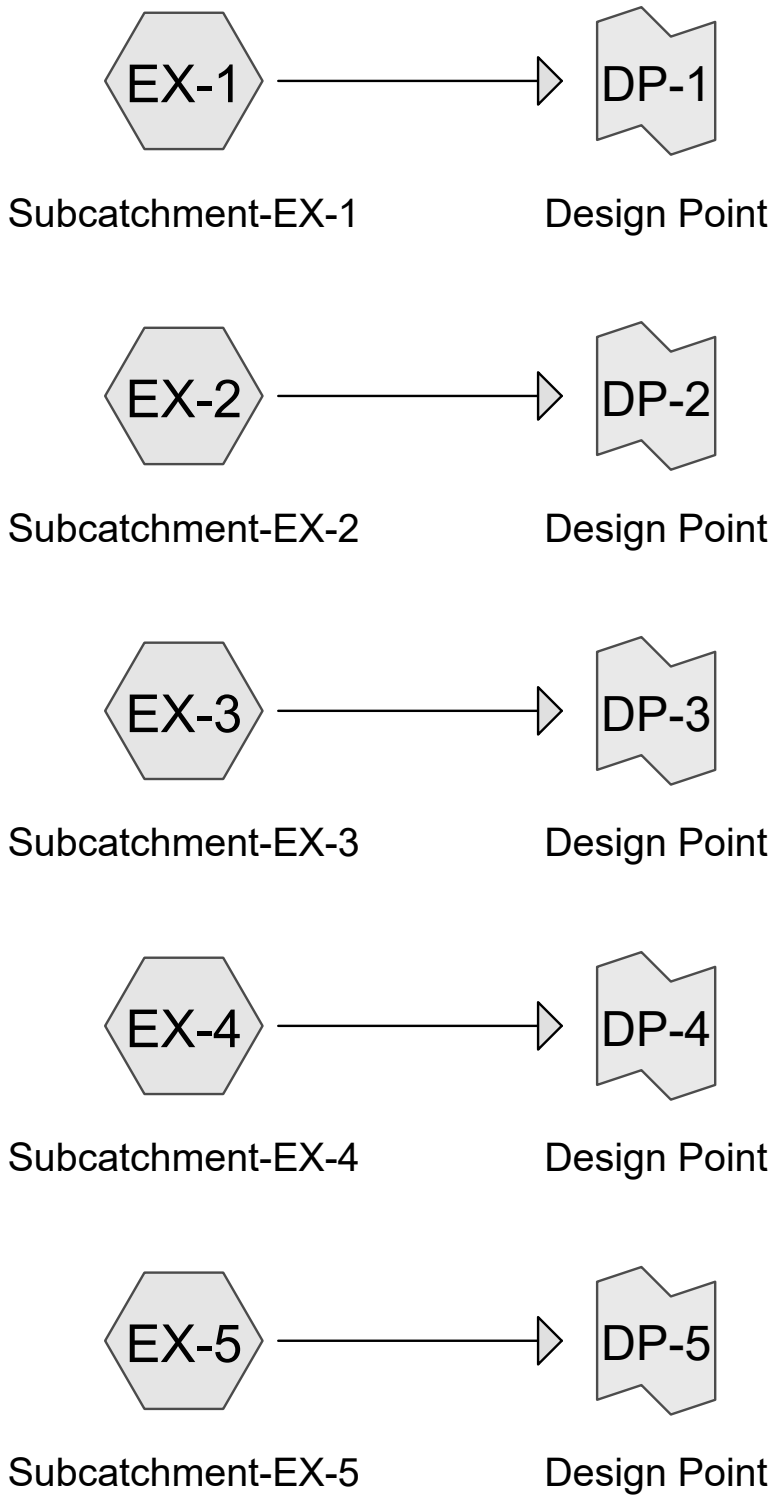
PREPARED FOR:
35 SARATOGA PROPERTY OWNER, LLC
133 PEARL STREET
BOSTON, MA

PROJECT:
PROPOSED BUILDING
AVANTOR FLUID HANDLING
35 SARATOGA BOULEVARD
DEVENS, MA

DRAWING:
PRE DEVELOPMENT WATERSHED

SCALE: 1/16" = 1'-0"
DATE: MAY 6, 2021

DRAWING NUMBER
PRE.1



Subcat Reach Pond Link

Routing Diagram for Saratoge-Hydrology-EMAIL
Prepared by Dana F. Perkins, Inc.

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Subcatchment-EX-1 Runoff Area=124,882 sf 11.80% Impervious Runoff Depth=0.40"
Tc=5.0 min CN=62 Runoff=1.06 cfs 0.095 af

Subcatchment EX-2: Subcatchment-EX-2 Runoff Area=13,700 sf 2.77% Impervious Runoff Depth=0.40"
Tc=5.0 min CN=62 Runoff=0.12 cfs 0.010 af

Subcatchment EX-3: Subcatchment-EX-3 Runoff Area=151,588 sf 15.49% Impervious Runoff Depth=0.43"
Tc=5.0 min CN=63 Runoff=1.49 cfs 0.126 af

Subcatchment EX-4: Subcatchment-EX-4 Runoff Area=104,487 sf 11.59% Impervious Runoff Depth=0.30"
Tc=5.0 min CN=59 Runoff=0.50 cfs 0.061 af

Subcatchment EX-5: Subcatchment-EX-5 Runoff Area=2,824 sf 89.52% Impervious Runoff Depth=2.16"
Tc=5.0 min CN=92 Runoff=0.18 cfs 0.012 af

Link DP-1: Design Point Inflow=1.06 cfs 0.095 af
Primary=1.06 cfs 0.095 af

Link DP-2: Design Point Inflow=0.12 cfs 0.010 af
Primary=0.12 cfs 0.010 af

Link DP-3: Design Point Inflow=1.49 cfs 0.126 af
Primary=1.49 cfs 0.126 af

Link DP-4: Design Point Inflow=0.50 cfs 0.061 af
Primary=0.50 cfs 0.061 af

Link DP-5: Design Point Inflow=0.18 cfs 0.012 af
Primary=0.18 cfs 0.012 af

Total Runoff Area = 9.125 ac Runoff Volume = 0.303 af Average Runoff Depth = 0.40"
86.61% Pervious = 7.903 ac 13.39% Impervious = 1.222 ac

Summary for Subcatchment EX-1: Subcatchment-EX-1

Runoff = 1.06 cfs @ 12.14 hrs, Volume= 0.095 af, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
14,740	98	Paved parking, HSG B
75,824	55	Woods, Good, HSG B
34,318	61	>75% Grass cover, Good, HSG B
124,882	62	Weighted Average
110,142		88.20% Pervious Area
14,740		11.80% Impervious Area

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

Summary for Subcatchment EX-2: Subcatchment-EX-2

Runoff = 0.12 cfs @ 12.14 hrs, Volume= 0.010 af, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
379	98	Paved parking, HSG B
13,321	61	>75% Grass cover, Good, HSG B
13,700	62	Weighted Average
13,321		97.23% Pervious Area
379		2.77% Impervious Area

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

Summary for Subcatchment EX-3: Subcatchment-EX-3

Runoff = 1.49 cfs @ 12.14 hrs, Volume= 0.126 af, Depth= 0.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
23,479	98	Paved parking, HSG B
97,433	55	Woods, Good, HSG B
1,742	39	>75% Grass cover, Good, HSG A
28,934	61	>75% Grass cover, Good, HSG B
151,588	63	Weighted Average
128,109		84.51% Pervious Area
23,479		15.49% Impervious Area

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

Summary for Subcatchment EX-4: Subcatchment-EX-4

Runoff = 0.50 cfs @ 12.14 hrs, Volume= 0.061 af, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
12,107	98	Paved parking, HSG B
40,654	55	Woods, Good, HSG B
2,411	30	Woods, Good, HSG A
13,062	39	>75% Grass cover, Good, HSG A
36,253	61	>75% Grass cover, Good, HSG B
104,487	59	Weighted Average
92,380		88.41% Pervious Area
12,107		11.59% Impervious Area

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

Summary for Subcatchment EX-5: Subcatchment-EX-5

Runoff = 0.18 cfs @ 12.12 hrs, Volume= 0.012 af, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
2,528	98	Paved parking, HSG B
296	39	>75% Grass cover, Good, HSG A
2,824	92	Weighted Average
296		10.48% Pervious Area
2,528		89.52% Impervious Area

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

Summary for Link DP-1: Design Point

Inflow Area = 2.867 ac, 11.80% Impervious, Inflow Depth = 0.40" for 2-Year event
Inflow = 1.06 cfs @ 12.14 hrs, Volume= 0.095 af
Primary = 1.06 cfs @ 12.14 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Design Point

Inflow Area = 0.315 ac, 2.77% Impervious, Inflow Depth = 0.40" for 2-Year event
Inflow = 0.12 cfs @ 12.14 hrs, Volume= 0.010 af
Primary = 0.12 cfs @ 12.14 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Design Point

Inflow Area = 3.480 ac, 15.49% Impervious, Inflow Depth = 0.43" for 2-Year event
Inflow = 1.49 cfs @ 12.14 hrs, Volume= 0.126 af
Primary = 1.49 cfs @ 12.14 hrs, Volume= 0.126 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Design Point

Inflow Area = 2.399 ac, 11.59% Impervious, Inflow Depth = 0.30" for 2-Year event
Inflow = 0.50 cfs @ 12.14 hrs, Volume= 0.061 af
Primary = 0.50 cfs @ 12.14 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Design Point

Inflow Area = 0.065 ac, 89.52% Impervious, Inflow Depth = 2.16" for 2-Year event
Inflow = 0.18 cfs @ 12.12 hrs, Volume= 0.012 af
Primary = 0.18 cfs @ 12.12 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Subcatchment-EX-1 Runoff Area=124,882 sf 11.80% Impervious Runoff Depth=1.12"
Tc=5.0 min CN=62 Runoff=4.00 cfs 0.267 af

Subcatchment EX-2: Subcatchment-EX-2 Runoff Area=13,700 sf 2.77% Impervious Runoff Depth=1.12"
Tc=5.0 min CN=62 Runoff=0.44 cfs 0.029 af

Subcatchment EX-3: Subcatchment-EX-3 Runoff Area=151,588 sf 15.49% Impervious Runoff Depth=1.18"
Tc=5.0 min CN=63 Runoff=5.18 cfs 0.342 af

Subcatchment EX-4: Subcatchment-EX-4 Runoff Area=104,487 sf 11.59% Impervious Runoff Depth=0.94"
Tc=5.0 min CN=59 Runoff=2.69 cfs 0.188 af

Subcatchment EX-5: Subcatchment-EX-5 Runoff Area=2,824 sf 89.52% Impervious Runoff Depth=3.56"
Tc=5.0 min CN=92 Runoff=0.28 cfs 0.019 af

Link DP-1: Design Point Inflow=4.00 cfs 0.267 af
Primary=4.00 cfs 0.267 af

Link DP-2: Design Point Inflow=0.44 cfs 0.029 af
Primary=0.44 cfs 0.029 af

Link DP-3: Design Point Inflow=5.18 cfs 0.342 af
Primary=5.18 cfs 0.342 af

Link DP-4: Design Point Inflow=2.69 cfs 0.188 af
Primary=2.69 cfs 0.188 af

Link DP-5: Design Point Inflow=0.28 cfs 0.019 af
Primary=0.28 cfs 0.019 af

Total Runoff Area = 9.125 ac Runoff Volume = 0.845 af Average Runoff Depth = 1.11"
86.61% Pervious = 7.903 ac 13.39% Impervious = 1.222 ac

Summary for Subcatchment EX-1: Subcatchment-EX-1

Runoff = 4.00 cfs @ 12.13 hrs, Volume= 0.267 af, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
14,740	98	Paved parking, HSG B
75,824	55	Woods, Good, HSG B
34,318	61	>75% Grass cover, Good, HSG B
124,882	62	Weighted Average
110,142		88.20% Pervious Area
14,740		11.80% Impervious Area

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

Summary for Subcatchment EX-2: Subcatchment-EX-2

Runoff = 0.44 cfs @ 12.13 hrs, Volume= 0.029 af, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
379	98	Paved parking, HSG B
13,321	61	>75% Grass cover, Good, HSG B
13,700	62	Weighted Average
13,321		97.23% Pervious Area
379		2.77% Impervious Area

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

Summary for Subcatchment EX-3: Subcatchment-EX-3

Runoff = 5.18 cfs @ 12.13 hrs, Volume= 0.342 af, Depth= 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
23,479	98	Paved parking, HSG B
97,433	55	Woods, Good, HSG B
1,742	39	>75% Grass cover, Good, HSG A
28,934	61	>75% Grass cover, Good, HSG B
151,588	63	Weighted Average
128,109		84.51% Pervious Area
23,479		15.49% Impervious Area

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

Summary for Subcatchment EX-4: Subcatchment-EX-4

Runoff = 2.69 cfs @ 12.13 hrs, Volume= 0.188 af, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
12,107	98	Paved parking, HSG B
40,654	55	Woods, Good, HSG B
2,411	30	Woods, Good, HSG A
13,062	39	>75% Grass cover, Good, HSG A
36,253	61	>75% Grass cover, Good, HSG B
104,487	59	Weighted Average
92,380		88.41% Pervious Area
12,107		11.59% Impervious Area

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

Summary for Subcatchment EX-5: Subcatchment-EX-5

Runoff = 0.28 cfs @ 12.12 hrs, Volume= 0.019 af, Depth= 3.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
2,528	98	Paved parking, HSG B
296	39	>75% Grass cover, Good, HSG A
2,824	92	Weighted Average
296		10.48% Pervious Area
2,528		89.52% Impervious Area

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

Summary for Link DP-1: Design Point

Inflow Area = 2.867 ac, 11.80% Impervious, Inflow Depth = 1.12" for 10-Year event
Inflow = 4.00 cfs @ 12.13 hrs, Volume= 0.267 af
Primary = 4.00 cfs @ 12.13 hrs, Volume= 0.267 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Design Point

Inflow Area = 0.315 ac, 2.77% Impervious, Inflow Depth = 1.12" for 10-Year event
Inflow = 0.44 cfs @ 12.13 hrs, Volume= 0.029 af
Primary = 0.44 cfs @ 12.13 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Design Point

Inflow Area = 3.480 ac, 15.49% Impervious, Inflow Depth = 1.18" for 10-Year event
Inflow = 5.18 cfs @ 12.13 hrs, Volume= 0.342 af
Primary = 5.18 cfs @ 12.13 hrs, Volume= 0.342 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Design Point

Inflow Area = 2.399 ac, 11.59% Impervious, Inflow Depth = 0.94" for 10-Year event
Inflow = 2.69 cfs @ 12.13 hrs, Volume= 0.188 af
Primary = 2.69 cfs @ 12.13 hrs, Volume= 0.188 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Design Point

Inflow Area = 0.065 ac, 89.52% Impervious, Inflow Depth = 3.56" for 10-Year event
Inflow = 0.28 cfs @ 12.12 hrs, Volume= 0.019 af
Primary = 0.28 cfs @ 12.12 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Subcatchment-EX-1 Runoff Area=124,882 sf 11.80% Impervious Runoff Depth=1.82"
Tc=5.0 min CN=62 Runoff=6.82 cfs 0.435 af

Subcatchment EX-2: Subcatchment-EX-2 Runoff Area=13,700 sf 2.77% Impervious Runoff Depth=1.82"
Tc=5.0 min CN=62 Runoff=0.75 cfs 0.048 af

Subcatchment EX-3: Subcatchment-EX-3 Runoff Area=151,588 sf 15.49% Impervious Runoff Depth=1.90"
Tc=5.0 min CN=63 Runoff=8.68 cfs 0.551 af

Subcatchment EX-4: Subcatchment-EX-4 Runoff Area=104,487 sf 11.59% Impervious Runoff Depth=1.59"
Tc=5.0 min CN=59 Runoff=4.88 cfs 0.318 af

Subcatchment EX-5: Subcatchment-EX-5 Runoff Area=2,824 sf 89.52% Impervious Runoff Depth=4.68"
Tc=5.0 min CN=92 Runoff=0.37 cfs 0.025 af

Link DP-1: Design Point Inflow=6.82 cfs 0.435 af
Primary=6.82 cfs 0.435 af

Link DP-2: Design Point Inflow=0.75 cfs 0.048 af
Primary=0.75 cfs 0.048 af

Link DP-3: Design Point Inflow=8.68 cfs 0.551 af
Primary=8.68 cfs 0.551 af

Link DP-4: Design Point Inflow=4.88 cfs 0.318 af
Primary=4.88 cfs 0.318 af

Link DP-5: Design Point Inflow=0.37 cfs 0.025 af
Primary=0.37 cfs 0.025 af

Total Runoff Area = 9.125 ac Runoff Volume = 1.377 af Average Runoff Depth = 1.81"
86.61% Pervious = 7.903 ac 13.39% Impervious = 1.222 ac

Summary for Subcatchment EX-1: Subcatchment-EX-1

Runoff = 6.82 cfs @ 12.13 hrs, Volume= 0.435 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
14,740	98	Paved parking, HSG B
75,824	55	Woods, Good, HSG B
34,318	61	>75% Grass cover, Good, HSG B
124,882	62	Weighted Average
110,142		88.20% Pervious Area
14,740		11.80% Impervious Area

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

Summary for Subcatchment EX-2: Subcatchment-EX-2

Runoff = 0.75 cfs @ 12.13 hrs, Volume= 0.048 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
379	98	Paved parking, HSG B
13,321	61	>75% Grass cover, Good, HSG B
13,700	62	Weighted Average
13,321		97.23% Pervious Area
379		2.77% Impervious Area

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

Summary for Subcatchment EX-3: Subcatchment-EX-3

Runoff = 8.68 cfs @ 12.13 hrs, Volume= 0.551 af, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
23,479	98	Paved parking, HSG B
97,433	55	Woods, Good, HSG B
1,742	39	>75% Grass cover, Good, HSG A
28,934	61	>75% Grass cover, Good, HSG B
151,588	63	Weighted Average
128,109		84.51% Pervious Area
23,479		15.49% Impervious Area

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

Summary for Subcatchment EX-4: Subcatchment-EX-4

Runoff = 4.88 cfs @ 12.13 hrs, Volume= 0.318 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
12,107	98	Paved parking, HSG B
40,654	55	Woods, Good, HSG B
2,411	30	Woods, Good, HSG A
13,062	39	>75% Grass cover, Good, HSG A
36,253	61	>75% Grass cover, Good, HSG B
104,487	59	Weighted Average
92,380		88.41% Pervious Area
12,107		11.59% Impervious Area

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

Summary for Subcatchment EX-5: Subcatchment-EX-5

Runoff = 0.37 cfs @ 12.12 hrs, Volume= 0.025 af, Depth= 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
2,528	98	Paved parking, HSG B
296	39	>75% Grass cover, Good, HSG A
2,824	92	Weighted Average
296		10.48% Pervious Area
2,528		89.52% Impervious Area

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

Summary for Link DP-1: Design Point

Inflow Area = 2.867 ac, 11.80% Impervious, Inflow Depth = 1.82" for 25-Year event
Inflow = 6.82 cfs @ 12.13 hrs, Volume= 0.435 af
Primary = 6.82 cfs @ 12.13 hrs, Volume= 0.435 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Design Point

Inflow Area = 0.315 ac, 2.77% Impervious, Inflow Depth = 1.82" for 25-Year event
Inflow = 0.75 cfs @ 12.13 hrs, Volume= 0.048 af
Primary = 0.75 cfs @ 12.13 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Design Point

Inflow Area = 3.480 ac, 15.49% Impervious, Inflow Depth = 1.90" for 25-Year event
Inflow = 8.68 cfs @ 12.13 hrs, Volume= 0.551 af
Primary = 8.68 cfs @ 12.13 hrs, Volume= 0.551 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Design Point

Inflow Area = 2.399 ac, 11.59% Impervious, Inflow Depth = 1.59" for 25-Year event
Inflow = 4.88 cfs @ 12.13 hrs, Volume= 0.318 af
Primary = 4.88 cfs @ 12.13 hrs, Volume= 0.318 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Design Point

Inflow Area = 0.065 ac, 89.52% Impervious, Inflow Depth = 4.68" for 25-Year event
Inflow = 0.37 cfs @ 12.12 hrs, Volume= 0.025 af
Primary = 0.37 cfs @ 12.12 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Subcatchment-EX-1 Runoff Area=124,882 sf 11.80% Impervious Runoff Depth=3.49"
Tc=5.0 min CN=62 Runoff=13.34 cfs 0.835 af

Subcatchment EX-2: Subcatchment-EX-2 Runoff Area=13,700 sf 2.77% Impervious Runoff Depth=3.49"
Tc=5.0 min CN=62 Runoff=1.46 cfs 0.092 af

Subcatchment EX-3: Subcatchment-EX-3 Runoff Area=151,588 sf 15.49% Impervious Runoff Depth=3.61"
Tc=5.0 min CN=63 Runoff=16.71 cfs 1.046 af

Subcatchment EX-4: Subcatchment-EX-4 Runoff Area=104,487 sf 11.59% Impervious Runoff Depth=3.16"
Tc=5.0 min CN=59 Runoff=10.07 cfs 0.632 af

Subcatchment EX-5: Subcatchment-EX-5 Runoff Area=2,824 sf 89.52% Impervious Runoff Depth=6.96"
Tc=5.0 min CN=92 Runoff=0.53 cfs 0.038 af

Link DP-1: Design Point Inflow=13.34 cfs 0.835 af
Primary=13.34 cfs 0.835 af

Link DP-2: Design Point Inflow=1.46 cfs 0.092 af
Primary=1.46 cfs 0.092 af

Link DP-3: Design Point Inflow=16.71 cfs 1.046 af
Primary=16.71 cfs 1.046 af

Link DP-4: Design Point Inflow=10.07 cfs 0.632 af
Primary=10.07 cfs 0.632 af

Link DP-5: Design Point Inflow=0.53 cfs 0.038 af
Primary=0.53 cfs 0.038 af

Total Runoff Area = 9.125 ac Runoff Volume = 2.642 af Average Runoff Depth = 3.47"
86.61% Pervious = 7.903 ac 13.39% Impervious = 1.222 ac

Summary for Subcatchment EX-1: Subcatchment-EX-1

Runoff = 13.34 cfs @ 12.13 hrs, Volume= 0.835 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
14,740	98	Paved parking, HSG B
75,824	55	Woods, Good, HSG B
34,318	61	>75% Grass cover, Good, HSG B
124,882	62	Weighted Average
110,142		88.20% Pervious Area
14,740		11.80% Impervious Area

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

Summary for Subcatchment EX-2: Subcatchment-EX-2

Runoff = 1.46 cfs @ 12.13 hrs, Volume= 0.092 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
379	98	Paved parking, HSG B
13,321	61	>75% Grass cover, Good, HSG B
13,700	62	Weighted Average
13,321		97.23% Pervious Area
379		2.77% Impervious Area

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

Summary for Subcatchment EX-3: Subcatchment-EX-3

Runoff = 16.71 cfs @ 12.13 hrs, Volume= 1.046 af, Depth= 3.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
23,479	98	Paved parking, HSG B
97,433	55	Woods, Good, HSG B
1,742	39	>75% Grass cover, Good, HSG A
28,934	61	>75% Grass cover, Good, HSG B
151,588	63	Weighted Average
128,109		84.51% Pervious Area
23,479		15.49% Impervious Area

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

Summary for Subcatchment EX-4: Subcatchment-EX-4

Runoff = 10.07 cfs @ 12.13 hrs, Volume= 0.632 af, Depth= 3.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
12,107	98	Paved parking, HSG B
40,654	55	Woods, Good, HSG B
2,411	30	Woods, Good, HSG A
13,062	39	>75% Grass cover, Good, HSG A
36,253	61	>75% Grass cover, Good, HSG B
104,487	59	Weighted Average
92,380		88.41% Pervious Area
12,107		11.59% Impervious Area

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

Summary for Subcatchment EX-5: Subcatchment-EX-5

Runoff = 0.53 cfs @ 12.12 hrs, Volume= 0.038 af, Depth= 6.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
2,528	98	Paved parking, HSG B
296	39	>75% Grass cover, Good, HSG A
2,824	92	Weighted Average
296		10.48% Pervious Area
2,528		89.52% Impervious Area

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

Summary for Link DP-1: Design Point

Inflow Area = 2.867 ac, 11.80% Impervious, Inflow Depth = 3.49" for 100-Year event
Inflow = 13.34 cfs @ 12.13 hrs, Volume= 0.835 af
Primary = 13.34 cfs @ 12.13 hrs, Volume= 0.835 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Design Point

Inflow Area = 0.315 ac, 2.77% Impervious, Inflow Depth = 3.49" for 100-Year event
Inflow = 1.46 cfs @ 12.13 hrs, Volume= 0.092 af
Primary = 1.46 cfs @ 12.13 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Design Point

Inflow Area = 3.480 ac, 15.49% Impervious, Inflow Depth = 3.61" for 100-Year event
Inflow = 16.71 cfs @ 12.13 hrs, Volume= 1.046 af
Primary = 16.71 cfs @ 12.13 hrs, Volume= 1.046 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Design Point

Inflow Area = 2.399 ac, 11.59% Impervious, Inflow Depth = 3.16" for 100-Year event
Inflow = 10.07 cfs @ 12.13 hrs, Volume= 0.632 af
Primary = 10.07 cfs @ 12.13 hrs, Volume= 0.632 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Design Point

Inflow Area = 0.065 ac, 89.52% Impervious, Inflow Depth = 6.96" for 100-Year event
Inflow = 0.53 cfs @ 12.12 hrs, Volume= 0.038 af
Primary = 0.53 cfs @ 12.12 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

POST DEVELOPMENT CALCULATIONS

NO	DATE	REVISIONS
1	10/12/22	REVISIONS TO ADDRESS DEC COMMENTS

Eugene T. Sullivan, Inc.
Consulting Engineers
230 Lowell Street - Suite 2A
Wilmington, MA 01887
Phone: 978.657.6469
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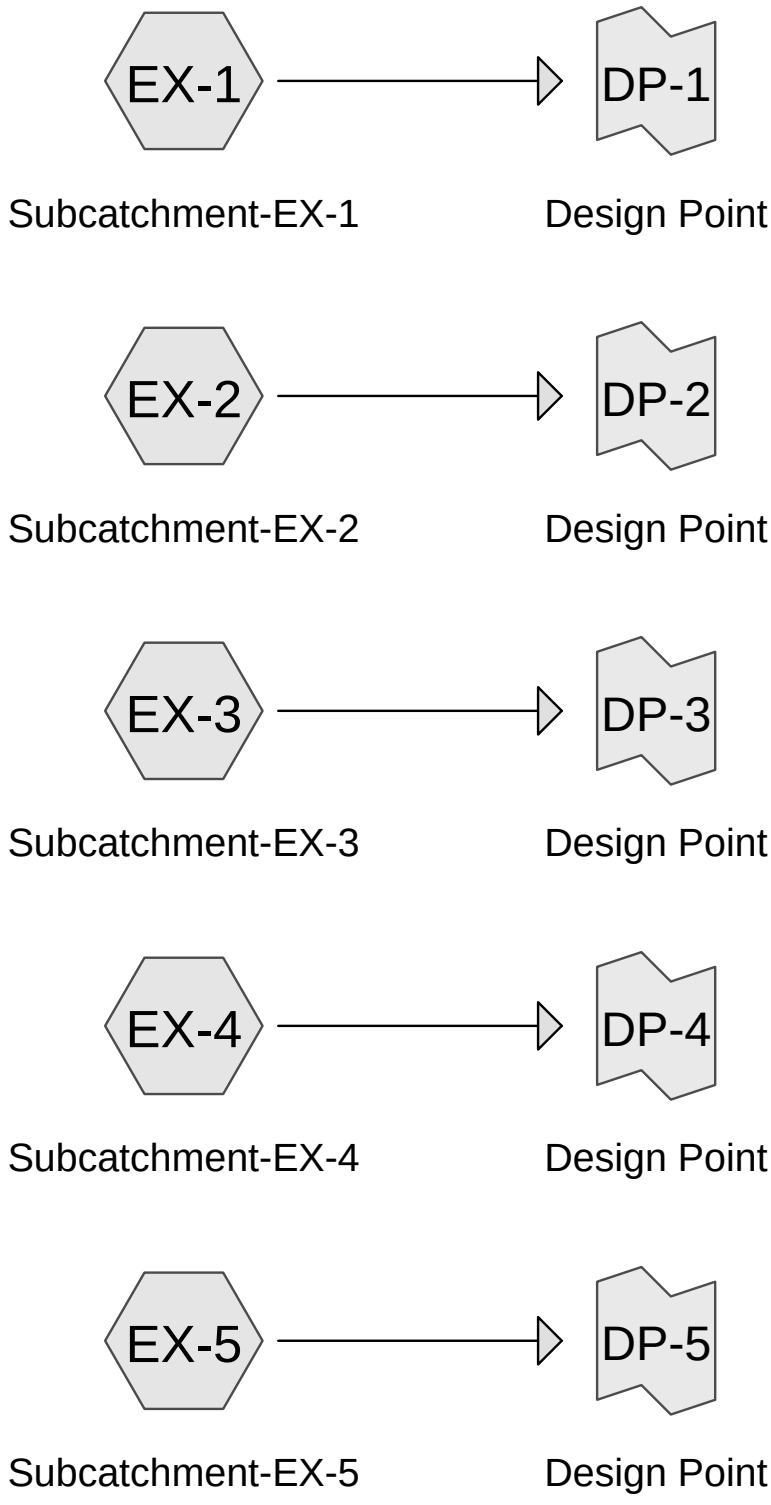
PREPARED FOR:
35 SARATOGA PROPERTY OWNER, LLC
133 PEARL STREET
BOSTON, MA

PROJECT:
PROPOSED BUILDING
AVANTOR FLUID HANDLING
35 SARATOGA BOULEVARD
DEVENS, MA

DRAWING:
POST DEVELOPMENT WATERSHED

SCALE: 1" = 40'-0"
DATE: MAY 6, 2021
DRAWING NUMBER
POST.1



Subcat Reach Pond Link

Routing Diagram for Saratoga-Hydrology.0722-EMAIL
Prepared by Dana F. Perkins, Inc.

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Subcatchment-EX-1 Runoff Area=124,882 sf 0.00% Impervious Runoff Depth=0.07"
Tc=5.0 min CN=49 Runoff=0.02 cfs 0.018 af

Subcatchment EX-2: Subcatchment-EX-2 Runoff Area=13,700 sf 0.00% Impervious Runoff Depth=0.07"
Tc=5.0 min CN=49 Runoff=0.00 cfs 0.002 af

Subcatchment EX-3: Subcatchment-EX-3 Runoff Area=151,588 sf 0.00% Impervious Runoff Depth=0.07"
Tc=5.0 min CN=49 Runoff=0.03 cfs 0.022 af

Subcatchment EX-4: Subcatchment-EX-4 Runoff Area=104,487 sf 0.00% Impervious Runoff Depth=0.07"
Tc=5.0 min CN=49 Runoff=0.02 cfs 0.015 af

Subcatchment EX-5: Subcatchment-EX-5 Runoff Area=2,824 sf 0.00% Impervious Runoff Depth=0.07"
Tc=5.0 min CN=49 Runoff=0.00 cfs 0.000 af

Link DP-1: Design Point Inflow=0.02 cfs 0.018 af
Primary=0.02 cfs 0.018 af

Link DP-2: Design Point Inflow=0.00 cfs 0.002 af
Primary=0.00 cfs 0.002 af

Link DP-3: Design Point Inflow=0.03 cfs 0.022 af
Primary=0.03 cfs 0.022 af

Link DP-4: Design Point Inflow=0.02 cfs 0.015 af
Primary=0.02 cfs 0.015 af

Link DP-5: Design Point Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 9.125 ac Runoff Volume = 0.057 af Average Runoff Depth = 0.07"
100.00% Pervious = 9.125 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: Subcatchment-EX-1

Runoff = 0.02 cfs @ 14.34 hrs, Volume= 0.018 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
124,882	49	50-75% Grass cover, Fair, HSG A
124,882		100.00% Pervious Area

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

Summary for Subcatchment EX-2: Subcatchment-EX-2

Runoff = 0.00 cfs @ 14.34 hrs, Volume= 0.002 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
13,700	49	50-75% Grass cover, Fair, HSG A
13,700		100.00% Pervious Area

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

Summary for Subcatchment EX-3: Subcatchment-EX-3

Runoff = 0.03 cfs @ 14.34 hrs, Volume= 0.022 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
151,588	49	50-75% Grass cover, Fair, HSG A
151,588		100.00% Pervious Area

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

Summary for Subcatchment EX-4: Subcatchment-EX-4

Runoff = 0.02 cfs @ 14.34 hrs, Volume= 0.015 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
104,487	49	50-75% Grass cover, Fair, HSG A
104,487		100.00% Pervious Area

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

Summary for Subcatchment EX-5: Subcatchment-EX-5

Runoff = 0.00 cfs @ 14.34 hrs, Volume= 0.000 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
2,824	49	50-75% Grass cover, Fair, HSG A
2,824		100.00% Pervious Area

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

Summary for Link DP-1: Design Point

Inflow Area = 2.867 ac, 0.00% Impervious, Inflow Depth = 0.07" for 2-Year event
Inflow = 0.02 cfs @ 14.34 hrs, Volume= 0.018 af
Primary = 0.02 cfs @ 14.34 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Design Point

Inflow Area = 0.315 ac, 0.00% Impervious, Inflow Depth = 0.07" for 2-Year event
Inflow = 0.00 cfs @ 14.34 hrs, Volume= 0.002 af
Primary = 0.00 cfs @ 14.34 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Design Point

Inflow Area = 3.480 ac, 0.00% Impervious, Inflow Depth = 0.07" for 2-Year event
Inflow = 0.03 cfs @ 14.34 hrs, Volume= 0.022 af
Primary = 0.03 cfs @ 14.34 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Design Point

Inflow Area = 2.399 ac, 0.00% Impervious, Inflow Depth = 0.07" for 2-Year event
Inflow = 0.02 cfs @ 14.34 hrs, Volume= 0.015 af
Primary = 0.02 cfs @ 14.34 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Design Point

Inflow Area = 0.065 ac, 0.00% Impervious, Inflow Depth = 0.07" for 2-Year event
Inflow = 0.00 cfs @ 14.34 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 14.34 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Subcatchment-EX-1 Runoff Area=124,882 sf 0.00% Impervious Runoff Depth=0.44"
Tc=5.0 min CN=49 Runoff=0.84 cfs 0.106 af

Subcatchment EX-2: Subcatchment-EX-2 Runoff Area=13,700 sf 0.00% Impervious Runoff Depth=0.44"
Tc=5.0 min CN=49 Runoff=0.09 cfs 0.012 af

Subcatchment EX-3: Subcatchment-EX-3 Runoff Area=151,588 sf 0.00% Impervious Runoff Depth=0.44"
Tc=5.0 min CN=49 Runoff=1.02 cfs 0.128 af

Subcatchment EX-4: Subcatchment-EX-4 Runoff Area=104,487 sf 0.00% Impervious Runoff Depth=0.44"
Tc=5.0 min CN=49 Runoff=0.70 cfs 0.088 af

Subcatchment EX-5: Subcatchment-EX-5 Runoff Area=2,824 sf 0.00% Impervious Runoff Depth=0.44"
Tc=5.0 min CN=49 Runoff=0.02 cfs 0.002 af

Link DP-1: Design Point Inflow=0.84 cfs 0.106 af
Primary=0.84 cfs 0.106 af

Link DP-2: Design Point Inflow=0.09 cfs 0.012 af
Primary=0.09 cfs 0.012 af

Link DP-3: Design Point Inflow=1.02 cfs 0.128 af
Primary=1.02 cfs 0.128 af

Link DP-4: Design Point Inflow=0.70 cfs 0.088 af
Primary=0.70 cfs 0.088 af

Link DP-5: Design Point Inflow=0.02 cfs 0.002 af
Primary=0.02 cfs 0.002 af

Total Runoff Area = 9.125 ac Runoff Volume = 0.336 af Average Runoff Depth = 0.44"
100.00% Pervious = 9.125 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: Subcatchment-EX-1

Runoff = 0.84 cfs @ 12.14 hrs, Volume= 0.106 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
124,882	49	50-75% Grass cover, Fair, HSG A
124,882		100.00% Pervious Area

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

Summary for Subcatchment EX-2: Subcatchment-EX-2

Runoff = 0.09 cfs @ 12.14 hrs, Volume= 0.012 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
13,700	49	50-75% Grass cover, Fair, HSG A
13,700		100.00% Pervious Area

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

Summary for Subcatchment EX-3: Subcatchment-EX-3

Runoff = 1.02 cfs @ 12.14 hrs, Volume= 0.128 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
151,588	49	50-75% Grass cover, Fair, HSG A
151,588		100.00% Pervious Area

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

Summary for Subcatchment EX-4: Subcatchment-EX-4

Runoff = 0.70 cfs @ 12.14 hrs, Volume= 0.088 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
104,487	49	50-75% Grass cover, Fair, HSG A
104,487		100.00% Pervious Area

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

Summary for Subcatchment EX-5: Subcatchment-EX-5

Runoff = 0.02 cfs @ 12.14 hrs, Volume= 0.002 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
2,824	49	50-75% Grass cover, Fair, HSG A
2,824		100.00% Pervious Area

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

Summary for Link DP-1: Design Point

Inflow Area = 2.867 ac, 0.00% Impervious, Inflow Depth = 0.44" for 10-Year event
Inflow = 0.84 cfs @ 12.14 hrs, Volume= 0.106 af
Primary = 0.84 cfs @ 12.14 hrs, Volume= 0.106 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Design Point

Inflow Area = 0.315 ac, 0.00% Impervious, Inflow Depth = 0.44" for 10-Year event
Inflow = 0.09 cfs @ 12.14 hrs, Volume= 0.012 af
Primary = 0.09 cfs @ 12.14 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Design Point

Inflow Area = 3.480 ac, 0.00% Impervious, Inflow Depth = 0.44" for 10-Year event
Inflow = 1.02 cfs @ 12.14 hrs, Volume= 0.128 af
Primary = 1.02 cfs @ 12.14 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Design Point

Inflow Area = 2.399 ac, 0.00% Impervious, Inflow Depth = 0.44" for 10-Year event
Inflow = 0.70 cfs @ 12.14 hrs, Volume= 0.088 af
Primary = 0.70 cfs @ 12.14 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Design Point

Inflow Area = 0.065 ac, 0.00% Impervious, Inflow Depth = 0.44" for 10-Year event
Inflow = 0.02 cfs @ 12.14 hrs, Volume= 0.002 af
Primary = 0.02 cfs @ 12.14 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Subcatchment-EX-1 Runoff Area=124,882 sf 0.00% Impervious Runoff Depth=0.89"
Tc=5.0 min CN=49 Runoff=2.69 cfs 0.212 af

Subcatchment EX-2: Subcatchment-EX-2 Runoff Area=13,700 sf 0.00% Impervious Runoff Depth=0.89"
Tc=5.0 min CN=49 Runoff=0.29 cfs 0.023 af

Subcatchment EX-3: Subcatchment-EX-3 Runoff Area=151,588 sf 0.00% Impervious Runoff Depth=0.89"
Tc=5.0 min CN=49 Runoff=3.26 cfs 0.258 af

Subcatchment EX-4: Subcatchment-EX-4 Runoff Area=104,487 sf 0.00% Impervious Runoff Depth=0.89"
Tc=5.0 min CN=49 Runoff=2.25 cfs 0.178 af

Subcatchment EX-5: Subcatchment-EX-5 Runoff Area=2,824 sf 0.00% Impervious Runoff Depth=0.89"
Tc=5.0 min CN=49 Runoff=0.06 cfs 0.005 af

Link DP-1: Design Point Inflow=2.69 cfs 0.212 af
Primary=2.69 cfs 0.212 af

Link DP-2: Design Point Inflow=0.29 cfs 0.023 af
Primary=0.29 cfs 0.023 af

Link DP-3: Design Point Inflow=3.26 cfs 0.258 af
Primary=3.26 cfs 0.258 af

Link DP-4: Design Point Inflow=2.25 cfs 0.178 af
Primary=2.25 cfs 0.178 af

Link DP-5: Design Point Inflow=0.06 cfs 0.005 af
Primary=0.06 cfs 0.005 af

Total Runoff Area = 9.125 ac Runoff Volume = 0.676 af Average Runoff Depth = 0.89"
100.00% Pervious = 9.125 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: Subcatchment-EX-1

Runoff = 2.69 cfs @ 12.13 hrs, Volume= 0.212 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
124,882	49	50-75% Grass cover, Fair, HSG A
124,882		100.00% Pervious Area

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

Summary for Subcatchment EX-2: Subcatchment-EX-2

Runoff = 0.29 cfs @ 12.13 hrs, Volume= 0.023 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
13,700	49	50-75% Grass cover, Fair, HSG A
13,700		100.00% Pervious Area

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

Summary for Subcatchment EX-3: Subcatchment-EX-3

Runoff = 3.26 cfs @ 12.13 hrs, Volume= 0.258 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
151,588	49	50-75% Grass cover, Fair, HSG A
151,588		100.00% Pervious Area

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

Summary for Subcatchment EX-4: Subcatchment-EX-4

Runoff = 2.25 cfs @ 12.13 hrs, Volume= 0.178 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
104,487	49	50-75% Grass cover, Fair, HSG A
104,487		100.00% Pervious Area

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

Summary for Subcatchment EX-5: Subcatchment-EX-5

Runoff = 0.06 cfs @ 12.13 hrs, Volume= 0.005 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
2,824	49	50-75% Grass cover, Fair, HSG A
2,824		100.00% Pervious Area

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

Summary for Link DP-1: Design Point

Inflow Area = 2.867 ac, 0.00% Impervious, Inflow Depth = 0.89" for 25-Year event
Inflow = 2.69 cfs @ 12.13 hrs, Volume= 0.212 af
Primary = 2.69 cfs @ 12.13 hrs, Volume= 0.212 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Design Point

Inflow Area = 0.315 ac, 0.00% Impervious, Inflow Depth = 0.89" for 25-Year event
Inflow = 0.29 cfs @ 12.13 hrs, Volume= 0.023 af
Primary = 0.29 cfs @ 12.13 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Design Point

Inflow Area = 3.480 ac, 0.00% Impervious, Inflow Depth = 0.89" for 25-Year event
Inflow = 3.26 cfs @ 12.13 hrs, Volume= 0.258 af
Primary = 3.26 cfs @ 12.13 hrs, Volume= 0.258 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Design Point

Inflow Area = 2.399 ac, 0.00% Impervious, Inflow Depth = 0.89" for 25-Year event
Inflow = 2.25 cfs @ 12.13 hrs, Volume= 0.178 af
Primary = 2.25 cfs @ 12.13 hrs, Volume= 0.178 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Design Point

Inflow Area = 0.065 ac, 0.00% Impervious, Inflow Depth = 0.89" for 25-Year event
Inflow = 0.06 cfs @ 12.13 hrs, Volume= 0.005 af
Primary = 0.06 cfs @ 12.13 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Subcatchment-EX-1 Runoff Area=124,882 sf 0.00% Impervious Runoff Depth=1.40"
Tc=5.0 min CN=49 Runoff=4.78 cfs 0.334 af

Subcatchment EX-2: Subcatchment-EX-2 Runoff Area=13,700 sf 0.00% Impervious Runoff Depth=1.40"
Tc=5.0 min CN=49 Runoff=0.52 cfs 0.037 af

Subcatchment EX-3: Subcatchment-EX-3 Runoff Area=151,588 sf 0.00% Impervious Runoff Depth=1.40"
Tc=5.0 min CN=49 Runoff=5.80 cfs 0.406 af

Subcatchment EX-4: Subcatchment-EX-4 Runoff Area=104,487 sf 0.00% Impervious Runoff Depth=1.40"
Tc=5.0 min CN=49 Runoff=4.00 cfs 0.280 af

Subcatchment EX-5: Subcatchment-EX-5 Runoff Area=2,824 sf 0.00% Impervious Runoff Depth=1.40"
Tc=5.0 min CN=49 Runoff=0.11 cfs 0.008 af

Link DP-1: Design Point Inflow=4.78 cfs 0.334 af
Primary=4.78 cfs 0.334 af

Link DP-2: Design Point Inflow=0.52 cfs 0.037 af
Primary=0.52 cfs 0.037 af

Link DP-3: Design Point Inflow=5.80 cfs 0.406 af
Primary=5.80 cfs 0.406 af

Link DP-4: Design Point Inflow=4.00 cfs 0.280 af
Primary=4.00 cfs 0.280 af

Link DP-5: Design Point Inflow=0.11 cfs 0.008 af
Primary=0.11 cfs 0.008 af

Total Runoff Area = 9.125 ac Runoff Volume = 1.064 af Average Runoff Depth = 1.40"
100.00% Pervious = 9.125 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: Subcatchment-EX-1

Runoff = 4.78 cfs @ 12.13 hrs, Volume= 0.334 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 50-Year Rainfall=6.66"

Area (sf)	CN	Description
124,882	49	50-75% Grass cover, Fair, HSG A
124,882		100.00% Pervious Area

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

Summary for Subcatchment EX-2: Subcatchment-EX-2

Runoff = 0.52 cfs @ 12.13 hrs, Volume= 0.037 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 50-Year Rainfall=6.66"

Area (sf)	CN	Description
13,700	49	50-75% Grass cover, Fair, HSG A
13,700		100.00% Pervious Area

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

Summary for Subcatchment EX-3: Subcatchment-EX-3

Runoff = 5.80 cfs @ 12.13 hrs, Volume= 0.406 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 50-Year Rainfall=6.66"

Area (sf)	CN	Description
151,588	49	50-75% Grass cover, Fair, HSG A
151,588		100.00% Pervious Area

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

Summary for Subcatchment EX-4: Subcatchment-EX-4

Runoff = 4.00 cfs @ 12.13 hrs, Volume= 0.280 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 50-Year Rainfall=6.66"

Area (sf)	CN	Description
104,487	49	50-75% Grass cover, Fair, HSG A
104,487		100.00% Pervious Area

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

Summary for Subcatchment EX-5: Subcatchment-EX-5

Runoff = 0.11 cfs @ 12.13 hrs, Volume= 0.008 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 50-Year Rainfall=6.66"

Area (sf)	CN	Description
2,824	49	50-75% Grass cover, Fair, HSG A
2,824		100.00% Pervious Area

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

Summary for Link DP-1: Design Point

Inflow Area = 2.867 ac, 0.00% Impervious, Inflow Depth = 1.40" for 50-Year event
Inflow = 4.78 cfs @ 12.13 hrs, Volume= 0.334 af
Primary = 4.78 cfs @ 12.13 hrs, Volume= 0.334 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Design Point

Inflow Area = 0.315 ac, 0.00% Impervious, Inflow Depth = 1.40" for 50-Year event
Inflow = 0.52 cfs @ 12.13 hrs, Volume= 0.037 af
Primary = 0.52 cfs @ 12.13 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Design Point

Inflow Area = 3.480 ac, 0.00% Impervious, Inflow Depth = 1.40" for 50-Year event
Inflow = 5.80 cfs @ 12.13 hrs, Volume= 0.406 af
Primary = 5.80 cfs @ 12.13 hrs, Volume= 0.406 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Design Point

Inflow Area = 2.399 ac, 0.00% Impervious, Inflow Depth = 1.40" for 50-Year event
Inflow = 4.00 cfs @ 12.13 hrs, Volume= 0.280 af
Primary = 4.00 cfs @ 12.13 hrs, Volume= 0.280 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Design Point

Inflow Area = 0.065 ac, 0.00% Impervious, Inflow Depth = 1.40" for 50-Year event
Inflow = 0.11 cfs @ 12.13 hrs, Volume= 0.008 af
Primary = 0.11 cfs @ 12.13 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Subcatchment-EX-1 Runoff Area=124,882 sf 0.00% Impervious Runoff Depth=2.10"
Tc=5.0 min CN=49 Runoff=7.61 cfs 0.501 af

Subcatchment EX-2: Subcatchment-EX-2 Runoff Area=13,700 sf 0.00% Impervious Runoff Depth=2.10"
Tc=5.0 min CN=49 Runoff=0.83 cfs 0.055 af

Subcatchment EX-3: Subcatchment-EX-3 Runoff Area=151,588 sf 0.00% Impervious Runoff Depth=2.10"
Tc=5.0 min CN=49 Runoff=9.23 cfs 0.608 af

Subcatchment EX-4: Subcatchment-EX-4 Runoff Area=104,487 sf 0.00% Impervious Runoff Depth=2.10"
Tc=5.0 min CN=49 Runoff=6.36 cfs 0.419 af

Subcatchment EX-5: Subcatchment-EX-5 Runoff Area=2,824 sf 0.00% Impervious Runoff Depth=2.10"
Tc=5.0 min CN=49 Runoff=0.17 cfs 0.011 af

Link DP-1: Design Point Inflow=7.61 cfs 0.501 af
Primary=7.61 cfs 0.501 af

Link DP-2: Design Point Inflow=0.83 cfs 0.055 af
Primary=0.83 cfs 0.055 af

Link DP-3: Design Point Inflow=9.23 cfs 0.608 af
Primary=9.23 cfs 0.608 af

Link DP-4: Design Point Inflow=6.36 cfs 0.419 af
Primary=6.36 cfs 0.419 af

Link DP-5: Design Point Inflow=0.17 cfs 0.011 af
Primary=0.17 cfs 0.011 af

Total Runoff Area = 9.125 ac Runoff Volume = 1.595 af Average Runoff Depth = 2.10"
100.00% Pervious = 9.125 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: Subcatchment-EX-1

Runoff = 7.61 cfs @ 12.13 hrs, Volume= 0.501 af, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
124,882	49	50-75% Grass cover, Fair, HSG A
124,882		100.00% Pervious Area

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

Summary for Subcatchment EX-2: Subcatchment-EX-2

Runoff = 0.83 cfs @ 12.13 hrs, Volume= 0.055 af, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
13,700	49	50-75% Grass cover, Fair, HSG A
13,700		100.00% Pervious Area

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

Summary for Subcatchment EX-3: Subcatchment-EX-3

Runoff = 9.23 cfs @ 12.13 hrs, Volume= 0.608 af, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
151,588	49	50-75% Grass cover, Fair, HSG A
151,588		100.00% Pervious Area

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

Summary for Subcatchment EX-4: Subcatchment-EX-4

Runoff = 6.36 cfs @ 12.13 hrs, Volume= 0.419 af, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
104,487	49	50-75% Grass cover, Fair, HSG A
104,487		100.00% Pervious Area

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

Summary for Subcatchment EX-5: Subcatchment-EX-5

Runoff = 0.17 cfs @ 12.13 hrs, Volume= 0.011 af, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
2,824	49	50-75% Grass cover, Fair, HSG A
2,824		100.00% Pervious Area

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

Summary for Link DP-1: Design Point

Inflow Area = 2.867 ac, 0.00% Impervious, Inflow Depth = 2.10" for 100-Year event
Inflow = 7.61 cfs @ 12.13 hrs, Volume= 0.501 af
Primary = 7.61 cfs @ 12.13 hrs, Volume= 0.501 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Design Point

Inflow Area = 0.315 ac, 0.00% Impervious, Inflow Depth = 2.10" for 100-Year event
Inflow = 0.83 cfs @ 12.13 hrs, Volume= 0.055 af
Primary = 0.83 cfs @ 12.13 hrs, Volume= 0.055 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Design Point

Inflow Area = 3.480 ac, 0.00% Impervious, Inflow Depth = 2.10" for 100-Year event
Inflow = 9.23 cfs @ 12.13 hrs, Volume= 0.608 af
Primary = 9.23 cfs @ 12.13 hrs, Volume= 0.608 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Design Point

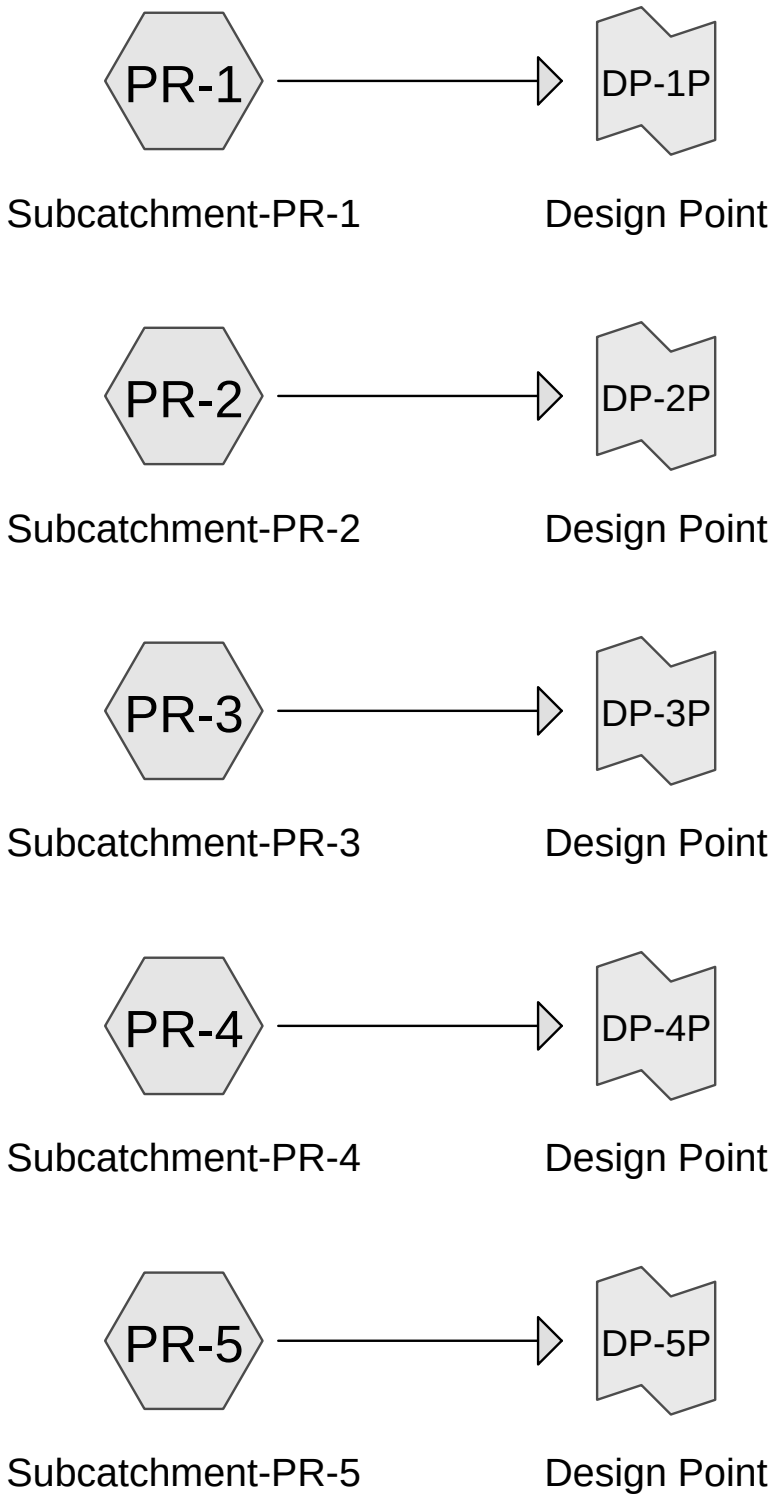
Inflow Area = 2.399 ac, 0.00% Impervious, Inflow Depth = 2.10" for 100-Year event
Inflow = 6.36 cfs @ 12.13 hrs, Volume= 0.419 af
Primary = 6.36 cfs @ 12.13 hrs, Volume= 0.419 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Design Point

Inflow Area = 0.065 ac, 0.00% Impervious, Inflow Depth = 2.10" for 100-Year event
Inflow = 0.17 cfs @ 12.13 hrs, Volume= 0.011 af
Primary = 0.17 cfs @ 12.13 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs



Subcat Reach Pond Link

Routing Diagram for Saratoga-Hydrology.1022-EMAIL
Prepared by Dana F. Perkins, Inc.

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Subcatchment-PR-1 Runoff Area=22,652 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment PR-2: Subcatchment-PR-2 Runoff Area=7,625 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment PR-3: Subcatchment-PR-3 Runoff Area=22,092 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment PR-4: Subcatchment-PR-4 Runoff Area=7,216 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment PR-5: Subcatchment-PR-5 Runoff Area=274 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af

Link DP-1P: Design Point Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link DP-2P: Design Point Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link DP-3P: Design Point Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link DP-4P: Design Point Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link DP-5P: Design Point Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 1.374 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.00"
100.00% Pervious = 1.374 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment PR-1: Subcatchment-PR-1

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
22,652	39	>75% Grass cover, Good, HSG A
22,652		100.00% Pervious Area

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

Summary for Subcatchment PR-2: Subcatchment-PR-2

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
7,625	39	>75% Grass cover, Good, HSG A
7,625		100.00% Pervious Area

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

Summary for Subcatchment PR-3: Subcatchment-PR-3

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
22,092	39	>75% Grass cover, Good, HSG A
22,092		100.00% Pervious Area

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

Summary for Subcatchment PR-4: Subcatchment-PR-4

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
7,216	39	>75% Grass cover, Good, HSG A
7,216		100.00% Pervious Area

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

Summary for Subcatchment PR-5: Subcatchment-PR-5

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
274	39	>75% Grass cover, Good, HSG A
274		100.00% Pervious Area

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

Summary for Link DP-1P: Design Point

Inflow Area = 0.520 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-2P: Design Point

Inflow Area = 0.175 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-3P: Design Point

Inflow Area = 0.507 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-4P: Design Point

Inflow Area = 0.166 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-5P: Design Point

Inflow Area = 0.006 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Subcatchment-PR-1 Runoff Area=22,652 sf 0.00% Impervious Runoff Depth=0.10"
Tc=5.0 min CN=39 Runoff=0.01 cfs 0.005 af

Subcatchment PR-2: Subcatchment-PR-2 Runoff Area=7,625 sf 0.00% Impervious Runoff Depth=0.10"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.002 af

Subcatchment PR-3: Subcatchment-PR-3 Runoff Area=22,092 sf 0.00% Impervious Runoff Depth=0.10"
Tc=5.0 min CN=39 Runoff=0.01 cfs 0.004 af

Subcatchment PR-4: Subcatchment-PR-4 Runoff Area=7,216 sf 0.00% Impervious Runoff Depth=0.10"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.001 af

Subcatchment PR-5: Subcatchment-PR-5 Runoff Area=274 sf 0.00% Impervious Runoff Depth=0.10"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af

Link DP-1P: Design Point Inflow=0.01 cfs 0.005 af
Primary=0.01 cfs 0.005 af

Link DP-2P: Design Point Inflow=0.00 cfs 0.002 af
Primary=0.00 cfs 0.002 af

Link DP-3P: Design Point Inflow=0.01 cfs 0.004 af
Primary=0.01 cfs 0.004 af

Link DP-4P: Design Point Inflow=0.00 cfs 0.001 af
Primary=0.00 cfs 0.001 af

Link DP-5P: Design Point Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 1.374 ac Runoff Volume = 0.012 af Average Runoff Depth = 0.10"
100.00% Pervious = 1.374 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment PR-1: Subcatchment-PR-1

Runoff = 0.01 cfs @ 14.34 hrs, Volume= 0.005 af, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
22,652	39	>75% Grass cover, Good, HSG A
22,652		100.00% Pervious Area

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

Summary for Subcatchment PR-2: Subcatchment-PR-2

Runoff = 0.00 cfs @ 14.34 hrs, Volume= 0.002 af, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
7,625	39	>75% Grass cover, Good, HSG A
7,625		100.00% Pervious Area

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

Summary for Subcatchment PR-3: Subcatchment-PR-3

Runoff = 0.01 cfs @ 14.34 hrs, Volume= 0.004 af, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
22,092	39	>75% Grass cover, Good, HSG A
22,092		100.00% Pervious Area

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

Summary for Subcatchment PR-4: Subcatchment-PR-4

Runoff = 0.00 cfs @ 14.34 hrs, Volume= 0.001 af, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
7,216	39	>75% Grass cover, Good, HSG A
7,216		100.00% Pervious Area

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

Summary for Subcatchment PR-5: Subcatchment-PR-5

Runoff = 0.00 cfs @ 14.34 hrs, Volume= 0.000 af, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
274	39	>75% Grass cover, Good, HSG A
274		100.00% Pervious Area

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

Summary for Link DP-1P: Design Point

Inflow Area = 0.520 ac, 0.00% Impervious, Inflow Depth = 0.10" for 10-Year event
Inflow = 0.01 cfs @ 14.34 hrs, Volume= 0.005 af
Primary = 0.01 cfs @ 14.34 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-2P: Design Point

Inflow Area = 0.175 ac, 0.00% Impervious, Inflow Depth = 0.10" for 10-Year event
Inflow = 0.00 cfs @ 14.34 hrs, Volume= 0.002 af
Primary = 0.00 cfs @ 14.34 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-3P: Design Point

Inflow Area = 0.507 ac, 0.00% Impervious, Inflow Depth = 0.10" for 10-Year event
Inflow = 0.01 cfs @ 14.34 hrs, Volume= 0.004 af
Primary = 0.01 cfs @ 14.34 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-4P: Design Point

Inflow Area = 0.166 ac, 0.00% Impervious, Inflow Depth = 0.10" for 10-Year event
Inflow = 0.00 cfs @ 14.34 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 14.34 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-5P: Design Point

Inflow Area = 0.006 ac, 0.00% Impervious, Inflow Depth = 0.10" for 10-Year event
Inflow = 0.00 cfs @ 14.34 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 14.34 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Subcatchment-PR-1 Runoff Area=22,652 sf 0.00% Impervious Runoff Depth=0.34"
Tc=5.0 min CN=39 Runoff=0.04 cfs 0.015 af

Subcatchment PR-2: Subcatchment-PR-2 Runoff Area=7,625 sf 0.00% Impervious Runoff Depth=0.34"
Tc=5.0 min CN=39 Runoff=0.01 cfs 0.005 af

Subcatchment PR-3: Subcatchment-PR-3 Runoff Area=22,092 sf 0.00% Impervious Runoff Depth=0.34"
Tc=5.0 min CN=39 Runoff=0.04 cfs 0.014 af

Subcatchment PR-4: Subcatchment-PR-4 Runoff Area=7,216 sf 0.00% Impervious Runoff Depth=0.34"
Tc=5.0 min CN=39 Runoff=0.01 cfs 0.005 af

Subcatchment PR-5: Subcatchment-PR-5 Runoff Area=274 sf 0.00% Impervious Runoff Depth=0.34"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af

Link DP-1P: Design Point Inflow=0.04 cfs 0.015 af
Primary=0.04 cfs 0.015 af

Link DP-2P: Design Point Inflow=0.01 cfs 0.005 af
Primary=0.01 cfs 0.005 af

Link DP-3P: Design Point Inflow=0.04 cfs 0.014 af
Primary=0.04 cfs 0.014 af

Link DP-4P: Design Point Inflow=0.01 cfs 0.005 af
Primary=0.01 cfs 0.005 af

Link DP-5P: Design Point Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 1.374 ac Runoff Volume = 0.039 af Average Runoff Depth = 0.34"
100.00% Pervious = 1.374 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment PR-1: Subcatchment-PR-1

Runoff = 0.04 cfs @ 12.34 hrs, Volume= 0.015 af, Depth= 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
22,652	39	>75% Grass cover, Good, HSG A
22,652		100.00% Pervious Area

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

Summary for Subcatchment PR-2: Subcatchment-PR-2

Runoff = 0.01 cfs @ 12.34 hrs, Volume= 0.005 af, Depth= 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
7,625	39	>75% Grass cover, Good, HSG A
7,625		100.00% Pervious Area

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

Summary for Subcatchment PR-3: Subcatchment-PR-3

Runoff = 0.04 cfs @ 12.34 hrs, Volume= 0.014 af, Depth= 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
22,092	39	>75% Grass cover, Good, HSG A
22,092		100.00% Pervious Area

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

Summary for Subcatchment PR-4: Subcatchment-PR-4

Runoff = 0.01 cfs @ 12.34 hrs, Volume= 0.005 af, Depth= 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
7,216	39	>75% Grass cover, Good, HSG A
7,216		100.00% Pervious Area

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

Summary for Subcatchment PR-5: Subcatchment-PR-5

Runoff = 0.00 cfs @ 12.34 hrs, Volume= 0.000 af, Depth= 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
274	39	>75% Grass cover, Good, HSG A
274		100.00% Pervious Area

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

Summary for Link DP-1P: Design Point

Inflow Area = 0.520 ac, 0.00% Impervious, Inflow Depth = 0.34" for 25-Year event
Inflow = 0.04 cfs @ 12.34 hrs, Volume= 0.015 af
Primary = 0.04 cfs @ 12.34 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-2P: Design Point

Inflow Area = 0.175 ac, 0.00% Impervious, Inflow Depth = 0.34" for 25-Year event
Inflow = 0.01 cfs @ 12.34 hrs, Volume= 0.005 af
Primary = 0.01 cfs @ 12.34 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-3P: Design Point

Inflow Area = 0.507 ac, 0.00% Impervious, Inflow Depth = 0.34" for 25-Year event
Inflow = 0.04 cfs @ 12.34 hrs, Volume= 0.014 af
Primary = 0.04 cfs @ 12.34 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-4P: Design Point

Inflow Area = 0.166 ac, 0.00% Impervious, Inflow Depth = 0.34" for 25-Year event
Inflow = 0.01 cfs @ 12.34 hrs, Volume= 0.005 af
Primary = 0.01 cfs @ 12.34 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-5P: Design Point

Inflow Area = 0.006 ac, 0.00% Impervious, Inflow Depth = 0.34" for 25-Year event
Inflow = 0.00 cfs @ 12.34 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 12.34 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Subcatchment-PR-1 Runoff Area=22,652 sf 0.00% Impervious Runoff Depth=0.65"
Tc=5.0 min CN=39 Runoff=0.22 cfs 0.028 af

Subcatchment PR-2: Subcatchment-PR-2 Runoff Area=7,625 sf 0.00% Impervious Runoff Depth=0.65"
Tc=5.0 min CN=39 Runoff=0.07 cfs 0.009 af

Subcatchment PR-3: Subcatchment-PR-3 Runoff Area=22,092 sf 0.00% Impervious Runoff Depth=0.65"
Tc=5.0 min CN=39 Runoff=0.21 cfs 0.027 af

Subcatchment PR-4: Subcatchment-PR-4 Runoff Area=7,216 sf 0.00% Impervious Runoff Depth=0.65"
Tc=5.0 min CN=39 Runoff=0.07 cfs 0.009 af

Subcatchment PR-5: Subcatchment-PR-5 Runoff Area=274 sf 0.00% Impervious Runoff Depth=0.65"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af

Link DP-1P: Design Point Inflow=0.22 cfs 0.028 af
Primary=0.22 cfs 0.028 af

Link DP-2P: Design Point Inflow=0.07 cfs 0.009 af
Primary=0.07 cfs 0.009 af

Link DP-3P: Design Point Inflow=0.21 cfs 0.027 af
Primary=0.21 cfs 0.027 af

Link DP-4P: Design Point Inflow=0.07 cfs 0.009 af
Primary=0.07 cfs 0.009 af

Link DP-5P: Design Point Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 1.374 ac Runoff Volume = 0.075 af Average Runoff Depth = 0.65"
100.00% Pervious = 1.374 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment PR-1: Subcatchment-PR-1

Runoff = 0.22 cfs @ 12.14 hrs, Volume= 0.028 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 50-Year Rainfall=6.66"

Area (sf)	CN	Description
22,652	39	>75% Grass cover, Good, HSG A
22,652		100.00% Pervious Area

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

Summary for Subcatchment PR-2: Subcatchment-PR-2

Runoff = 0.07 cfs @ 12.14 hrs, Volume= 0.009 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 50-Year Rainfall=6.66"

Area (sf)	CN	Description
7,625	39	>75% Grass cover, Good, HSG A
7,625		100.00% Pervious Area

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

Summary for Subcatchment PR-3: Subcatchment-PR-3

Runoff = 0.21 cfs @ 12.14 hrs, Volume= 0.027 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 50-Year Rainfall=6.66"

Area (sf)	CN	Description
22,092	39	>75% Grass cover, Good, HSG A
22,092		100.00% Pervious Area

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

Summary for Subcatchment PR-4: Subcatchment-PR-4

Runoff = 0.07 cfs @ 12.14 hrs, Volume= 0.009 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 50-Year Rainfall=6.66"

Area (sf)	CN	Description
7,216	39	>75% Grass cover, Good, HSG A
7,216		100.00% Pervious Area

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

Summary for Subcatchment PR-5: Subcatchment-PR-5

Runoff = 0.00 cfs @ 12.14 hrs, Volume= 0.000 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 50-Year Rainfall=6.66"

Area (sf)	CN	Description
274	39	>75% Grass cover, Good, HSG A
274		100.00% Pervious Area

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

Summary for Link DP-1P: Design Point

Inflow Area = 0.520 ac, 0.00% Impervious, Inflow Depth = 0.65" for 50-Year event
Inflow = 0.22 cfs @ 12.14 hrs, Volume= 0.028 af
Primary = 0.22 cfs @ 12.14 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-2P: Design Point

Inflow Area = 0.175 ac, 0.00% Impervious, Inflow Depth = 0.65" for 50-Year event
Inflow = 0.07 cfs @ 12.14 hrs, Volume= 0.009 af
Primary = 0.07 cfs @ 12.14 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-3P: Design Point

Inflow Area = 0.507 ac, 0.00% Impervious, Inflow Depth = 0.65" for 50-Year event
Inflow = 0.21 cfs @ 12.14 hrs, Volume= 0.027 af
Primary = 0.21 cfs @ 12.14 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-4P: Design Point

Inflow Area = 0.166 ac, 0.00% Impervious, Inflow Depth = 0.65" for 50-Year event
Inflow = 0.07 cfs @ 12.14 hrs, Volume= 0.009 af
Primary = 0.07 cfs @ 12.14 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-5P: Design Point

Inflow Area = 0.006 ac, 0.00% Impervious, Inflow Depth = 0.65" for 50-Year event
Inflow = 0.00 cfs @ 12.14 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 12.14 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Subcatchment-PR-1 Runoff Area=22,652 sf 0.00% Impervious Runoff Depth=1.12"
Tc=5.0 min CN=39 Runoff=0.57 cfs 0.049 af

Subcatchment PR-2: Subcatchment-PR-2 Runoff Area=7,625 sf 0.00% Impervious Runoff Depth=1.12"
Tc=5.0 min CN=39 Runoff=0.19 cfs 0.016 af

Subcatchment PR-3: Subcatchment-PR-3 Runoff Area=22,092 sf 0.00% Impervious Runoff Depth=1.12"
Tc=5.0 min CN=39 Runoff=0.56 cfs 0.047 af

Subcatchment PR-4: Subcatchment-PR-4 Runoff Area=7,216 sf 0.00% Impervious Runoff Depth=1.12"
Tc=5.0 min CN=39 Runoff=0.18 cfs 0.016 af

Subcatchment PR-5: Subcatchment-PR-5 Runoff Area=274 sf 0.00% Impervious Runoff Depth=1.12"
Tc=5.0 min CN=39 Runoff=0.01 cfs 0.001 af

Link DP-1P: Design Point Inflow=0.57 cfs 0.049 af
Primary=0.57 cfs 0.049 af

Link DP-2P: Design Point Inflow=0.19 cfs 0.016 af
Primary=0.19 cfs 0.016 af

Link DP-3P: Design Point Inflow=0.56 cfs 0.047 af
Primary=0.56 cfs 0.047 af

Link DP-4P: Design Point Inflow=0.18 cfs 0.016 af
Primary=0.18 cfs 0.016 af

Link DP-5P: Design Point Inflow=0.01 cfs 0.001 af
Primary=0.01 cfs 0.001 af

Total Runoff Area = 1.374 ac Runoff Volume = 0.129 af Average Runoff Depth = 1.12"
100.00% Pervious = 1.374 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment PR-1: Subcatchment-PR-1

Runoff = 0.57 cfs @ 12.14 hrs, Volume= 0.049 af, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
22,652	39	>75% Grass cover, Good, HSG A
22,652		100.00% Pervious Area

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

Summary for Subcatchment PR-2: Subcatchment-PR-2

Runoff = 0.19 cfs @ 12.14 hrs, Volume= 0.016 af, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
7,625	39	>75% Grass cover, Good, HSG A
7,625		100.00% Pervious Area

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

Summary for Subcatchment PR-3: Subcatchment-PR-3

Runoff = 0.56 cfs @ 12.14 hrs, Volume= 0.047 af, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
22,092	39	>75% Grass cover, Good, HSG A
22,092		100.00% Pervious Area

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

Summary for Subcatchment PR-4: Subcatchment-PR-4

Runoff = 0.18 cfs @ 12.14 hrs, Volume= 0.016 af, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
7,216	39	>75% Grass cover, Good, HSG A
7,216		100.00% Pervious Area

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

Summary for Subcatchment PR-5: Subcatchment-PR-5

Runoff = 0.01 cfs @ 12.14 hrs, Volume= 0.001 af, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
274	39	>75% Grass cover, Good, HSG A
274		100.00% Pervious Area

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

Summary for Link DP-1P: Design Point

Inflow Area = 0.520 ac, 0.00% Impervious, Inflow Depth = 1.12" for 100-Year event
Inflow = 0.57 cfs @ 12.14 hrs, Volume= 0.049 af
Primary = 0.57 cfs @ 12.14 hrs, Volume= 0.049 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-2P: Design Point

Inflow Area = 0.175 ac, 0.00% Impervious, Inflow Depth = 1.12" for 100-Year event
Inflow = 0.19 cfs @ 12.14 hrs, Volume= 0.016 af
Primary = 0.19 cfs @ 12.14 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-3P: Design Point

Inflow Area = 0.507 ac, 0.00% Impervious, Inflow Depth = 1.12" for 100-Year event
Inflow = 0.56 cfs @ 12.14 hrs, Volume= 0.047 af
Primary = 0.56 cfs @ 12.14 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-4P: Design Point

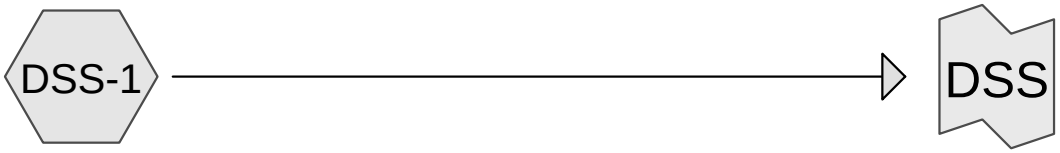
Inflow Area = 0.166 ac, 0.00% Impervious, Inflow Depth = 1.12" for 100-Year event
Inflow = 0.18 cfs @ 12.14 hrs, Volume= 0.016 af
Primary = 0.18 cfs @ 12.14 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Summary for Link DP-5P: Design Point

Inflow Area = 0.006 ac, 0.00% Impervious, Inflow Depth = 1.12" for 100-Year event
Inflow = 0.01 cfs @ 12.14 hrs, Volume= 0.001 af
Primary = 0.01 cfs @ 12.14 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs



DSS Subcatchment

Existing DMH
(Saratoga)

Subcat Reach Pond Link

Routing Diagram for Saratoga-Hydrology.0722-EMAIL
Prepared by Dana F. Perkins, Inc.

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 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 DSS-1: DSS Subcatchment Runoff Area=4.650 ac 100.00% Impervious Runoff Depth=2.77"
Tc=5.0 min CN=98 Runoff=14.75 cfs 1.073 af

Link DSS: Existing DMH (Saratoga) Inflow=14.75 cfs 1.073 af
Primary=14.75 cfs 1.073 af

Total Runoff Area = 4.650 ac Runoff Volume = 1.073 af Average Runoff Depth = 2.77"
0.00% Pervious = 0.000 ac 100.00% Impervious = 4.650 ac

Summary for Subcatchment DSS-1: DSS Subcatchment

Runoff = 14.75 cfs @ 12.12 hrs, Volume= 1.073 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (ac)	CN	Description
4.650	98	Paved parking, HSG B
4.650		100.00% Impervious Area

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

Summary for Link DSS: Existing DMH (Saratoga)

Inflow Area = 4.650 ac,100.00% Impervious, Inflow Depth = 2.77" for 2-Year event
Inflow = 14.75 cfs @ 12.12 hrs, Volume= 1.073 af
Primary = 14.75 cfs @ 12.12 hrs, Volume= 1.073 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 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 DSS-1: DSS Subcatchment Runoff Area=4.650 ac 100.00% Impervious Runoff Depth=4.22"
Tc=5.0 min CN=98 Runoff=22.09 cfs 1.637 af

Link DSS: Existing DMH (Saratoga) Inflow=22.09 cfs 1.637 af
Primary=22.09 cfs 1.637 af

Total Runoff Area = 4.650 ac Runoff Volume = 1.637 af Average Runoff Depth = 4.22"
0.00% Pervious = 0.000 ac 100.00% Impervious = 4.650 ac

Summary for Subcatchment DSS-1: DSS Subcatchment

Runoff = 22.09 cfs @ 12.12 hrs, Volume= 1.637 af, Depth= 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (ac)	CN	Description
4.650	98	Paved parking, HSG B
4.650		100.00% Impervious Area

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

Summary for Link DSS: Existing DMH (Saratoga)

Inflow Area = 4.650 ac,100.00% Impervious, Inflow Depth = 4.22" for 10-Year event
Inflow = 22.09 cfs @ 12.12 hrs, Volume= 1.637 af
Primary = 22.09 cfs @ 12.12 hrs, Volume= 1.637 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 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 DSS-1: DSS Subcatchment Runoff Area=4.650 ac 100.00% Impervious Runoff Depth=5.36"
Tc=5.0 min CN=98 Runoff=27.80 cfs 2.078 af

Link DSS: Existing DMH (Saratoga) Inflow=27.80 cfs 2.078 af
Primary=27.80 cfs 2.078 af

Total Runoff Area = 4.650 ac Runoff Volume = 2.078 af Average Runoff Depth = 5.36"
0.00% Pervious = 0.000 ac 100.00% Impervious = 4.650 ac

Summary for Subcatchment DSS-1: DSS Subcatchment

Runoff = 27.80 cfs @ 12.12 hrs, Volume= 2.078 af, Depth= 5.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (ac)	CN	Description
4.650	98	Paved parking, HSG B
4.650		100.00% Impervious Area

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

Summary for Link DSS: Existing DMH (Saratoga)

Inflow Area = 4.650 ac,100.00% Impervious, Inflow Depth = 5.36" for 25-Year event
Inflow = 27.80 cfs @ 12.12 hrs, Volume= 2.078 af
Primary = 27.80 cfs @ 12.12 hrs, Volume= 2.078 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 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 DSS-1: DSS Subcatchment Runoff Area=4.650 ac 100.00% Impervious Runoff Depth=6.42"
Tc=5.0 min CN=98 Runoff=33.10 cfs 2.488 af

Link DSS: Existing DMH (Saratoga) Inflow=33.10 cfs 2.488 af
Primary=33.10 cfs 2.488 af

Total Runoff Area = 4.650 ac Runoff Volume = 2.488 af Average Runoff Depth = 6.42"
0.00% Pervious = 0.000 ac 100.00% Impervious = 4.650 ac

Summary for Subcatchment DSS-1: DSS Subcatchment

Runoff = 33.10 cfs @ 12.12 hrs, Volume= 2.488 af, Depth= 6.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 50-Year Rainfall=6.66"

Area (ac)	CN	Description
4.650	98	Paved parking, HSG B
4.650		100.00% Impervious Area

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

Summary for Link DSS: Existing DMH (Saratoga)

Inflow Area = 4.650 ac,100.00% Impervious, Inflow Depth = 6.42" for 50-Year event
Inflow = 33.10 cfs @ 12.12 hrs, Volume= 2.488 af
Primary = 33.10 cfs @ 12.12 hrs, Volume= 2.488 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 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 DSS-1: DSS Subcatchment Runoff Area=4.650 ac 100.00% Impervious Runoff Depth=7.68"
Tc=5.0 min CN=98 Runoff=39.40 cfs 2.976 af

Link DSS: Existing DMH (Saratoga) Inflow=39.40 cfs 2.976 af
Primary=39.40 cfs 2.976 af

Total Runoff Area = 4.650 ac Runoff Volume = 2.976 af Average Runoff Depth = 7.68"
0.00% Pervious = 0.000 ac 100.00% Impervious = 4.650 ac

Summary for Subcatchment DSS-1: DSS Subcatchment

Runoff = 39.40 cfs @ 12.12 hrs, Volume= 2.976 af, Depth= 7.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

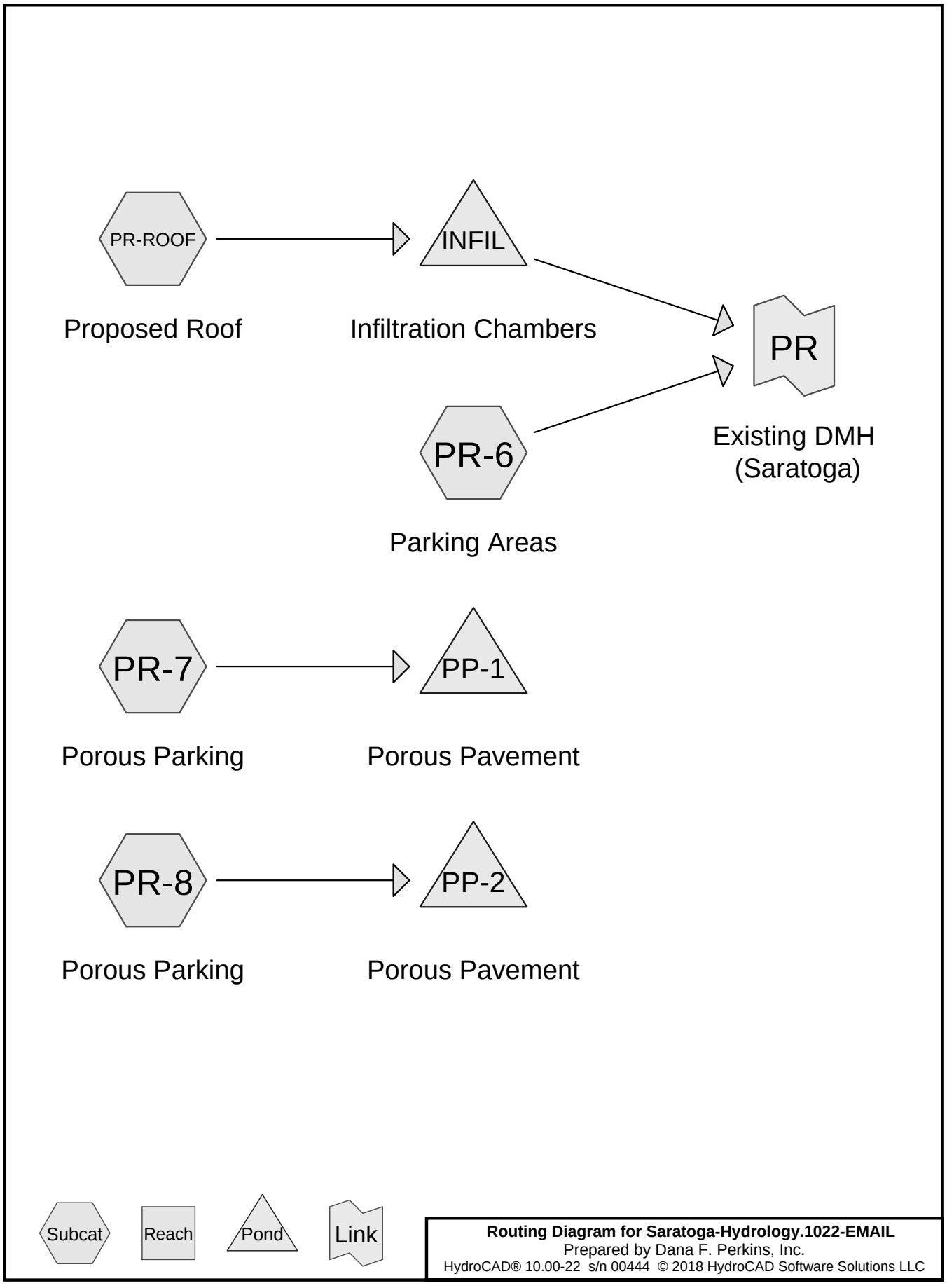
Area (ac)	CN	Description
4.650	98	Paved parking, HSG B
4.650		100.00% Impervious Area

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

Summary for Link DSS: Existing DMH (Saratoga)

Inflow Area = 4.650 ac,100.00% Impervious, Inflow Depth = 7.68" for 100-Year event
Inflow = 39.40 cfs @ 12.12 hrs, Volume= 2.976 af
Primary = 39.40 cfs @ 12.12 hrs, Volume= 2.976 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs



Routing Diagram for Saratoga-Hydrology.1022-EMAIL
Prepared by Dana F. Perkins, Inc.

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-6: Parking Areas Runoff Area=120,448 sf 79.85% Impervious Runoff Depth=1.66"
Tc=5.0 min CN=86 Runoff=6.07 cfs 0.383 af

Subcatchment PR-7: Porous Parking Runoff Area=66,108 sf 79.29% Impervious Runoff Depth=1.98"
Tc=5.0 min CN=90 Runoff=3.90 cfs 0.251 af

Subcatchment PR-8: Porous Parking Runoff Area=21,133 sf 80.02% Impervious Runoff Depth=1.66"
Tc=5.0 min CN=86 Runoff=1.07 cfs 0.067 af

Subcatchment PR-ROOF: Proposed Roof Runoff Area=126,000 sf 100.00% Impervious Runoff Depth=2.77"
Tc=5.0 min CN=98 Runoff=9.18 cfs 0.667 af

Pond INFIL: Infiltration Chambers Peak Elev=258.57' Storage=8,100 cf Inflow=9.18 cfs 0.667 af
Discarded=1.02 cfs 0.667 af Primary=0.00 cfs 0.000 af Outflow=1.02 cfs 0.667 af

Pond PP-1: Porous Pavement Peak Elev=263.00' Storage=81 cf Inflow=3.90 cfs 0.251 af
Outflow=3.89 cfs 0.251 af

Pond PP-2: Porous Pavement Peak Elev=266.00' Storage=22 cf Inflow=1.07 cfs 0.067 af
Outflow=1.06 cfs 0.067 af

Link PR: Existing DMH (Saratoga) Inflow=6.07 cfs 0.383 af
Primary=6.07 cfs 0.383 af

Total Runoff Area = 7.660 ac Runoff Volume = 1.369 af Average Runoff Depth = 2.14"
12.64% Pervious = 0.969 ac 87.36% Impervious = 6.692 ac

Summary for Subcatchment PR-6: Parking Areas

Runoff = 6.07 cfs @ 12.12 hrs, Volume= 0.383 af, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
96,172	98	Paved parking, HSG A
24,276	39	>75% Grass cover, Good, HSG A
120,448	86	Weighted Average
24,276		20.15% Pervious Area
96,172		79.85% Impervious Area

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

Summary for Subcatchment PR-7: Porous Parking

Runoff = 3.90 cfs @ 12.12 hrs, Volume= 0.251 af, Depth= 1.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
52,418	98	Paved parking, HSG B
13,690	61	>75% Grass cover, Good, HSG B
66,108	90	Weighted Average
13,690		20.71% Pervious Area
52,418		79.29% Impervious Area

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

Summary for Subcatchment PR-8: Porous Parking

Runoff = 1.07 cfs @ 12.12 hrs, Volume= 0.067 af, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
16,911	98	Paved parking, HSG B
4,222	39	>75% Grass cover, Good, HSG A
21,133	86	Weighted Average
4,222		19.98% Pervious Area
16,911		80.02% Impervious Area

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

Summary for Subcatchment PR-ROOF: Proposed Roof

Runoff = 9.18 cfs @ 12.12 hrs, Volume= 0.667 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.00"

Area (sf)	CN	Description
126,000	98	Roofs, HSG A
126,000		100.00% Impervious Area

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

Summary for Pond INFIL: Infiltration Chambers

Inflow Area = 2.893 ac,100.00% Impervious, Inflow Depth = 2.77" for 2-Year event
Inflow = 9.18 cfs @ 12.12 hrs, Volume= 0.667 af
Outflow = 1.02 cfs @ 11.49 hrs, Volume= 0.667 af, Atten= 89%, Lag= 0.0 min
Discarded = 1.02 cfs @ 11.49 hrs, Volume= 0.667 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 258.57' @ 12.75 hrs Surf.Area= 5,348 sf Storage= 8,100 cf

Plug-Flow detention time= 47.5 min calculated for 0.667 af (100% of inflow)
Center-of-Mass det. time= 47.5 min (806.5 - 759.0)

Volume	Invert	Avail.Storage	Storage Description
#1	256.25'	10,193 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 36,099 cf Overall - 10,617 cf Embedded = 25,482 cf x 40.0% Voids
#2	257.00'	10,617 cf	**Cultec R-902HD** x 164 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
		20,810 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
256.25	5,348	0	0
263.00	5,348	36,099	36,099

Device	Routing	Invert	Outlet Devices
#1	Discarded	256.25'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	259.75'	**24.0" Round Culvert** L= 160.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 259.75' / 253.20' S= 0.0409 '/' Cc= 0.900

n= 0.012, Flow Area= 3.14 sf

Discarded OutFlow Max=1.02 cfs @ 11.49 hrs HW=256.32' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=256.25' (Free Discharge)
2=Culvert (Controls 0.00 cfs)

Summary for Pond PP-1: Porous Pavement

Inflow Area = 1.518 ac, 79.29% Impervious, Inflow Depth = 1.98" for 2-Year event
Inflow = 3.90 cfs @ 12.12 hrs, Volume= 0.251 af
Outflow = 3.89 cfs @ 12.13 hrs, Volume= 0.251 af, Atten= 0%, Lag= 0.3 min
Discarded = 3.89 cfs @ 12.13 hrs, Volume= 0.251 af

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 263.00' @ 12.13 hrs Surf.Area= 44,443 sf Storage= 81 cf

Plug-Flow detention time= 0.3 min calculated for 0.251 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (816.6 - 816.2)

Volume	Invert	Avail.Storage	Storage Description
#1	263.00'	17,777 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 44,443 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
263.00	44,443	0	0
264.00	44,443	44,443	44,443

Device	Routing	Invert	Outlet Devices
#1	Discarded	263.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=8.51 cfs @ 12.13 hrs HW=263.00' (Free Discharge)
1=Exfiltration (Exfiltration Controls 8.51 cfs)

Summary for Pond PP-2: Porous Pavement

Inflow Area = 0.485 ac, 80.02% Impervious, Inflow Depth = 1.66" for 2-Year event
Inflow = 1.07 cfs @ 12.12 hrs, Volume= 0.067 af
Outflow = 1.06 cfs @ 12.13 hrs, Volume= 0.067 af, Atten= 0%, Lag= 0.3 min
Discarded = 1.06 cfs @ 12.13 hrs, Volume= 0.067 af

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 266.00' @ 12.13 hrs Surf.Area= 13,862 sf Storage= 22 cf

Plug-Flow detention time= 0.3 min calculated for 0.067 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (834.3 - 833.9)

Volume	Invert	Avail.Storage	Storage Description
#1	266.00'	5,545 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 13,862 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
266.00	13,862	0	0
267.00	13,862	13,862	13,862

Device	Routing	Invert	Outlet Devices
#1	Discarded	266.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.65 cfs @ 12.13 hrs HW=266.00' (Free Discharge)
1=Exfiltration (Exfiltration Controls 2.65 cfs)

Summary for Link PR: Existing DMH (Saratoga)

Inflow Area = 5.658 ac, 90.15% Impervious, Inflow Depth = 0.81" for 2-Year event
Inflow = 6.07 cfs @ 12.12 hrs, Volume= 0.383 af
Primary = 6.07 cfs @ 12.12 hrs, Volume= 0.383 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-6: Parking Areas Runoff Area=120,448 sf 79.85% Impervious Runoff Depth=2.97"
Tc=5.0 min CN=86 Runoff=10.61 cfs 0.684 af

Subcatchment PR-7: Porous Parking Runoff Area=66,108 sf 79.29% Impervious Runoff Depth=3.36"
Tc=5.0 min CN=90 Runoff=6.41 cfs 0.425 af

Subcatchment PR-8: Porous Parking Runoff Area=21,133 sf 80.02% Impervious Runoff Depth=2.97"
Tc=5.0 min CN=86 Runoff=1.86 cfs 0.120 af

Subcatchment PR-ROOF: Proposed Roof Runoff Area=126,000 sf 100.00% Impervious Runoff Depth=4.22"
Tc=5.0 min CN=98 Runoff=13.74 cfs 1.018 af

Pond INFIL: Infiltration Chambers Peak Elev=260.15' Storage=14,069 cf Inflow=13.74 cfs 1.018 af
Discarded=1.02 cfs 0.973 af Primary=0.75 cfs 0.045 af Outflow=1.77 cfs 1.018 af

Pond PP-1: Porous Pavement Peak Elev=263.01' Storage=133 cf Inflow=6.41 cfs 0.425 af
Outflow=6.39 cfs 0.425 af

Pond PP-2: Porous Pavement Peak Elev=266.01' Storage=39 cf Inflow=1.86 cfs 0.120 af
Outflow=1.86 cfs 0.120 af

Link PR: Existing DMH (Saratoga) Inflow=10.61 cfs 0.729 af
Primary=10.61 cfs 0.729 af

Total Runoff Area = 7.660 ac Runoff Volume = 2.246 af Average Runoff Depth = 3.52"
12.64% Pervious = 0.969 ac 87.36% Impervious = 6.692 ac

Summary for Subcatchment PR-6: Parking Areas

Runoff = 10.61 cfs @ 12.12 hrs, Volume= 0.684 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
96,172	98	Paved parking, HSG A
24,276	39	>75% Grass cover, Good, HSG A
120,448	86	Weighted Average
24,276		20.15% Pervious Area
96,172		79.85% Impervious Area

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

Summary for Subcatchment PR-7: Porous Parking

Runoff = 6.41 cfs @ 12.12 hrs, Volume= 0.425 af, Depth= 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
52,418	98	Paved parking, HSG B
13,690	61	>75% Grass cover, Good, HSG B
66,108	90	Weighted Average
13,690		20.71% Pervious Area
52,418		79.29% Impervious Area

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

Summary for Subcatchment PR-8: Porous Parking

Runoff = 1.86 cfs @ 12.12 hrs, Volume= 0.120 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
16,911	98	Paved parking, HSG B
4,222	39	>75% Grass cover, Good, HSG A
21,133	86	Weighted Average
4,222		19.98% Pervious Area
16,911		80.02% Impervious Area

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

Summary for Subcatchment PR-ROOF: Proposed Roof

Runoff = 13.74 cfs @ 12.12 hrs, Volume= 1.018 af, Depth= 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.46"

Area (sf)	CN	Description
126,000	98	Roofs, HSG A
126,000		100.00% Impervious Area

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

Summary for Pond INFIL: Infiltration Chambers

Inflow Area = 2.893 ac,100.00% Impervious, Inflow Depth = 4.22" for 10-Year event
Inflow = 13.74 cfs @ 12.12 hrs, Volume= 1.018 af
Outflow = 1.77 cfs @ 12.61 hrs, Volume= 1.018 af, Atten= 87%, Lag= 29.4 min
Discarded = 1.02 cfs @ 11.06 hrs, Volume= 0.973 af
Primary = 0.75 cfs @ 12.61 hrs, Volume= 0.045 af

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 260.15' @ 12.61 hrs Surf.Area= 5,348 sf Storage= 14,069 cf

Plug-Flow detention time= 83.7 min calculated for 1.018 af (100% of inflow)
Center-of-Mass det. time= 83.7 min (834.2 - 750.5)

Volume	Invert	Avail.Storage	Storage Description
#1	256.25'	10,193 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 36,099 cf Overall - 10,617 cf Embedded = 25,482 cf x 40.0% Voids
#2	257.00'	10,617 cf	**Cultec R-902HD** x 164 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
		20,810 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
256.25	5,348	0	0
263.00	5,348	36,099	36,099

Device	Routing	Invert	Outlet Devices
#1	Discarded	256.25'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	259.75'	**24.0" Round Culvert** L= 160.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 259.75' / 253.20' S= 0.0409 '/' Cc= 0.900

n= 0.012, Flow Area= 3.14 sf

Discarded OutFlow Max=1.02 cfs @ 11.06 hrs HW=256.32' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.02 cfs)

Primary OutFlow Max=0.74 cfs @ 12.61 hrs HW=260.15' (Free Discharge)
2=Culvert (Inlet Controls 0.74 cfs @ 1.69 fps)

Summary for Pond PP-1: Porous Pavement

Inflow Area = 1.518 ac, 79.29% Impervious, Inflow Depth = 3.36" for 10-Year event
Inflow = 6.41 cfs @ 12.12 hrs, Volume= 0.425 af
Outflow = 6.39 cfs @ 12.13 hrs, Volume= 0.425 af, Atten= 0%, Lag= 0.3 min
Discarded = 6.39 cfs @ 12.13 hrs, Volume= 0.425 af

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 263.01' @ 12.13 hrs Surf.Area= 44,443 sf Storage= 133 cf

Plug-Flow detention time= 0.3 min calculated for 0.424 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (800.2 - 799.8)

Volume	Invert	Avail.Storage	Storage Description
#1	263.00'	17,777 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 44,443 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
263.00	44,443	0	0
264.00	44,443	44,443	44,443

Device	Routing	Invert	Outlet Devices
#1	Discarded	263.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=8.51 cfs @ 12.13 hrs HW=263.01' (Free Discharge)
1=Exfiltration (Exfiltration Controls 8.51 cfs)

Summary for Pond PP-2: Porous Pavement

Inflow Area = 0.485 ac, 80.02% Impervious, Inflow Depth = 2.97" for 10-Year event
Inflow = 1.86 cfs @ 12.12 hrs, Volume= 0.120 af
Outflow = 1.86 cfs @ 12.13 hrs, Volume= 0.120 af, Atten= 0%, Lag= 0.3 min
Discarded = 1.86 cfs @ 12.13 hrs, Volume= 0.120 af

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 266.01' @ 12.13 hrs Surf.Area= 13,862 sf Storage= 39 cf

Plug-Flow detention time= 0.3 min calculated for 0.120 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (815.9 - 815.6)

Volume	Invert	Avail.Storage	Storage Description
#1	266.00'	5,545 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 13,862 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
266.00	13,862	0	0
267.00	13,862	13,862	13,862

Device	Routing	Invert	Outlet Devices
#1	Discarded	266.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.65 cfs @ 12.13 hrs HW=266.01' (Free Discharge)
1=Exfiltration (Exfiltration Controls 2.65 cfs)

Summary for Link PR: Existing DMH (Saratoga)

Inflow Area = 5.658 ac, 90.15% Impervious, Inflow Depth = 1.55" for 10-Year event
Inflow = 10.61 cfs @ 12.12 hrs, Volume= 0.729 af
Primary = 10.61 cfs @ 12.12 hrs, Volume= 0.729 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-6: Parking Areas Runoff Area=120,448 sf 79.85% Impervious Runoff Depth=4.03"
Tc=5.0 min CN=86 Runoff=14.18 cfs 0.929 af

Subcatchment PR-7: Porous Parking Runoff Area=66,108 sf 79.29% Impervious Runoff Depth=4.46"
Tc=5.0 min CN=90 Runoff=8.35 cfs 0.564 af

Subcatchment PR-8: Porous Parking Runoff Area=21,133 sf 80.02% Impervious Runoff Depth=4.03"
Tc=5.0 min CN=86 Runoff=2.49 cfs 0.163 af

Subcatchment PR-ROOF: Proposed Roof Runoff Area=126,000 sf 100.00% Impervious Runoff Depth=5.36"
Tc=5.0 min CN=98 Runoff=17.29 cfs 1.293 af

Pond INFIL: Infiltration Chambers Peak Elev=260.74' Storage=15,919 cf Inflow=17.29 cfs 1.293 af
Discarded=1.02 cfs 1.103 af Primary=4.16 cfs 0.189 af Outflow=5.18 cfs 1.293 af

Pond PP-1: Porous Pavement Peak Elev=263.01' Storage=174 cf Inflow=8.35 cfs 0.564 af
Outflow=8.33 cfs 0.564 af

Pond PP-2: Porous Pavement Peak Elev=266.01' Storage=52 cf Inflow=2.49 cfs 0.163 af
Outflow=2.48 cfs 0.163 af

Link PR: Existing DMH (Saratoga) Inflow=14.18 cfs 1.118 af
Primary=14.18 cfs 1.118 af

Total Runoff Area = 7.660 ac Runoff Volume = 2.948 af Average Runoff Depth = 4.62"
12.64% Pervious = 0.969 ac 87.36% Impervious = 6.692 ac

Summary for Subcatchment PR-6: Parking Areas

Runoff = 14.18 cfs @ 12.12 hrs, Volume= 0.929 af, Depth= 4.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
96,172	98	Paved parking, HSG A
24,276	39	>75% Grass cover, Good, HSG A
120,448	86	Weighted Average
24,276		20.15% Pervious Area
96,172		79.85% Impervious Area

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

Summary for Subcatchment PR-7: Porous Parking

Runoff = 8.35 cfs @ 12.12 hrs, Volume= 0.564 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
52,418	98	Paved parking, HSG B
13,690	61	>75% Grass cover, Good, HSG B
66,108	90	Weighted Average
13,690		20.71% Pervious Area
52,418		79.29% Impervious Area

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

Summary for Subcatchment PR-8: Porous Parking

Runoff = 2.49 cfs @ 12.12 hrs, Volume= 0.163 af, Depth= 4.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
16,911	98	Paved parking, HSG B
4,222	39	>75% Grass cover, Good, HSG A
21,133	86	Weighted Average
4,222		19.98% Pervious Area
16,911		80.02% Impervious Area

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

Summary for Subcatchment PR-ROOF: Proposed Roof

Runoff = 17.29 cfs @ 12.12 hrs, Volume= 1.293 af, Depth= 5.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=5.60"

Area (sf)	CN	Description
126,000	98	Roofs, HSG A
126,000		100.00% Impervious Area

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

Summary for Pond INFIL: Infiltration Chambers

Inflow Area = 2.893 ac,100.00% Impervious, Inflow Depth = 5.36" for 25-Year event
Inflow = 17.29 cfs @ 12.12 hrs, Volume= 1.293 af
Outflow = 5.18 cfs @ 12.28 hrs, Volume= 1.293 af, Atten= 70%, Lag= 9.5 min
Discarded = 1.02 cfs @ 10.76 hrs, Volume= 1.103 af
Primary = 4.16 cfs @ 12.28 hrs, Volume= 0.189 af

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 260.74' @ 12.28 hrs Surf.Area= 5,348 sf Storage= 15,919 cf

Plug-Flow detention time= 77.6 min calculated for 1.292 af (100% of inflow)
Center-of-Mass det. time= 77.5 min (824.0 - 746.5)

Volume	Invert	Avail.Storage	Storage Description
#1	256.25'	10,193 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 36,099 cf Overall - 10,617 cf Embedded = 25,482 cf x 40.0% Voids
#2	257.00'	10,617 cf	**Cultec R-902HD** x 164 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
		20,810 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
256.25	5,348	0	0
263.00	5,348	36,099	36,099

Device	Routing	Invert	Outlet Devices
#1	Discarded	256.25'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	259.75'	**24.0" Round Culvert** L= 160.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 259.75' / 253.20' S= 0.0409 '/' Cc= 0.900

n= 0.012, Flow Area= 3.14 sf

Discarded OutFlow Max=1.02 cfs @ 10.76 hrs HW=256.32' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.02 cfs)

Primary OutFlow Max=4.15 cfs @ 12.28 hrs HW=260.74' (Free Discharge)
2=Culvert (Inlet Controls 4.15 cfs @ 2.68 fps)

Summary for Pond PP-1: Porous Pavement

Inflow Area = 1.518 ac, 79.29% Impervious, Inflow Depth = 4.46" for 25-Year event
Inflow = 8.35 cfs @ 12.12 hrs, Volume= 0.564 af
Outflow = 8.33 cfs @ 12.13 hrs, Volume= 0.564 af, Atten= 0%, Lag= 0.3 min
Discarded = 8.33 cfs @ 12.13 hrs, Volume= 0.564 af

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 263.01' @ 12.13 hrs Surf.Area= 44,443 sf Storage= 174 cf

Plug-Flow detention time= 0.3 min calculated for 0.563 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (791.6 - 791.2)

Volume	Invert	Avail.Storage	Storage Description
#1	263.00'	17,777 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 44,443 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
263.00	44,443	0	0
264.00	44,443	44,443	44,443

Device	Routing	Invert	Outlet Devices
#1	Discarded	263.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=8.51 cfs @ 12.13 hrs HW=263.01' (Free Discharge)
1=Exfiltration (Exfiltration Controls 8.51 cfs)

Summary for Pond PP-2: Porous Pavement

Inflow Area = 0.485 ac, 80.02% Impervious, Inflow Depth = 4.03" for 25-Year event
Inflow = 2.49 cfs @ 12.12 hrs, Volume= 0.163 af
Outflow = 2.48 cfs @ 12.13 hrs, Volume= 0.163 af, Atten= 0%, Lag= 0.3 min
Discarded = 2.48 cfs @ 12.13 hrs, Volume= 0.163 af

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 266.01' @ 12.13 hrs Surf.Area= 13,862 sf Storage= 52 cf

Plug-Flow detention time= 0.3 min calculated for 0.163 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (806.3 - 806.0)

Volume	Invert	Avail.Storage	Storage Description
#1	266.00'	5,545 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 13,862 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
266.00	13,862	0	0
267.00	13,862	13,862	13,862

Device	Routing	Invert	Outlet Devices
#1	Discarded	266.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.65 cfs @ 12.13 hrs HW=266.01' (Free Discharge)
1=Exfiltration (Exfiltration Controls 2.65 cfs)

Summary for Link PR: Existing DMH (Saratoga)

Inflow Area = 5.658 ac, 90.15% Impervious, Inflow Depth = 2.37" for 25-Year event
Inflow = 14.18 cfs @ 12.12 hrs, Volume= 1.118 af
Primary = 14.18 cfs @ 12.12 hrs, Volume= 1.118 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-6: Parking Areas Runoff Area=120,448 sf 79.85% Impervious Runoff Depth=5.04"
Tc=5.0 min CN=86 Runoff=17.49 cfs 1.161 af

Subcatchment PR-7: Porous Parking Runoff Area=66,108 sf 79.29% Impervious Runoff Depth=5.49"
Tc=5.0 min CN=90 Runoff=10.15 cfs 0.694 af

Subcatchment PR-8: Porous Parking Runoff Area=21,133 sf 80.02% Impervious Runoff Depth=5.04"
Tc=5.0 min CN=86 Runoff=3.07 cfs 0.204 af

Subcatchment PR-ROOF: Proposed Roof Runoff Area=126,000 sf 100.00% Impervious Runoff Depth=6.42"
Tc=5.0 min CN=98 Runoff=20.59 cfs 1.548 af

Pond INFIL: Infiltration Chambers Peak Elev=261.44' Storage=17,478 cf Inflow=20.59 cfs 1.548 af
Discarded=1.02 cfs 1.215 af Primary=9.91 cfs 0.332 af Outflow=10.94 cfs 1.548 af

Pond PP-1: Porous Pavement Peak Elev=263.03' Storage=484 cf Inflow=10.15 cfs 0.694 af
Outflow=8.51 cfs 0.694 af

Pond PP-2: Porous Pavement Peak Elev=266.02' Storage=125 cf Inflow=3.07 cfs 0.204 af
Outflow=2.65 cfs 0.204 af

Link PR: Existing DMH (Saratoga) Inflow=22.93 cfs 1.494 af
Primary=22.93 cfs 1.494 af

Total Runoff Area = 7.660 ac Runoff Volume = 3.607 af Average Runoff Depth = 5.65"
12.64% Pervious = 0.969 ac 87.36% Impervious = 6.692 ac

Summary for Subcatchment PR-6: Parking Areas

Runoff = 17.49 cfs @ 12.12 hrs, Volume= 1.161 af, Depth= 5.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 50-Year Rainfall=6.66"

Area (sf)	CN	Description
96,172	98	Paved parking, HSG A
24,276	39	>75% Grass cover, Good, HSG A
120,448	86	Weighted Average
24,276		20.15% Pervious Area
96,172		79.85% Impervious Area

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

Summary for Subcatchment PR-7: Porous Parking

Runoff = 10.15 cfs @ 12.12 hrs, Volume= 0.694 af, Depth= 5.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 50-Year Rainfall=6.66"

Area (sf)	CN	Description
52,418	98	Paved parking, HSG B
13,690	61	>75% Grass cover, Good, HSG B
66,108	90	Weighted Average
13,690		20.71% Pervious Area
52,418		79.29% Impervious Area

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

Summary for Subcatchment PR-8: Porous Parking

Runoff = 3.07 cfs @ 12.12 hrs, Volume= 0.204 af, Depth= 5.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 50-Year Rainfall=6.66"

Area (sf)	CN	Description
16,911	98	Paved parking, HSG B
4,222	39	>75% Grass cover, Good, HSG A
21,133	86	Weighted Average
4,222		19.98% Pervious Area
16,911		80.02% Impervious Area

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

Summary for Subcatchment PR-ROOF: Proposed Roof

Runoff = 20.59 cfs @ 12.12 hrs, Volume= 1.548 af, Depth= 6.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 50-Year Rainfall=6.66"

Area (sf)	CN	Description
126,000	98	Roofs, HSG A
126,000		100.00% Impervious Area

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

Summary for Pond INFIL: Infiltration Chambers

Inflow Area = 2.893 ac,100.00% Impervious, Inflow Depth = 6.42" for 50-Year event
Inflow = 20.59 cfs @ 12.12 hrs, Volume= 1.548 af
Outflow = 10.94 cfs @ 12.19 hrs, Volume= 1.548 af, Atten= 47%, Lag= 4.4 min
Discarded = 1.02 cfs @ 10.56 hrs, Volume= 1.215 af
Primary = 9.91 cfs @ 12.19 hrs, Volume= 0.332 af

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 261.44' @ 12.19 hrs Surf.Area= 5,348 sf Storage= 17,478 cf

Plug-Flow detention time= 73.2 min calculated for 1.547 af (100% of inflow)
Center-of-Mass det. time= 73.2 min (816.9 - 743.7)

Volume	Invert	Avail.Storage	Storage Description
#1	256.25'	10,193 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 36,099 cf Overall - 10,617 cf Embedded = 25,482 cf x 40.0% Voids
#2	257.00'	10,617 cf	**Cultec R-902HD** x 164 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
		20,810 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
256.25	5,348	0	0
263.00	5,348	36,099	36,099

Device	Routing	Invert	Outlet Devices
#1	Discarded	256.25'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	259.75'	**24.0" Round Culvert** L= 160.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 259.75' / 253.20' S= 0.0409 '/' Cc= 0.900

n= 0.012, Flow Area= 3.14 sf

Discarded OutFlow Max=1.02 cfs @ 10.56 hrs HW=256.32' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.02 cfs)

Primary OutFlow Max=9.90 cfs @ 12.19 hrs HW=261.44' (Free Discharge)
2=Culvert (Inlet Controls 9.90 cfs @ 3.49 fps)

Summary for Pond PP-1: Porous Pavement

Inflow Area = 1.518 ac, 79.29% Impervious, Inflow Depth = 5.49" for 50-Year event
Inflow = 10.15 cfs @ 12.12 hrs, Volume= 0.694 af
Outflow = 8.51 cfs @ 12.08 hrs, Volume= 0.694 af, Atten= 16%, Lag= 0.0 min
Discarded = 8.51 cfs @ 12.08 hrs, Volume= 0.694 af

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 263.03' @ 12.15 hrs Surf.Area= 44,443 sf Storage= 484 cf

Plug-Flow detention time= 0.4 min calculated for 0.694 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (785.5 - 785.1)

Volume	Invert	Avail.Storage	Storage Description
#1	263.00'	17,777 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 44,443 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
263.00	44,443	0	0
264.00	44,443	44,443	44,443

Device	Routing	Invert	Outlet Devices
#1	Discarded	263.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=8.51 cfs @ 12.08 hrs HW=263.01' (Free Discharge)
1=Exfiltration (Exfiltration Controls 8.51 cfs)

Summary for Pond PP-2: Porous Pavement

Inflow Area = 0.485 ac, 80.02% Impervious, Inflow Depth = 5.04" for 50-Year event
Inflow = 3.07 cfs @ 12.12 hrs, Volume= 0.204 af
Outflow = 2.65 cfs @ 12.09 hrs, Volume= 0.204 af, Atten= 14%, Lag= 0.0 min
Discarded = 2.65 cfs @ 12.09 hrs, Volume= 0.204 af

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 266.02' @ 12.15 hrs Surf.Area= 13,862 sf Storage= 125 cf

Plug-Flow detention time= 0.4 min calculated for 0.204 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (799.4 - 799.1)

Volume	Invert	Avail.Storage	Storage Description
#1	266.00'	5,545 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 13,862 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
266.00	13,862	0	0
267.00	13,862	13,862	13,862

Device	Routing	Invert	Outlet Devices
#1	Discarded	266.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.65 cfs @ 12.09 hrs HW=266.01' (Free Discharge)
1=Exfiltration (Exfiltration Controls 2.65 cfs)

Summary for Link PR: Existing DMH (Saratoga)

Inflow Area = 5.658 ac, 90.15% Impervious, Inflow Depth = 3.17" for 50-Year event
Inflow = 22.93 cfs @ 12.15 hrs, Volume= 1.494 af
Primary = 22.93 cfs @ 12.15 hrs, Volume= 1.494 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Time span=0.00-25.00 hrs, dt=0.01 hrs, 2501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-6: Parking Areas Runoff Area=120,448 sf 79.85% Impervious Runoff Depth=6.25"
Tc=5.0 min CN=86 Runoff=21.41 cfs 1.441 af

Subcatchment PR-7: Porous Parking Runoff Area=66,108 sf 79.29% Impervious Runoff Depth=6.73"
Tc=5.0 min CN=90 Runoff=12.27 cfs 0.851 af

Subcatchment PR-8: Porous Parking Runoff Area=21,133 sf 80.02% Impervious Runoff Depth=6.25"
Tc=5.0 min CN=86 Runoff=3.76 cfs 0.253 af

Subcatchment PR-ROOF: Proposed Roof Runoff Area=126,000 sf 100.00% Impervious Runoff Depth=7.68"
Tc=5.0 min CN=98 Runoff=24.51 cfs 1.851 af

Pond INFIL: Infiltration Chambers Peak Elev=262.34' Storage=19,397 cf Inflow=24.51 cfs 1.851 af
Discarded=1.02 cfs 1.337 af Primary=15.06 cfs 0.514 af Outflow=16.08 cfs 1.851 af

Pond PP-1: Porous Pavement Peak Elev=263.07' Storage=1,201 cf Inflow=12.27 cfs 0.851 af
Outflow=8.51 cfs 0.851 af

Pond PP-2: Porous Pavement Peak Elev=266.06' Storage=345 cf Inflow=3.76 cfs 0.253 af
Outflow=2.65 cfs 0.253 af

Link PR: Existing DMH (Saratoga) Inflow=34.37 cfs 1.955 af
Primary=34.37 cfs 1.955 af

Total Runoff Area = 7.660 ac Runoff Volume = 4.396 af Average Runoff Depth = 6.89"
12.64% Pervious = 0.969 ac 87.36% Impervious = 6.692 ac

Summary for Subcatchment PR-6: Parking Areas

Runoff = 21.41 cfs @ 12.12 hrs, Volume= 1.441 af, Depth= 6.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
96,172	98	Paved parking, HSG A
24,276	39	>75% Grass cover, Good, HSG A
120,448	86	Weighted Average
24,276		20.15% Pervious Area
96,172		79.85% Impervious Area

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

Summary for Subcatchment PR-7: Porous Parking

Runoff = 12.27 cfs @ 12.12 hrs, Volume= 0.851 af, Depth= 6.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
52,418	98	Paved parking, HSG B
13,690	61	>75% Grass cover, Good, HSG B
66,108	90	Weighted Average
13,690		20.71% Pervious Area
52,418		79.29% Impervious Area

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

Summary for Subcatchment PR-8: Porous Parking

Runoff = 3.76 cfs @ 12.12 hrs, Volume= 0.253 af, Depth= 6.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
16,911	98	Paved parking, HSG B
4,222	39	>75% Grass cover, Good, HSG A
21,133	86	Weighted Average
4,222		19.98% Pervious Area
16,911		80.02% Impervious Area

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

Summary for Subcatchment PR-ROOF: Proposed Roof

Runoff = 24.51 cfs @ 12.12 hrs, Volume= 1.851 af, Depth= 7.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=7.92"

Area (sf)	CN	Description
126,000	98	Roofs, HSG A
126,000		100.00% Impervious Area

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

Summary for Pond INFIL: Infiltration Chambers

Inflow Area = 2.893 ac,100.00% Impervious, Inflow Depth = 7.68" for 100-Year event
Inflow = 24.51 cfs @ 12.12 hrs, Volume= 1.851 af
Outflow = 16.08 cfs @ 12.17 hrs, Volume= 1.851 af, Atten= 34%, Lag= 3.3 min
Discarded = 1.02 cfs @ 10.01 hrs, Volume= 1.337 af
Primary = 15.06 cfs @ 12.17 hrs, Volume= 0.514 af

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 262.34' @ 12.17 hrs Surf.Area= 5,348 sf Storage= 19,397 cf

Plug-Flow detention time= 69.8 min calculated for 1.851 af (100% of inflow)
Center-of-Mass det. time= 69.8 min (811.0 - 741.3)

Volume	Invert	Avail.Storage	Storage Description
#1	256.25'	10,193 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 36,099 cf Overall - 10,617 cf Embedded = 25,482 cf x 40.0% Voids
#2	257.00'	10,617 cf	**Cultec R-902HD** x 164 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
		20,810 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
256.25	5,348	0	0
263.00	5,348	36,099	36,099

Device	Routing	Invert	Outlet Devices
#1	Discarded	256.25'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	259.75'	**24.0" Round Culvert** L= 160.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 259.75' / 253.20' S= 0.0409 '/' Cc= 0.900

n= 0.012, Flow Area= 3.14 sf

Discarded OutFlow Max=1.02 cfs @ 10.01 hrs HW=256.32' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.02 cfs)

Primary OutFlow Max=15.03 cfs @ 12.17 hrs HW=262.33' (Free Discharge)
2=Culvert (Inlet Controls 15.03 cfs @ 4.79 fps)

Summary for Pond PP-1: Porous Pavement

Inflow Area = 1.518 ac, 79.29% Impervious, Inflow Depth = 6.73" for 100-Year event
Inflow = 12.27 cfs @ 12.12 hrs, Volume= 0.851 af
Outflow = 8.51 cfs @ 12.06 hrs, Volume= 0.851 af, Atten= 31%, Lag= 0.0 min
Discarded = 8.51 cfs @ 12.06 hrs, Volume= 0.851 af

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 263.07' @ 12.17 hrs Surf.Area= 44,443 sf Storage= 1,201 cf

Plug-Flow detention time= 0.5 min calculated for 0.850 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (779.8 - 779.3)

Volume	Invert	Avail.Storage	Storage Description
#1	263.00'	17,777 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 44,443 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
263.00	44,443	0	0
264.00	44,443	44,443	44,443

Device	Routing	Invert	Outlet Devices
#1	Discarded	263.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=8.51 cfs @ 12.06 hrs HW=263.01' (Free Discharge)
1=Exfiltration (Exfiltration Controls 8.51 cfs)

Summary for Pond PP-2: Porous Pavement

Inflow Area = 0.485 ac, 80.02% Impervious, Inflow Depth = 6.25" for 100-Year event
Inflow = 3.76 cfs @ 12.12 hrs, Volume= 0.253 af
Outflow = 2.65 cfs @ 12.06 hrs, Volume= 0.253 af, Atten= 29%, Lag= 0.0 min
Discarded = 2.65 cfs @ 12.06 hrs, Volume= 0.253 af

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 266.06' @ 12.17 hrs Surf.Area= 13,862 sf Storage= 345 cf

Plug-Flow detention time= 0.5 min calculated for 0.253 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (793.0 - 792.5)

Volume	Invert	Avail.Storage	Storage Description
#1	266.00'	5,545 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 13,862 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
266.00	13,862	0	0
267.00	13,862	13,862	13,862

Device	Routing	Invert	Outlet Devices
#1	Discarded	266.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.65 cfs @ 12.06 hrs HW=266.01' (Free Discharge)
1=Exfiltration (Exfiltration Controls 2.65 cfs)

Summary for Link PR: Existing DMH (Saratoga)

Inflow Area = 5.658 ac, 90.15% Impervious, Inflow Depth = 4.15" for 100-Year event
Inflow = 34.37 cfs @ 12.13 hrs, Volume= 1.955 af
Primary = 34.37 cfs @ 12.13 hrs, Volume= 1.955 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

DEP STORMWATER CHECKLIST/ ILLICIT DISCHARGE STATEMENT

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

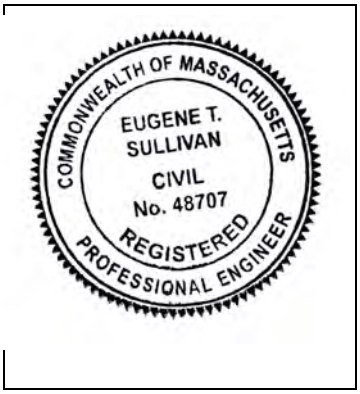
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



Grant T. Sullivan P.E.

4/8/22

Signature and Date

Checklist

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

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☐ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

ILLICIT DISCHARGE COMPLIANCE STATEMENT

SITE ADDRESS: 35 SARATOGA BOULEVARD, DEVENS, MASSACHUSETTS

OWNER: 35 SARATOGA PROPERTY OWNER, LLC

PLAN REFERENCE: DRAINAGE & UTILITIES PLAN PREPARED BY EUGENE T. SULLIVAN, INC.

DATE: APRIL 8, 2022

As required by Standard 10 of the Massachusetts Stormwater Standards, I, the undersigned, being the authorized owner/responsible party of the above referenced property do hereby certify that no illicit discharges exist on the site and that the stormwater management system, as shown on the above referenced plan, does not contain or permit any illicit discharges to enter the stormwater management system. Furthermore discharges from interior building drains or plumbing within the buildings are prohibited. Illicit discharges do not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents.

The pollution prevention plan measures to implements in this project to prevent illicit discharges to the stormwater management system, including wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease, include:

1. Identifying the responsible personnel for the implementation of an effective Illicit Discharge Detection and Elimination [IDDE] program.
2. Identify potential sources of Illicit Discharges.
3. Implement the Spill Prevention and Control Plan contained in the property Stormwater Pollution Prevention Plan [SWPPP].

Further, I certify that the stormwater management system ass shown on the referenced plan will be maintained in accordance with the conditions of the Long Term Pollution Prevention Plan.

NAME: Steve Goodman

SIGNED: 

DATE: August 4, 2021

TSS REMOVAL / PIPE SIZE CALCS / RECHARGE CALCS

Project: Proposed Building Avantor Fluid Handling
Location: Devens, MA
Prepared For: Eugene T Sullivan Inc

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1" of runoff from the contributing impervious surface.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Procedure: Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Compute Q Rate using the following equation:

$$Q = (qu)\ (A)\ (WQV)$$

where:

Q = flow rate associated with first 1" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1" in this case)

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
WQU	2.20	0.0034375	6.0	0.100	1.00	774.00	2.66

CONTECH ENGINEERED SOLUTIONS

Estimated Net Annual Solids Load Reduction
Based on the Rational Rainfall Method

CASCADE separator™

PROPOSED BUILDING AVANTOR FLUID HANDLING
DEVENS, MA
WQU

AREA	2.20	acres	**CASCADE MODEL**	CS-5	
WEIGHTED C	0.90		**PARTICLE SIZE**	110	microns
TC	6.00	minutes	**RAINFALL STATION**	69	

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Hydraulic Loading Rate (gpm/ft2)	Removal Efficiency (%)	Incremental Removal (%)
0.02	10.2%	0.91	100.0	10.2
0.04	9.6%	1.81	100.0	9.6
0.06	9.4%	2.72	100.0	9.4
0.08	7.7%	3.62	100.0	7.7
0.10	8.6%	4.53	100.0	8.6
0.12	6.3%	5.43	100.0	6.3
0.14	4.7%	6.34	100.0	4.7
0.16	4.6%	7.24	100.0	4.6
0.18	3.5%	8.15	100.0	3.5
0.20	4.3%	9.05	100.0	4.3
0.25	8.0%	11.32	100.0	8.0
0.30	5.6%	13.58	99.1	5.5
0.35	4.4%	15.84	97.0	4.2
0.40	2.5%	18.10	94.9	2.4
0.45	2.5%	20.37	92.8	2.3
0.50	1.4%	22.63	90.6	1.3
0.75	5.0%	33.95	80.0	4.0
1.00	1.0%	45.26	69.4	0.7
1.50	0.0%	67.89	48.1	0.0
2.00	0.0%	80.01	32.4	0.0
3.00	0.5%	80.01	21.6	0.1
				97.7
			Removal Efficiency Adjustment[2] =	6.5%
			Predicted % Annual Rainfall Treated =	93.3%
			Predicted Net Annual Load Removal Efficiency =	**91.2%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

TSS REMOVAL CALCULATION WORKSHEET					
PROJECT:	PROPOSED WAREHOUSE				
	35 SARATOGA BOULEVARD				
	DEVENS, MASSACHUSETTS				
LOCATION:	Pavement Runoff to DSS				
BMP	TSS REMOVAL RATE	STARTING TSS LOAD	AMOUNT REMOVED	REMAINING LOAD	
STREET SWEEPING	$ 0.05	$ 1.00	0.05	$ 0.95	
DEEP SUMP CATCH BASIN	$ 0.25	$ 0.95	$ 0.24	$ 0.71	
CDS WATER QUALITY STRUCTURE [STC-1]	$ 0.91	$ 0.71	$ 0.65	$ 0.06	
TOTAL TSS REMOVAL	$ 0.94				

PHOSPORUS REMOVAL CALCULATION WORKSHEET

PROJECT: PROPOSED WAREHOUSE
35 SARATOGA BOULEVARD
DEVENS, MASSACHUSETTS

LAND USE	COVER TYPE	BMP TYPE	AREA [Acres]	PLER	PHOSPORUS LOAD [LBS/YR]	REMOVAL RATE [PER PERFORMCE CURVES]	REMAINING PHOSPORUS	
Industrial	Impervious- Roof	Subsurface Infiltration	3.54	1.78	6.30	100%	0	
Industrial	Impervious- Pavement	Wet Pond	2.21	0.03	0.07	63%	0.02	
Industrial	Pervious-Pavement	Porous Pavement	1.33	0.03	0.04	78%	0.01	
Industrial	Dev Land Pervious [HSG A]		2.04	0.03	0.06	0	0.06	
				TOTALS	$ 6.47	lbs/yr	0.09	lbs/yr
			PHOSPORUS REDUCTION %		98.54%			

BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Cumulative Phosphorus Load Reduction	14%	25%	37%	44%	48%	53%	58%	63%
Cumulative Nitrogen Load Reduction	9%	16%	23%	28%	31%	32%	37%	40%

Figure 3-18: BMP Performance Curve: Wet Pond

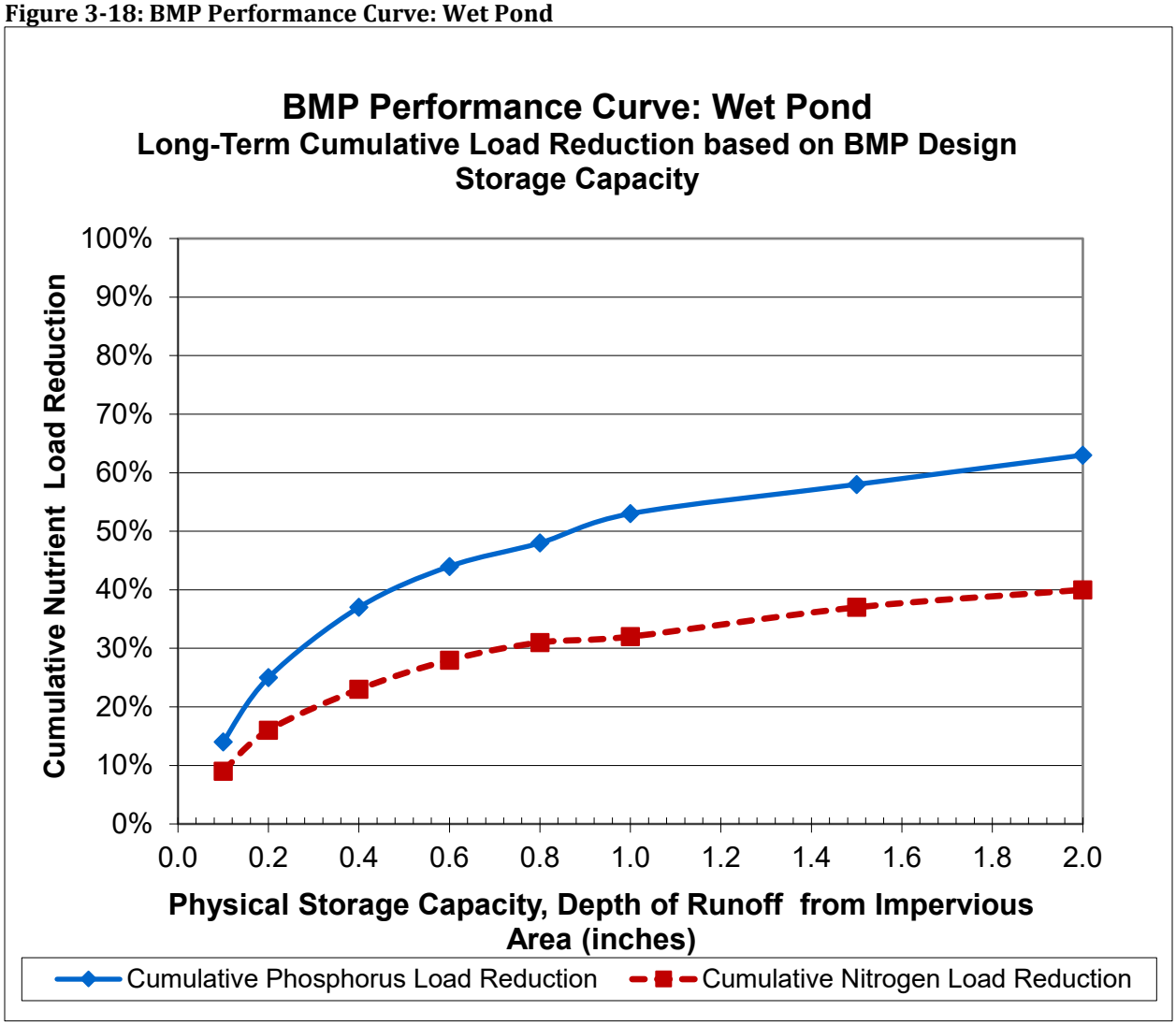


Table 3-24: Dry Pond BMP Performance Table

Extended Dry Pond BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction

BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Cumulative Phosphorus Load Reduction	14%	25%	37%	44%	48%	53%	58%	63%
Cumulative Nitrogen Load Reduction	9%	16%	23%	28%	31%	32%	37%	40%

Figure 3-18: BMP Performance Curve: Wet Pond

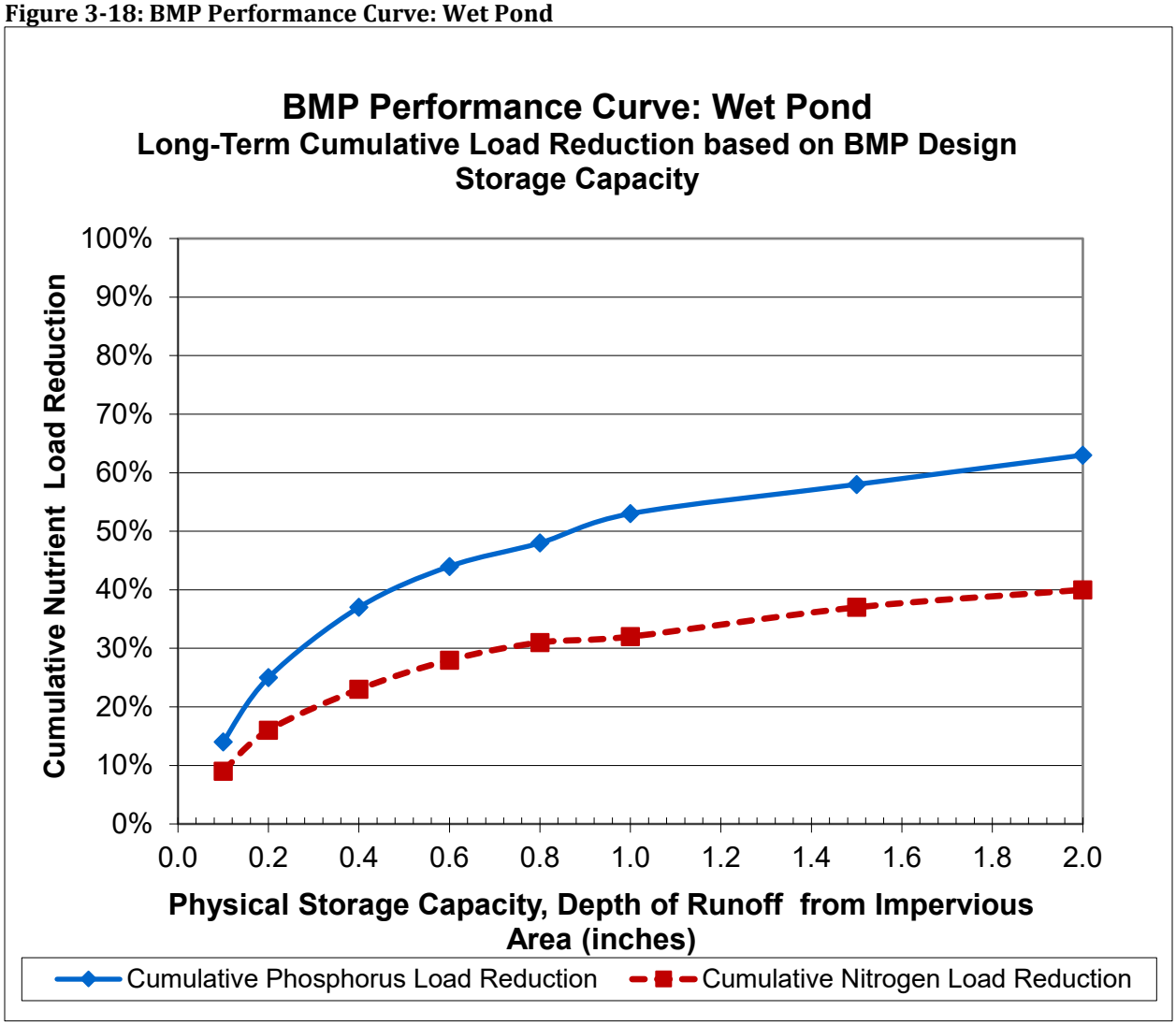


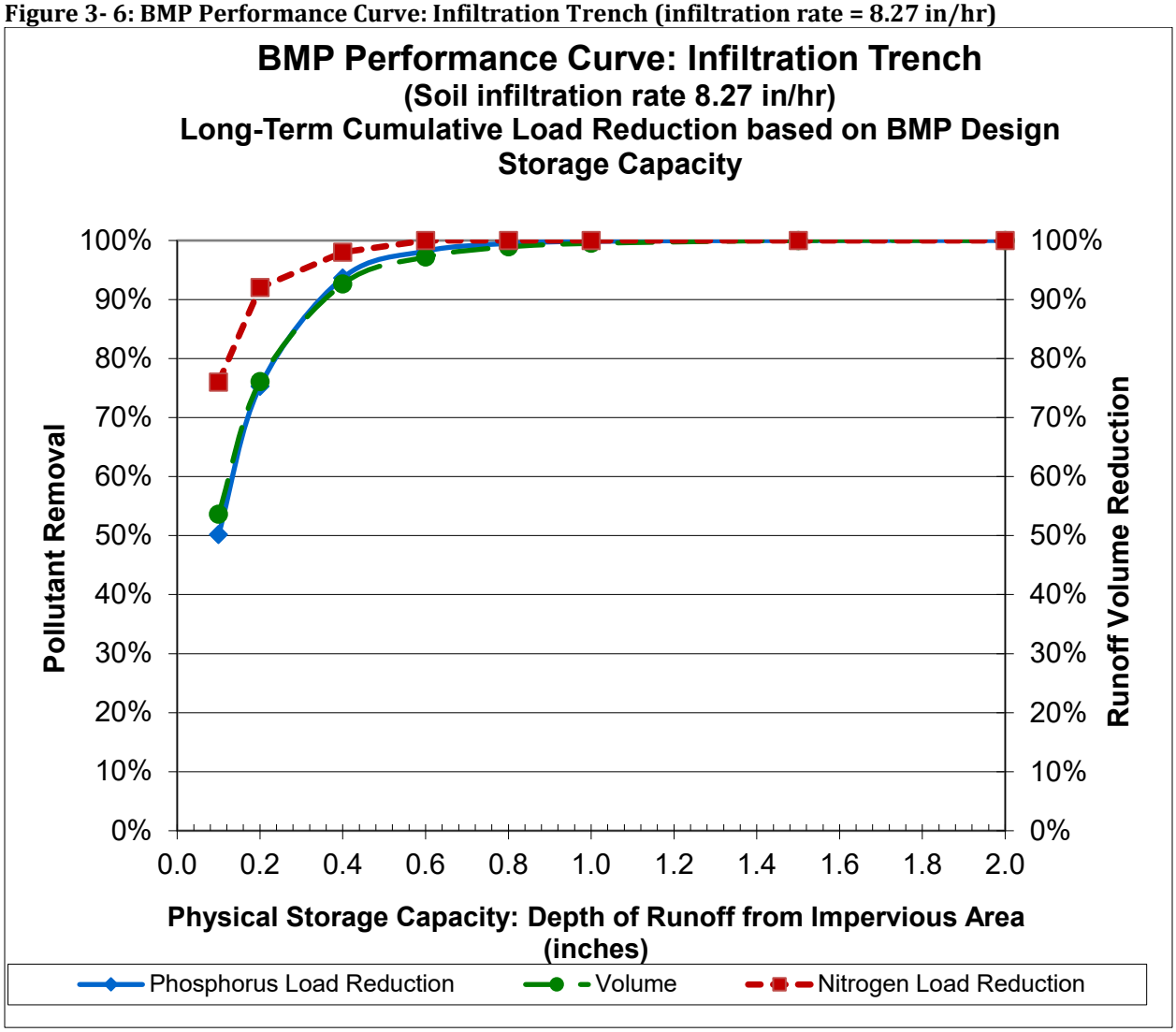
Table 3-24: Dry Pond BMP Performance Table

Extended Dry Pond BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction

Table 3- 11: Infiltration Trench (8.27 in/hr) BMP Performance Table

Infiltration Trench (8.27 in/hr) BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	53.6%	76.1%	92.6%	97.2%	98.9%	99.5%	100.0%	100.0%
Cumulative Phosphorus Load Reduction	50%	75%	94%	98%	99%	100%	100%	100%
Cumulative Nitrogen Load Reduction	76%	92%	98%	100%	100%	100%	100%	100%

Figure 3- 6: BMP Performance Curve: Infiltration Trench (infiltration rate = 8.27 in/hr)



Dana F. Perkins, Inc.

Consulting Engineers & Land Surveyors
1057 East Street
Tewksbury, MA 01876

LOCATION: Proposed Warehouse Building
35 Saratoga Blvd Devens, MA

COMPUTED BY: AMP
CHECKED BY: EED

DATE: July 19, 2022
SHEET: 1 of 1

25-YEAR STORM
DESIGN EVENT

PROFESSIONAL ENGINEER

LOCATION		AREA x COEFFICIENT							TIME OF FLOW			DESIGN					PROFILE				
		PERVIOUS			IMPERVIOUS							ALL PIPES ARE CIRCULAR HDPE UNLESS NOTED								INVERT ELEV.	
FROM	TO	AREA	C	SUBTOTAL	AREA	C	SUBTOTAL	TOTAL	Total	I	Q	PIPE SIZE	SLOPE	n	CAPACITY FULL	VELOCITY FULL	LENGTH	FALL	RIM ELEV.	UPPER	LOWER
		(acres)			(acres)				(min.)	(in/hr)	(c. f. s.)	(inches)	(ft. per ft.)		(c. f. s.)	(ft. / sec)	(ft.)	(ft.)	(ft.)	(ft.)	(ft.)
CB #1	DMH #1	0.402	0.30	0.121	0.537	0.90	0.484	0.604	5.00	5.6	3.38	12	0.010	0.012	3.87	4.93	86	0.86	265.60	262.60	261.74
CB #2	DMH #1	0.038	0.30	0.012	0.285	0.90	0.257	0.268	5.00	5.6	1.50	12	0.005	0.012	2.73	3.48	40	0.20	265.60	262.60	262.40
DMH #1	DMH #2	-	-	-	-	-	-	0.873	5.00	5.6	4.89	18	0.005	0.012	8.06	4.56	144	0.72	266.50	261.64	260.92
CB #3	DMH #2	0.000	0.30	0.000	0.554	0.90	0.498	0.498	5.00	5.6	2.79	12	0.015	0.012	4.74	6.03	76	1.14	265.60	262.60	261.46
DMH #2	DMH #3	-	-	-	-	-	-	1.371	5.00	5.6	7.68	18	0.010	0.012	11.40	6.45	118	1.18	267.10	260.82	259.64
CB #4	DMH #3	0.000	0.30	0.000	0.053	0.90	0.048	0.048	5.00	5.6	0.27	12	0.040	0.012	7.73	9.85	18	0.72	268.40	264.50	263.78
DMH #3	DMH #4	-	-	-	-	-	-	1.419	5.00	5.6	7.94	24	0.005	0.012	17.36	5.53	164	0.82	269.00	259.54	258.72
CB #5	DMH #4	0.000	0.30	0.000	0.053	0.90	0.047	0.047	5.00	5.6	0.27	12	0.040	0.012	7.73	9.85	16	0.64	270.00	267.00	266.36
DMH #4	DMH #5	-	-	-	-	-	-	1.466	5.00	5.6	8.21	24	0.010	0.012	24.56	7.82	193	1.93	269.80	258.62	256.69
CB #6	DMH #5	0.000	0.30	0.000	0.133	0.90	0.119	0.119	5.00	5.6	0.67	12	0.005	0.012	2.73	3.48	16	0.08	264.50	260.50	260.42
CB #7	DMH #5	0.000	0.30	0.000	0.159	0.90	0.143	0.143	5.00	5.6	0.80	12	0.005	0.012	2.73	3.48	30	0.15	264.50	260.50	260.35
DMH #5	DMH #6	-	-	-	-	-	-	1.728	5.00	5.6	9.68	24	0.030	0.012	42.53	13.54	227	6.81	264.50	256.59	249.78
CB #8	DMH #6	0.000	0.30	0.000	0.133	0.90	0.119	0.119	5.00	5.6	0.67	12	0.040	0.012	7.73	9.85	36	1.44	258.50	254.50	253.06
CB #9	DMH #6	0.000	0.30	0.000	0.186	0.90	0.167	0.167	5.00	5.6	0.94	12	0.040	0.012	7.73	9.85	45	1.80	258.50	254.50	252.70
DMH #6	STC	-	-	-	-	-	-	2.014	5.00	5.6	11.28	24	0.010	0.012	24.56	7.82	12	0.12	257.80	249.68	249.56
DMH #8	DMH #9	0.000	0.30	0.000	2.893	0.90	2.603	2.603	5.00	5.6	14.58	24	0.005	0.012	17.36	5.53	94	0.47	270.50	255.81	255.34
DMH #9	INFIL	-	-	-	-	-	-	2.603	5.00	5.6	14.58	24	0.010	0.012	24.56	7.82	74	0.74	270.00	255.24	254.50
DMH #10	DMH #11	-	-	-	-	-	-	-	5.00	5.6	6.21	24	0.035	0.012	45.94	14.63	160	5.60	263.50	258.00	252.40
STC	DMH #7	-	-	-	-	-	-	2.014	5.00	5.6	11.28	24	0.010	0.012	24.56	7.82	17	0.17	257.40	249.56	249.39
DMH #11	DMH #7	-	-	-	-	-	-	-	5.00	5.6	6.21	24	0.010	0.012	24.56	7.82	60	0.60	258.40	252.30	251.70
DMH #7	EX. DMH	-	-	-	-	-	-	-	5.00	5.6	17.49	24	0.010	0.012	24.56	7.82	24	0.24	256.80	249.29	249.05

STORMWATER CALCULATIONS

Proposed Warehouse
35 Saratoga Blvd
Devens, Massachusetts

See attached Stage/Storage calculations for volumes provided.

Required Recharge Volume

Total Proposed Impervious Area = 231,647 SF ± ("A" Soils)

Infiltration Standard for "A" Soils = 0.60 inches of runoff

Required Recharge Volume = Impervious Area x Infiltration Standard

Required Volume to Recharge = 231,647 SF x (0.60 IN x 1 FT/12 IN) »» **11,582 CF**

Volume Provided in Infiltration Chambers

Storage volume provided per Cultec infiltration system = 12,667 CF ±

12,667 CF > 11,582 CF (satisfies the infiltration standard)

Stage-Area-Storage for Pond INFIL: Infiltration Chambers

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
256.25	**5,348**	0
256.35	5,348	214
256.45	5,348	428
256.55	5,348	642
256.65	5,348	856
256.75	5,348	1,070
256.85	5,348	1,284
256.95	5,348	1,497
257.05	5,348	1,815
257.15	5,348	2,238
257.25	5,348	2,661
257.35	5,348	3,081
257.45	5,348	3,500
257.55	5,348	3,918
257.65	5,348	4,336
257.75	5,348	4,752
257.85	5,348	5,166
257.95	5,348	5,578
258.05	5,348	5,988
258.15	5,348	6,399
258.25	5,348	6,807
258.35	5,348	7,212
258.45	5,348	7,616
258.55	5,348	8,019
258.65	5,348	8,419
258.75	5,348	8,818
258.85	5,348	9,215
258.95	5,348	9,610
259.05	5,348	10,004
259.15	5,348	10,393
259.25	5,348	10,781
259.35	5,348	11,166
259.45	5,348	11,547
259.55	5,348	11,925
259.65	5,348	12,298
259.75	5,348	12,667
259.85	5,348	13,031
259.95	5,348	13,389
260.05	5,348	13,741
260.15	5,348	14,086
260.25	5,348	14,423
260.35	5,348	14,752
260.45	5,348	15,071
260.55	5,348	15,380
260.65	5,348	15,672
260.75	5,348	15,943
260.85	5,348	16,191
260.95	5,348	16,421
261.05	5,348	16,638
261.15	5,348	16,852
261.25	5,348	17,066
261.35	5,348	17,280
261.45	5,348	17,494
261.55	5,348	17,708
261.65	5,348	17,922
261.75	5,348	18,136
261.85	5,348	18,349
261.95	5,348	18,563
262.05	5,348	18,777
262.15	5,348	18,991
262.25	5,348	19,205
262.35	5,348	19,419
262.45	5,348	19,633
262.55	5,348	19,847
262.65	5,348	20,061
262.75	5,348	20,275
262.85	5,348	20,489
262.95	5,348	**20,703**

SOILS DATA

FORM 11 - SOIL EVALUATOR FORM

No. 171070 Date: 10/12/17

Commonwealth of Massachusetts
Devens, Massachusetts

Soil Suitability Assessment for Stormwater Management

Performed by: Kyle Burchard, GPR, Inc. Date: 10/12/17
Witnessed by: - Unwitnessed -

Location Address:	Owner's Name: McInnis Cement, Inc.
or Lot No. 35 Saratoga Boulevard	Address: 1350 Boul. René-Lévesque Quest,
Devens, MA	Bureau 205
	Montréal (Quebec) H3G 2W2
	Telephone No. N/A

New Construction ☑ Upgrade ☐ Repair ☐

Office Review

Published Soil Survey Available: No ☐ Yes ☑

Year Published Internet Publication Scale N/A Soil Map Units 421C, 262A, 255A, 255C

Soil Name Canton fine sany loam Soil Limitations Shallow bedrock

Soil Name Quonset loamy sand Soil Limitations >80"

Soil Name Windsor loamy sand Soil Limitations >80"

Surficial Geologic Report Available: No ☑ Yes ☐

Year Published Publication Scale

Geologic Material(Map Unit) Glacial Till

Landform Ground Morraine

Flood Insurance Rate Map: 25027 C0311E

Above 500 Year Flood Boundary	No ☐	Yes ☑
Within 500 Year Flood Boundary	No ☑	Yes ☐
Within 100 Year Flood Boundary	No ☑	Yes ☐
Within Velocity Zone	No ☑	Yes ☐

Wetland Area:

National Wetlands Inventory Map (map unit) N/A

Wetlands Conservancy Program Map (map unit) N/A

Current Water Resource Conditions (USGS): Month May

Range: Above Normal ☐ Normal ☑ Below Normal ☐

Other Reference Reviewed USGS

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 35 Saratoga Boulevard
Devens, MA

On-Site Review

Deep Hole #: SWM-1 Date: 10/12/17 Time: 10:30 AM Weather: P. Cloudy, 47°
Location (identify on site plan) See Attached Sketch
Land Use Vacant land Slope (%) 3-5% Surfaces Stones None
(eg woodland, agricultural field, vacant lot etc…)
Vegatation Edge of forest and existing pavement
Landform Kame
Position on landscape See attached Sketch
Distances from:

Open Water Body	N/A feet	Drainage Way	N/A feet
Possible Wet Area	N/A feet	Property Line	30± feet
Drinking Water Well	N/A feet	Other:	feet

Deep Observation Hole Log

Hole # SWM-1 NB KB1 Suface El. 256.9±

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistence, % Gravel)
0-16	A	SL	10YR 2/2	---	mvfr/l
16-24	B1	S	10YR 4/3	---	mvfr/l, wet
24-120	B2	S	10YR 5/6	---	mvfr/l

Parent Material (geologic) Abalation Till Depth to Bedrock: > 120 inches
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole None
Additional Notes: Good sand

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 35 Saratoga Boulevard
Devens, MA

On-Site Review

Deep Hole #: SWM-2 Date: 10/12/17 Time: 11:00 AM Weather: P. Cloudy, 47°
Location (identify on site plan) See Attached Sketch
Land Use Vacant land Slope (%) 1-2% Surfaces Stones None
(eg woodland, agricultural field, vacant lot etc…)
Vegatation Edge of forest and existing pavement
Landform Kame
Position on landscape See attached Sketch
Distances from:

Open Water Body	N/A feet	Drainage Way	N/A feet
Possible Wet Area	N/A feet	Property Line	50± feet
Drinking Water Well	N/A feet	Other:	feet

Deep Observation Hole Log

Hole # SWM-2 NB KB1 Suface El. 255.5±

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistence, % Gravel)
0-16	A	SL	10YR 3/2	---	mvfr/l
16-132	B	S	10YR 6/4	---	mvfr/l

Parent Material (geologic) Abalation Till Depth to Bedrock: > 132 inches
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole None
Aditional Notes: Good sand

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 35 Saratoga Boulevard
Devens, MA

On-Site Review

Deep Hole #: SWM-3 Date: 10/12/17 Time: 11:30 AM Weather: P. Cloudy, 47°
Location (identify on site plan) See Attached Sketch
Land Use Vacant land Slope (%) 1-3% Surfaces Stones None
(eg woodland, agricultural field, vacant lot etc…)
Vegatation Lawn
Landform Kame
Position on landscape See attached Sketch
Distances from:

Open Water Body	N/A feet	Drainage Way	N/A feet
Possible Wet Area	N/A feet	Property Line	80± feet
Drinking Water Well	N/A feet	Other:	feet

Deep Observation Hole Log

Hole # SWM-3 NB KB1 Suface El. 254.7±

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistence, % Gravel)
0-8	A	SL	10YR 4/2	---	mvfr/l
8-126	B	S	2.5YR 6/3	---	mvfr/l

Parent Material (geologic) Abalation Till Depth to Bedrock: > 126 inches
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole None
Aditional Notes: Good sand

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot#: 35 Saratoga Boulevard
Devens, MA

Determination for Seasonal High Water Table

Method Used:

- ☐ Depth observed standing in observation hole ____ inches ____
- ☐ Depth weeping from side of observation hole ____ inches ____
- ☑ Depth to soil mottles ____ inches See individual Reports
- ☐ Ground water adjustment ____ feet ____

Index Well Number none Reading Date n/a Index Well Level n/a

Adjustment Factor n/a Adjusted Ground Water Level n/a

Depth of Naturally Occuring Pervious Material

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

If not, what is the depth of naturally occuring pervious material? _____ Feet

Certification

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

Signature _____ Date 10/30/2017

Notes: Deep holes dug for stormwater infiltration evaluation only to conform with DEP requirements. Infiltration areas located in deep sands with no observed mottles or water.

TEST BORING LOG

MILLER ENGINEERING & TESTING, INC.
100 Sheffield Road - Manchester, NH 03103
Ph. (603) 668-6016 - Fax: (603) 668-8641

Project: McInnis Cement Silos
Devens, MA
Project No: 17.254.NH
Date Start: 10-13-17
Date End: 10-13-17

Sheet 1 **of** 1
Boring No: B-1
Location: See Plan
Approx. Surface Elev: 268

	CASING	SAMPLER	GROUNDWATER OBSERVATIONS			
			Date	Depth	Casing At	Stabilization Period
Type	HSA	SS	10-13-17			Groundwater Not Observed
Size	2-1/4" ID	1-3/8" ID				
Hammer		140 lbs.				
Fall		30"				

Depth/ Elev.	Cas bl/ft	SAMPLE Sample No.	SAMPLE Depth Range	SAMPLE Pen.	SAMPLE Rec.	BLOWS 0-6"	BLOWS 6-12"	BLOWS 12-18"	BLOWS 18-24"	Strata Change	Sample Description	Notes
0 268		S-1	0.0-2.0	24	3	1	1	5	13		S-1: Forest mat and topsoil - black, dry, loose, silt, abundant leaves, roots, pine needles and other plant matter (forest mat and topsoil)	
											Terminated boring at approximately 2' due to auger refusal	
4 264											Spun and seated 3" casing at a depth of approximately 2' and began rock coring. Please refer to the geologic log provided separately.	
											BORING TERMINATED AT 2 ft	
8 260												
12 256												
16 252												
20 248												
24 244												

Driller: R. Marcoux
Helper: J. Ricci
Inspector: D. Ray

COHESIVE CONSISTENCY (Blows/Foot)
0-2 VERY SOFT
2-4 SOFT
4-8 MEDIUM STIFF
8-15 STIFF
15-30 HARD

COHESIONLESS (Blows/Foot)
0-4 VERY LOOSE
4-10 LOOSE
10-30 MEDIUM DENSE
30-50 DENSE
50+ VERY DENSE

PROPORTIONS USED
TRACE: 0-10%
LITTLE: 10-20%
SOME: 20-35%
AND: 35-50%

NOTES:

REMARKS: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITION MAY BE GRADUAL.
WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS.
FLUCTUATIONS IN THE LEVEL OF THE GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

TEST BORING LOG

MILLER ENGINEERING & TESTING, INC.
100 Sheffield Road - Manchester, NH 03103
Ph. (603) 668-6016 - Fax: (603) 668-8641

Project: McInnis Cement Silos
Devens, MA
Project No: 17.254.NH
Date Start: 10-13-17
Date End: 10-13-17

Sheet 1 **of** 1
Boring No: B-2
Location: See Plan
267
Approx. Surface Elev:

			GROUNDWATER OBSERVATIONS			
	CASING	**SAMPLER**	**Date**	**Depth**	**Casing At**	**Stabilization Period**
Type	HSA	SS	10-13-17			Groundwater Not Observed
Size	2-1/4" ID	1-3/8" ID				
Hammer		140 lbs.				
Fall		30"				

Depth/ Elev.	Cas bl/ft	SAMPLE Sample No.	SAMPLE Depth Range	SAMPLE Pen.	SAMPLE Rec.	BLOWS 0-6"	BLOWS 6-12"	BLOWS 12-18"	BLOWS 18-24"	Strata Change	Sample Description	Notes
0		-	0.0-2.0	24							-: No sample collected. Probed with auger and found refusal at a depth of 2'. Observed forest mat and topsoil directly on the bedrock surface (forest mat and topsoil).	
											Spun and seated 3" casing at a depth of approximately 2.2' and began rock coring. Please refer to the geologic log provided separately.	
4											BORING TERMINATED AT 2 ft	
8												
12												
16												
20												
24												

Driller: R. Marcoux
Helper: J. Ricci
Inspector: D. Ray

COHESIVE CONSISTENCY (Blows/Foot)
0-2 VERY SOFT
2-4 SOFT
4-8 MEDIUM STIFF
8-15 STIFF
15-30 HARD

COHESIONLESS (Blows/Foot)
0-4 VERY LOOSE
4-10 LOOSE
10-30 MEDIUM DENSE
30-50 DENSE
50+ VERY DENSE

PROPORTIONS USED
TRACE: 0-10%
LITTLE: 10-20%
SOME: 20-35%
AND: 35-50%

NOTES:

REMARKS: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITION MAY BE GRADUAL.
WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS.
FLUCTUATIONS IN THE LEVEL OF THE GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

TEST BORING LOG

MILLER ENGINEERING & TESTING, INC.
100 Sheffield Road - Manchester, NH 03103
Ph. (603) 668-6016 - Fax: (603) 668-8641

Project: McInnis Cement Silos
Devens, MA
Project No: 17.254.NH
Date Start: 10-13-17
Date End: 10-13-17

Sheet 1 **of** 1
Boring No: B-3
Location: See Plan
262
Approx. Surface Elev:

	CASING	SAMPLER	GROUNDWATER OBSERVATIONS			
			Date	Depth	Casing At	Stabilization Period
Type	HSA	SS	10-13-17			Groundwater Not Observed
Size	2-1/4" ID	1-3/8" ID				
Hammer		140 lbs.				
Fall		30"				

Depth/ Elev.	Cas bl/ft	SAMPLE Sample No.	Depth Range	Pen.	Rec.	BLOWS 0-6"	6-12"	12-18"	18-24"	Strata Change	Sample Description	Notes
0		S-1	0.0-2.0	24	3	1	1	2	3		S-1: Forest mat and topsoil (2") underlain by light brown, tan, dry, loose silt and fine sand (forest mat and topsoil)	
		S-2	2.0-4.0	24	10	6	3	3	3		S-2: Tan, dry, loose, silt and fine sand (subsoil)	
4		S-3	4.0-4.5	6	3	60/6"					S-3: Tan, dry, silt and fine sand (subsoil). Spoon refusal at 4.5'	
											Auger Refusal at 4.5'	
											BORING TERMINATED AT 4.5 ft	
8												
12												
16												
20												
24												

Driller: R. Marcoux
Helper: J. Ricci
Inspector: D. Ray

COHESIVE CONSISTENCY (Blows/Foot)
0-2 VERY SOFT
2-4 SOFT
4-8 MEDIUM STIFF
8-15 STIFF
15-30 HARD

COHESIONLESS (Blows/Foot)
0-4 VERY LOOSE
4-10 LOOSE
10-30 MEDIUM DENSE
30-50 DENSE
50+ VERY DENSE

PROPORTIONS USED
TRACE: 0-10%
LITTLE: 10-20%
SOME: 20-35%
AND: 35-50%

NOTES:

REMARKS: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITION MAY BE GRADUAL.
WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS.
FLUCTUATIONS IN THE LEVEL OF THE GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

TEST BORING LOG

MILLER ENGINEERING & TESTING, INC.
100 Sheffield Road - Manchester, NH 03103
Ph. (603) 668-6016 - Fax: (603) 668-8641

Project: McInnis Cement Silos
Devens, MA
Project No: 17.254.NH
Date Start: 10-13-17
Date End: 10-13-17

Sheet 1 **of** 1
Boring No: B-4
Location: See Plan
266
Approx. Surface Elev:

	CASING	SAMPLER	GROUNDWATER OBSERVATIONS			
			Date	Depth	Casing At	Stabilization Period
Type	HSA	SS	10-13-17			Groundwater Not Observed
Size	2-1/4" ID	1-3/8" ID				
Hammer		140 lbs.				
Fall		30"				

Depth/ Elev.	Cas bl/ft	SAMPLE Sample No.	SAMPLE Depth Range	SAMPLE Pen.	SAMPLE Rec.	BLOWS 0-6"	BLOWS 6-12"	BLOWS 12-18"	BLOWS 18-24"	Strata Change	Sample Description	Notes
0		S-1	0.0-2.0	24	6	1	5	16	11		S-1: Black to dark brown, dry, loose to medium dense, silt and fine sand, abundant roots and plant debris (forest mat and topsoil)	
											Auger Refusal at 2.5'	
											BORING TERMINATED AT 2.5 ft	
4												
8												
12												
16												
20												
24												

Driller: R. Marcoux
Helper: J. Ricci
Inspector: D. Ray

COHESIVE CONSISTENCY (Blows/Foot)
0-2 VERY SOFT
2-4 SOFT
4-8 MEDIUM STIFF
8-15 STIFF
15-30 HARD

COHESIONLESS (Blows/Foot)
0-4 VERY LOOSE
4-10 LOOSE
10-30 MEDIUM DENSE
30-50 DENSE
50+ VERY DENSE

PROPORTIONS USED
TRACE: 0-10%
LITTLE: 10-20%
SOME: 20-35%
AND: 35-50%

NOTES:

REMARKS: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITION MAY BE GRADUAL.
WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS.
FLUCTUATIONS IN THE LEVEL OF THE GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

TEST BORING LOG

MILLER ENGINEERING & TESTING, INC.
100 Sheffield Road - Manchester, NH 03103
Ph. (603) 668-6016 - Fax: (603) 668-8641

Project: McInnis Cement Silos
Devens, MA
Project No: 17.254.NH
Date Start: 10-13-17
Date End: 10-13-17

Sheet 1 **of** 1
Boring No: B-5
Location: See Plan
263
Approx. Surface Elev:

	CASING	SAMPLER	GROUNDWATER OBSERVATIONS			
			Date	Depth	Casing At	Stabilization Period
Type	HSA	SS	10-13-17			Groundwater Not Observed
Size	2-1/4" ID	1-3/8" ID				
Hammer		140 lbs.				
Fall		30"				

Depth/ Elev.	Cas bl/ft	SAMPLE Sample No.	Depth Range	Pen.	Rec.	BLOWS 0-6"	6-12"	12-18"	18-24"	Strata Change	Sample Description	Notes
0		S-1	0.0-2.0	24	2	2	2	6	8		S-1: Forest mat and topsoil - black, dry, loose, silt, abundant leaves, roots, pine needles and other plant matter (forest mat and topsoil)	
		S-2	2.0-3.3	16	7	4	15	24	60/4"		S-2: Light brown, tan, dry, medium dense, silt and fine sand, trace fine gravel, trace roots. Rock fragment in tip of spoon (subsoil)	
4		S-3	4.0-4.3	3	1	50/3"					S-3: Rock fragments Auger Refusal at 4.25' BORING TERMINATED AT 4.25 ft	
8												
12												
16												
20												
24												

Driller: R. Marcoux
Helper: J. Ricci
Inspector: D. RAy

COHESIVE CONSISTENCY (Blows/Foot)
0-2 VERY SOFT
2-4 SOFT
4-8 MEDIUM STIFF
8-15 STIFF
15-30 HARD

COHESIONLESS (Blows/Foot)
0-4 VERY LOOSE
4-10 LOOSE
10-30 MEDIUM DENSE
30-50 DENSE
50+ VERY DENSE

PROPORTIONS USED
TRACE: 0-10%
LITTLE: 10-20%
SOME: 20-35%
AND: 35-50%

NOTES:

REMARKS: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITION MAY BE GRADUAL.
WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS.
FLUCTUATIONS IN THE LEVEL OF THE GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

GEOLOGIC LOG

MILLER ENGINEERING & TESTING, INC.
100 Sheffield Road - Manchester, NH 03103
Ph. (603) 668-6016 - Fax: (603) 668-8641

Project:	McInnis Cement Silos	**Sheet**	1 of 1
	Devens, MA	**Boring No:**	B-1
Project No:	17.254.NH	**Location:**	See Plan
Date Start:	10-13-17		
Date End:	10-16-17	**Approx. Surface Elev:**	268

			GROUNDWATER OBSERVATIONS			
Core Size	NX (2-1/8" Core)		**Date**	**Depth**	**Casing At**	**Stabilization Period**
Overburden	1.9'					
Total	15.1'					

Depth/ Elev.	CORE Sample No.	CORE Depth Range	CORE Pen. (in.)	CORE Rec. (in.)	Core Rec %	RQD %	Feed (min. per ft.)	Core Description	Notes
0 — 268	-	0.0-1.9	23					-: 3" casing spun to a depth of 1.9 , began rock coring (Run #1) at 1.9'.	
	Run-1	1.9-2.9	12				11	Run-1: Reddish-brown, pink, grey, medium- grained, equigranular to locally porphyritic, foliated, granite gneiss with highly deformed porphyroblasts of potassium feldspar accessory, biotite and muscovite. Rock is generally massive with some diagonal (30-40 degrees) fractures and high-angle (70-90 degrees) fractures. Rock foliation is parallel to the high angle fractures. Rock breaks along high angle fractures when struck with hammer. Rock matrix exhibits minor weathering. Localized weathering along the surfaces of fracture planes.	
	-	2.9-3.9	12	60/38	63	53	8		
4 — 264	-	3.9-4.9	12				7		
	-	4.9-5.9	12				15		
	-	5.9-6.9	12				18		
	Run-2	6.9-7.9	12				14	Run-2: Reddish-brown, pink, grey, medium- grained, equigranular to locally porphyritic, foliated, granite gneiss with highly deformed porphyroblasts of potassium feldspar accessory biotite and misc. biotite and muscovite a. Rock is generally massive with some diagonal (30-40 degrees) fractures and high-angle (70-90 degrees) fractures. Rock foliation is parallel to the high angle fractures. Rock breaks along high angle fractures when struck with hammer. Rock matrix exhibits minor weathering. Localized weathering along the surfaces of fracture planes. Recovery = 60" (22" of rock from Run #1 recovered and 38" of new rock	
8 — 260	-	7.9-8.9	12	60/60	100	87	12		
	-	8.9-9.9	12				14		
	-	9.9-10.1	2				6		
	Run-3	10.1-11.1	12				14		
	-	11.1-12.1	12				18		
12 — 256	-	12.1-13.1	12	60/55	92	84	15	Run-3: Reddish-brown, pink, grey, medium- grained, equigranular to locally porphyritic, foliated, granite gneiss with highly deformed porphyroblasts of potassium feldspar accessory, biotite and muscovite. Rock is generally massive with some diagonal (30-40 degrees) fractures and high-angle (70-90 degrees) fractures. Rock foliation is parallel to the high angle fractures. Rock breaks along high angle fractures when struck with hammer. Rock matrix exhibits minor weathering. Localized weathering is present along the surfaces of fracture planes. -: Total rock drilled = 13.2'.	
	-	13.1-14.1	12				17		
	-	14.1-15.1	12				16		
16 — 252								BORING TERMINATED AT 15.1 ft	
20 — 248									
24 — 244									
28 — 240									

Driller: R. Marcoux **Helper:** J. Ricci **Inspector:** D. Ray

NOTES: Minimal water lost during coring of B-1.

GEOLOGIC LOG

MILLER ENGINEERING & TESTING, INC.
100 Sheffield Road - Manchester, NH 03103
Ph. (603) 668-6016 - Fax: (603) 668-8641

Project:	McInnis Cement Silos
	Devens, MA
Project No:	17.254.NH
Date Start:	10-16-17
Date End:	10-16-17
Sheet	1 **of** 1
Boring No:	B-2
Location:	See Plan
Approx. Surface Elev:	

			GROUNDWATER OBSERVATIONS			
Core Size	NX (2-1/8" Core)		**Date**	**Depth**	**Casing At**	**Stabilization Period**
Overburden	2.2'					
Total	12.2'					

Depth/ Elev.	CORE Sample No.	CORE Depth Range	CORE Pen. (in.)	CORE Rec. (in.)	Core Rec %	RQD %	Feed (min. per ft.)	Core Description	Notes
0	-	0.0-2.2	26					-: 3" casing spun to a depth of 2.2', began rock coring (Run #1) at 2.2'.	
	Run-1	2.2-3.2	12				11	Run-1: Reddish-brown, pink, grey, medium- grained, equigranular to locally porphyritic, foliated, granite gneiss with highly deformed porphyroblasts of potassium feldspar, accessory biotite and muscovite. Rock exhibits numerous diagonal (30-40 degrees) and high-angle (70-90 degrees) fractures. Rock foliation is parallel to the high angle fracture set. Rock breaks along high angle fractures when struck with hammer. Rock matrix exhibits minor weathering. Localized weathering is present along the surfaces of fracture planes.	
	-	3.2-4.2	12				12		
4	-	4.2-5.2	12	60/60	100	55	12		
	-	5.2-6.2	12				11		
	-	6.2-7.2	12				15		
	Run-2	7.2-8.2	12				10	Run-2: Reddish-brown, pink, grey, medium- grained, equigranular to locally porphyritic, foliated, granite gneiss with highly deformed porphyroblasts of potassium feldspar, accessory biotite and muscovite. Rock is generally massive with some diagonal (30-40 degrees) fractures and high-angle (70-90 degrees) parting fractures. Rock foliation is parallel to the high angle fractures. Rock breaks along high angle fractures when struck with hammer. Rock matrix exhibits very minor weathering. Localized weathering is present along the surfaces of fracture planes. -: Total rock drilled = 10.0'	
8	-	8.2-9.2	12				17		
	-	9.2-10.2	12	60/50	83	78	13		
	-	10.2-11.2	12				19		
12	-	11.2-12.2	12				26		
16								BORING TERMINATED AT 12.2 ft	
20									
24									
28									

Driller: R. Marcoux **Helper:** J. Ricci **Inspector:** D. Ray

NOTES:

Map Scale: 1:6,740 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Worcester County, Massachusetts, Northeastern Part
Survey Area Data: Version 11, Sep 14, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 12, 2014—Sep 28, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Worcester County, Massachusetts, Northeastern Part (MA613)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
1	Water		9.3	5.7%
51A	Swansea muck, 0 to 1 percent slopes	B/D	4.4	2.7%
52A	Freetown muck, 0 to 1 percent slopes	B/D	0.8	0.5%
226B	Hinesburg loamy sand, 3 to 8 percent slopes	A	0.9	0.6%
245B	Hinckley loamy sand, 3 to 8 percent slopes	A	1.9	1.2%
245D	Hinckley loamy sand, 15 to 25 percent slopes	A	1.9	1.2%
245E	Hinckley loamy sand, 25 to 35 percent slopes	A	9.0	5.6%
249A	Deerfield sandy loam, 0 to 3 percent slopes	B	3.0	1.9%
255A	Windsor loamy sand, 0 to 3 percent slopes	A	31.6	19.4%
255B	Windsor loamy sand, 3 to 8 percent slopes	A	12.3	7.6%
255C	Windsor loamy sand, 8 to 15 percent slopes	A	4.2	2.6%
262A	Quonset loamy sand, 0 to 3 percent slopes	A	28.2	17.4%
262B	Quonset loamy sand, 3 to 8 percent slopes	A	8.9	5.5%
421C	Canton fine sandy loam, 8 to 15 percent slopes, very stony	B	15.7	9.7%
422B	Canton fine sandy loam, 0 to 8 percent slopes, extremely stony	B	2.6	1.6%
422D	Canton fine sandy loam, 15 to 35 percent slopes, extremely stony	B	13.9	8.5%
600	Pits, gravel		2.0	1.2%
651	Udorthents, smoothed		11.7	7.2%
Totals for Area of Interest			**162.3**	**100.0%**

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Massachusetts State Plane Mainland Zone (FIPS zone 2001). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography. Base map files were provided in digital format by Massachusetts Geographic Information Systems (MassGIS). Ortho imagery was produced at a scale of 1:5,000. Aerial photography is dated April 2005.

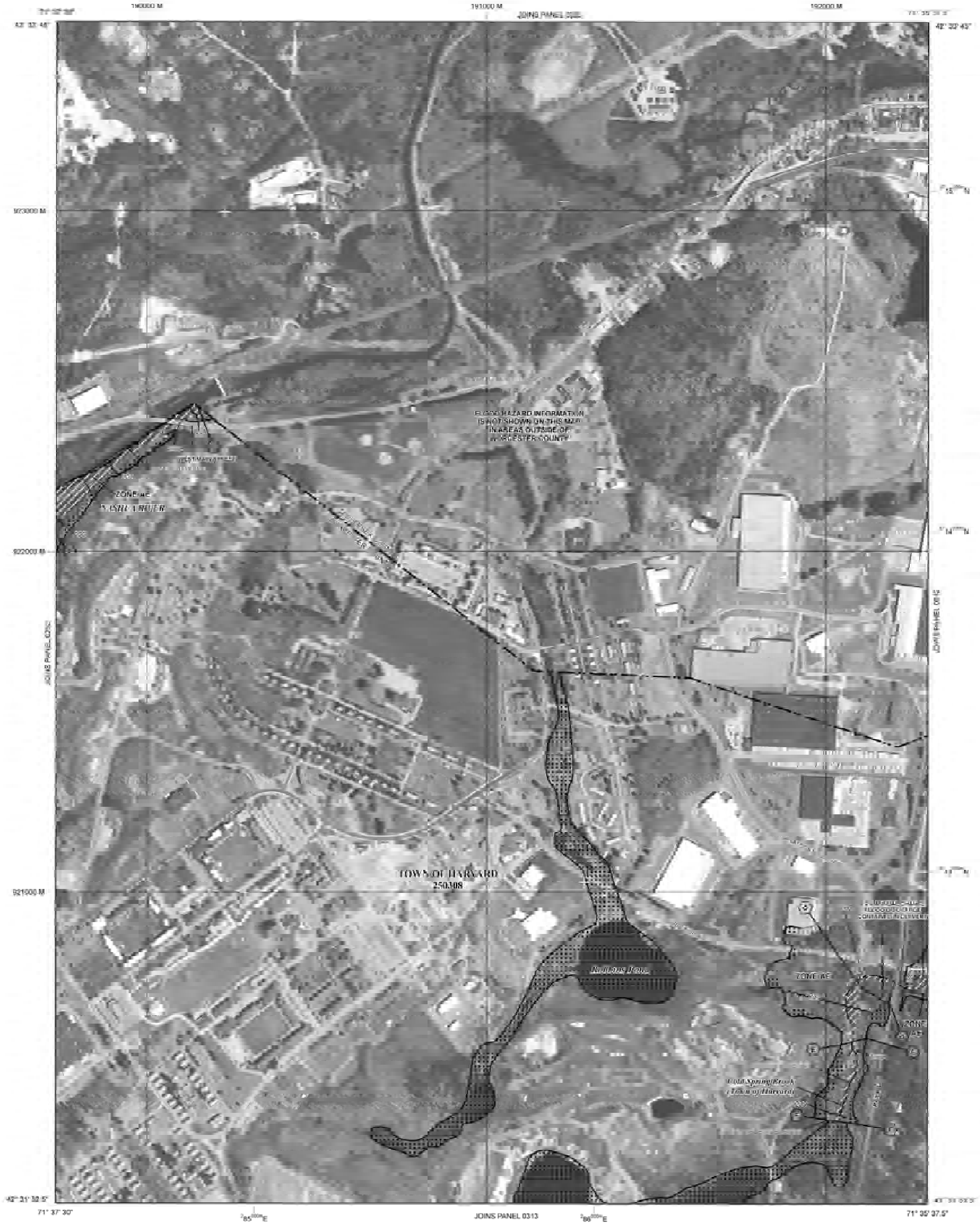
The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



LEGEND

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

ZONE A
ZONE AE
ZONE AH
ZONE AO
ZONE AR
ZONE A99
ZONE V
ZONE VE

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X

OTHER AREAS

ZONE X
ZONE D

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

MAP SCALE 1" = 500'

250	0	500	1000 FEET
150	0	150	300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0311E

FIRM
FLOOD INSURANCE RATE MAP

WORCESTER COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 311 OF 1075

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HARVARD, TOWN OF	250308	0311	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25027C0311E

EFFECTIVE DATE
JULY 4, 2011

Federal Emergency Management Agency

LONG TERM POLLUTION PREVENTION PLAN AND OPERATION / MAINTENANCE PLAN

LONG TERM POLLUTION PREVENTION PLAN

35 SARATOGA BOULEVARD

Devens, Massachusetts

APRIL 8, 2022

Prepared by:

Eugene T. Sullivan, Inc.

230 Lowell Street, Suite 2A

Wilmington, MA 01887

[978] 657.646

Contact Information/ Responsable Parties

Operator(s) / Emergency Contact:

35 Saratoga Property Owner, LLC
133 Pearl Street
Boston, MA 02110
Attention: Will Deshler
Phone: 617.292.0101
Email: wdeshler@gfipartners.com

OPERATION & MAINTENANCE

MANUAL

FOR THE STORM

DRAINAGE FACILITIES

LOCATED AT:

35 SARATOGA BOULEVARD

Devens, Massachusetts

APRIL 8, 2022

Prepared By:

Eugene T. Sullivan, Inc.
Consulting Engineers
230 Lowell Street – Suite 2A
Wilmington, Massachusetts
978.657.6469

TABLE OF CONTENTS

1.0 INTRODUCTION

The Site Stormwater management system for the new parking area have been designed to capture solids. Proper maintenance is essential to the continued effectiveness of the storm drainage facilities.

The drainage facility components include deep sump catch basin, water quality structure, and a Subsurface Infiltration Basin. The drainage facility is designed to limit peak runoff to below the predevelopment conditions, reduce solids load to the outfall and recharge groundwater.

An estimated annual budget of $ 15,000 should be allocated by the site operator for the maintenance and proper operation of the stormwater system.

The following outline contains the procedures and frequency of tasks necessary to manage the system and avoid costly premature component failure. Refer to the labeled project site plan to assist in locating all drainage structures.

2.0 INITIAL NEW SYSTEM INSPECTION

The new system must be initially inspected within the first two months.

2.1 Deep Sump Catch Basin

The drainage system includes new catch basin. All catch basins shall be inspected initially after a major rainfall event for the first couple of months. Initial inspection is intended to observe proper stabilization of the catch basin foundation. There after the catch basins shall be inspected regularly as outlined in Section 3.1.

2.2 CONTECH Water Quality Structure

The drainage system includes a Contechs Water Quality CDS Unit. The unit should be inspected after any major rainfall events for the first couple of months. Initial Inspection is intended to observe proper stabilization of the tank's foundation. There after the tanks should be inspected regularly as outlined in Section 3.2.

2.3 Porous Pavement

Visual inspections are an integral part of system maintenance, this includes monitoring pavement to ensure water drainage, debris accumulation and surface deterioration.

- Check for standing water on the surface of the pavement after a precipitation event. If standing water remains on the pavement 30 minutes after the rainfall has ended, cleaning of the porous pavement is recommended.
- Controlling run-on and debris tracking is key to extending the life of the porous surface. Erosion and sedimentation control of adjacent areas is critical.
- Do not store materials such as sand/salt, and other stockpiles on the porous surfaces.
- Stockpiling snow on porous surfaces is not recommended and will lead to premature clogging.

2.4 Permeable Pavers

Periodic Visual inspections are an integral part of system maintenance, this includes monitoring pavement to ensure water drainage, debris accumulation and surface deterioration. The visual inspections determine that the stormwater is infiltrating into the system. Areas that have pooled standing water on the surface need to be addressed as a remedial repair as opposed to maintenance

- Controlling run-on and debris tracking is key to extending the life of the porous surface. Erosion and sedimentation control of adjacent areas is critical.
- Do not store materials such as sand/salt, and other stockpiles on the porous surfaces.
- Stockpiling snow on porous surfaces is not recommended and will lead to premature clogging.

2.5 Cultec Recharge Chambers

The drainage system includes new Cultec recharge chambers. The chambers operate at peak performance when installed in series with pretreatment. Without proper pretreatment, the effectiveness of the chambers will be severely compromised. The chamber rows will be equipped with 6" diameter access ports located on the piping. These access ports will allow access to the piping rows below to measure sediment.

3.0 REGULAR INSPECTION AND MAINTENANCE OF STRUCTURES

3.1 Deep Sump Catch Basins

The actual removal of sediments, associated pollutants and trash occurs only when sumps are cleaned out; therefore, regular maintenance is required. Most studies have linked the failure of deep sumps to lack of regular maintenance. The more frequent the cleaning, the less likely sediments will be re-suspended and subsequently discharged or carried over.

Inspection
Inspect for sediment accumulation every month.

Maintenance:

Deep sumps shall be cleaned at least four times a year and at the end of the foliage and snow removal seasons or whenever the depth of the sediments is greater than or equal to ½ the depth from the bottom of the Invert of the lowest pipe in the basin. *See sediment disposal section*.

3.2 CONTECH Water Quality CDS Unit

Inspection of the CDS Unit is essential to effective maintenance to ensure optimum performance.

Inspection:

Visual Inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen.
The Inspection should also quantify the accumulations of hydrocarbons, trash, and sediment in the system.
Inspect for sediment accumulation.
Inspect for cracking on the walls.
Inspect for sediment accumulation around the outlet.
Inspect for oil and grease accumulation after every major storm event but at least every month.

Cleaning:
Access to the CDS Units is typically achieved through manhole access covers. This allows for the inspection and cleanout of the separation chamber [cylinder and screen] and isolated sump. Also inspect and cleanout the sediment captured and retained outside the screen.

The CDS system should be cleaned when the level of the sediment has reached 75% of the capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated.

Cleaning of the CDS system should be done during dry weather conditions when no flow is entering the system. Cleanout of the CDS system with a vacuum truck is the most effective method of removing pollutants from the separator. Cleaning of the CDS system is typically done by inserting a vacuum hose into the sump and evacuating the sump of water and pollutants. The area outside the screen should also be cleaned out. In installations were the risk of petroleum spills is small, liquid containments may not accumulate as quickly as sediments. However, the system should be cleaned out immediately in the event of an oil or gasoline spill.

Maintenance:

The Separator unit shall be cleaned as necessary or as required by inspection. At minimum the separator tanks should be cleaned at least two times a year, (fall and spring). *See sediment disposal section*.

3.3 Porous Pavement

Regular inspection and maintenance are critical to the effective operation of porous pavement.

Maintenance:

Pavement vacuuming should occur in the spring and fall at a minimum.
A vacuum sweeper shall be used to remove sediment and organic debris on the pavement surface. The sweeper may be fitted with water jets.
Power washing can be an effective tool for cleaning clogged areas. This should occur at mid=pressure typically less than 500 psi and at angle of 30 degrees or less.
For loose debris accumulating on the pavement, a power/leaf blower or gutter broom can be used.

3.4 Permeable Pavers

Regular inspection and maintenance are critical to the effective operation of the permeable pavers. The pavers will require standard BMP practices for pavements surfaces regarding sweeping procedures.

Normal Maintenance:

For loose debris accumulating on the pavement, a power/leaf blower or gutter broom can be used. A dry vacuum type sweeper vacuuming should occur in the spring and fall at a minimum. Additional void materials may be swept into joints and voids if necessary.

Remedial Maintenance:

A vacuum sweeper with water jets, sweeper, and vacuum bar attachment will evacuate clogged void materials from joint and void openings. Joint and void materials shall then be replaced by sweeping until the voids are full.

3.5 ***Cultec Recharge Chambers***

The chamber rows will be equipped with a 6" pipe to the chamber rows below. The pipe will be capped with an at grade circular cast box placed in a rectangular concrete collar. From the surface thru the access ports sediment may be measured using a stadia rod. If the depth of the sediment is greater than 3", then the row shall be cleaned with high pressure water and back-flushed out thru an upstream manhole. The sediment and water are then removed from the manhole using a vacuum truck.

Maintenance:

Monthly in the first year:	Check inlets and outlets for clogging and remove any debris as required:
Spring and Fall:	Check inlets and outlets for clogging and remove any debris as required:

The Inspection and Cleaning of all deep sump catch basins, water quality units and recharge chambers shall be performed in April and October of each year. A report detailing the inspections and cleaning of the structures is to be submitted to the Public Works Department after each cleaning and shall be prepared by an appropriate Professional.

4.0 PAVED AREA AND PARKING LOT SWEEPING

An effective measure to the removal of total suspended solids is through frequent sweeping. Based on data collected throughout the country, effective regular sweeping can reduce the total suspended solids by 50% to 80%. Infrequent sweepings have shown that the removal efficiencies are 20% of the total suspended solids. Vacuum type sweepers have demonstrated higher efficiencies.

Maintenance

Sweeping shall occur a minimum of 4 times per year [each quarter] and additionally as necessary to control yard sediments from entering the drainage systems.

5.0 SEDIMENT DISPOSAL

All sediments, grease and hydrocarbons are considered hazardous waste and therefore should be handled properly and disposed of in accordance with applicable local, state, and federal laws and regulations.

6.0 SPILL KITS

A Spill Kit, absorbent pads and/or socks shall always be provided onsite to prevent any spills from entering the stormwater collection system.

THE MAINTENANCE OF THE STORM DRAINAGE SYSTEMS IS THE RESPONSIBILITY OF THE OWNER OF THE PROPERTY.

POLLUTION PREVENTION PLAN
FOR
35 SARATOGA BOULEVARD
Devens, Massachusetts

PROPERTY OWNER:

35 SARATOGA PROPERTY OWNER, LLC
133 PEARL STREET
BOSTON, MASSACHUSETTS 02110
617.292.0101

PREPARED BY:
EUGENE T. SULLIVAN INC.
230 Lowell Street
Wilmington, Massachusetts

DATE:
APRIL 8, 2022

LANDSCAPE MAINTENANCE AND WATER MANAGEMENT PLAN

Spring and Fall Clean-up:

A general clean-up in the spring shall include the removal of all leaves, branches, twigs and debris from all lawn areas, tree, and shrub beds and from individual tree beds. Also included is de-thatching of all lawn areas and cutting of the grass. The work shall take place between April 15 and May 15. An annual Fall clean up should include the removal of leaves, tree branches, debris and refuse due to deciduous cycles and other conditions. The work shall take place between mid-October to mid-November after the leaves have fallen and before the first snowfall of the season. All debris shall be removed from the site and disposed of legally.

Blanket applications of pesticides are prohibited. Targeted treatment of pesticides is permitted only by a licensed applicator.

Manual Weed Control:

During establishment, weed growth shall be manually or chemically removed, including grass from tree and shrub beds and from individual tree beds. Woody growth, vines, and other undesirable plants shall be removed and legally disposed of. Weed control activities shall be performed in such a manner so as not to disturb or destroy plant material or mulched areas.
Chemical weed control of seeded areas and plant beds shall be by pre- and post-emergent herbicides in the spring and fall according to manufacturer's instructions.

Watering of Plants and Seeded Areas:

Use of manual watering should be by rain harvesting whenever possible to reduce use of potable water irrigation. Generally, plantings and seeding selections for the NE Resource Recovery are specified for low maintenance and easy establishment. It is anticipated that beyond initial establishment, watering will not need to be done on a regular basis, but only in extremely dry conditions.
All new plantings shall be watered by soaking the plants thoroughly at the time of installation and again within a twenty-four (24) hour period after the initial planting. Additional watering shall be made at least once every three weeks, unless otherwise directed, until final acceptance of the plant material.
At the time of seeding, water all areas within 72 hours of seeding operation water grass to maintain an adequate supply of moisture within the root zone. An adequate supply of moisture is the equivalent of one (1") of absorbed water per week that is delivered at weekly intervals in the form of natural rain or is augmented by periodic watering.

Irrigation system subject to approval by the Devens Enterprise Commission and shall comply with the installation requirements in 974 CMR 8.09 (11) including being equipped with soil moisture sensor devices and backflow prevention.

Soil Testing:

Soil should be tested once a year by a Mass. Soil testing agency. Soils should be tested for organic content, soil ph and nitrogen, phosphorous and potassium levels. A sieve analysis shall also be performed. Tests results shall be provided along with recommended fertilization and treatment schedule.

Blanket applications of pesticides are prohibited. Targeted treatment of pesticides is permitted only by a licensed applicator.

Infiltration Basins:

Trash and debris should be removed periodically keeping outlet structures and headwalls clear. Prune and maintain vegetation and grasses within these areas a minimum of two times between May and September. Weed growth should be monitored and removed monthly until establishment of specified plant material. The filter media soil should be replaced every 4 years or when it becomes clogged and infiltration has slowed. An indication of clogged filter media is ponded water longer than 72-hours after rainfall. Vegetated swales should be inspected for sediment build-up and erosion and should be corrected in a timely manner.

Fertilization:

The seeded areas should be inspected visually at the time of each scheduled mowing to determine if the turf has developed insect or disease problems. Over-seeding and other industry standard treatments should be done on an as-needed basis. Plantings should be inspected for healthy growth seasonally. When fertilizers are necessary, coated time-release fertilizers are the preferred method.

Blanket applications of pesticides are prohibited. Targeted treatment of pesticides is permitted only by a licensed applicator. Fertilizers, Herbicides, and pesticides are not to be stored onsite.

Mulching:

Mulching shall be performed between April 15 and May 30. All shrub and tree beds and individual trees previously mulched shall be mulched with one inch (1") of fine-shredded pine bark mulch. Immediately before the installation of mulch, all areas shall receive an application of pre-emergent herbicide applied at the manufacturer's recommended rates.

Grass Mowing:

All lawn areas shall be cut at least once every seven (7) days from May 1 thru October 31 to maintain a height of two inches (2”). The mowing frequency may be increased or decreased depending on the growth rate of the grass. The mowing operation shall result in a stand of evenly mowed grass two inches (2") tall. As a rule, the grass should be cut so that only one third (1/3) of its total length is removed during cutting operations. To maintain a height of two inches (2"), the grass shall be cut when it reaches a height of three inches (3").
Neat trimming shall be performed around all poles, curbs, posts, signs, mulched areas, and other structures falling within the lawn areas. Trimming shall be conducted simultaneously with the mowing operation. All sidewalks, mulch areas, and road surfaces shall be left free of all grass clippings. Extreme care shall be taken to prevent trimming damage of any kind to trees and shrubs.

INVASIVE SPECIES CONTROL:

Invasive species are plants that are non-native to the surrounding ecosystem and whose introduction causes or is likely to cause harm.

Inventory/Survey and Mapping:

- Review the Invasive Plant Atlas of New England to become familiar with invasive and potentially invasive plants. This will assist in the early detection and rapid response to invasions.
- Assess the status of invasive plant populations [i.e. location, distribution, abundance]
- Identify areas free of invasive plants
- Detect new invasive plant species/populations

Risk Assessment:

- Assess the relative risk of invasive plant species/populations [i.e. prioritizing and ranking] and control methods

Management Methods:

- Select appropriate methods [physical, chemical, biocontrol, prescribed burning, prescribed grazing] for eradication, suppression, containment, or restoration

Monitoring:

- Assess trends of invasive species populations to determine the effectiveness of management methods or species invasiveness
- Detect new invasive plant species/populations

INSECTS AND DISEASE CONTROL:

Periodic inspection of all plants by trained personnel is necessary to detect problems during early stages of insect or disease infestation. A good faith and reasonable effort shall be made in a timely manner to control any infestation or disease. Application of all chemicals including insecticides and fungicides shall be carried out in accordance with State laws and only by individuals with current State Pesticide Applicators License. All insecticides and fungicides shall be approved of by the Owner prior to application.

Refer to the Integrated Pest Management tools listed on the Landscape Nursery and Urban Forestry website http://www.umassgreenifo.org

RODENT CONTROL:

The primary pests found in institutional sites are insects and rodents. Good sanitation and cleanliness are the keys to control and management of pests and rodents in institutional sites. Prevention is an essential management practice that includes sanitation and exclusion. Pests and rodents must have food, water, and shelter to survive. Remove these and pest problems will be significantly reduced.

Food:

Clean food preparation areas and other site problem areas frequently. Thorough cleaning under and behind equipment, shelving and appliances may be necessary to remove all food sources. Remove trash regularly and use trash can liners. Keep the areas around dumpsters clean. Store food in rodent proof and insect proof containers.

Water:

Pests find water in numerous places. Wring out and hang wet mops to dry. Clogged rain gutters and leaking faucets are also important water sources for rodents. Clean floor drains routinely as they are sources of both food and water.

Shelter:

Restrict rodents' access to shelter and food by sealing the entry points. Install door sweeps and window screens. Seal cracks and crevices with screens, silicone, or other sealant materials. Eliminate clutter and keep stored products on shelving off the floor.

Routine Monitoring is an important part of managing pests and rodents. Monitoring not only includes surveying for pests and rodents but also observing conditions that are favorable for them, including unsanitary conditions, entry sites, and shelter locations. When conditions favoring pests and rodents are found, they should be corrected as soon as possible. When monitoring, look for pests and evidence of pests, such as fecal material, shed skins, tracks and grease marks left by rodents. Routine monitoring will indicate if pests and rodents are present and help to evaluate whether the management strategies are successful.
Pesticides and Rodenticides may be applied as intended by certified applicators and should be used in combination with preventative measures, including exclusion and sanitation.

MATERIALS STORAGE:

All storage of materials and waste products is to be within the building. However, if outdoor storge is required the following procedures must be followed:

- Storage of materials must be enclosed or covered to prevent exposure to precipitation
- Absorbent materials shall be stored within the building and the spill prevention procedures outlined below must be followed to prevent materials from entering the stormwater management systems.

Vehicle maintenance and washing is strictly prohibited on this property.

SPILL PREVENTION AND CONTROL PLAN

Contractor awareness is the key to an effective spill prevention and response program. Anticipated spills for this project would be a result of oil or gas leaks. These spills should be brought to the attention of the project manager immediately. The project manager should have an adequate supply of absorbent compounds, rags etc. readily available at all time. The project manager will be trained to handle small spill events using the following procedures:

Stop the spill at the source.
Contain the spilled materials.
Collect the spilled materials as necessary using absorbent compounds, rags etc.
Dispose of the materials properly.

If the spill occurs near a storm drain structure, absorbent pads and/or socks shall be placed around the drains to prevent the spill from entering the collection system.

Spills should not be washed down with water unless the water can be contained and disposed of properly.

If a significant spill event occurs and cannot be handled by the project manager, contact the Fire Department or Local Environmental Emergency Response Team as required.

SNOW MANAGEMENT PLAN:

SNOW REMOVAL PROCEDURE:

Reduced salt zones have been established primarily for the purpose of reducing sodium levels. This is accomplished by substituting or reducing the amount of sodium-based deicer (i.e. granular road salt. For this property, the parking and driveway areas will be treated using “Ice B’Gone”. Ice B’Gone “IBG” is a highly effective liquid deicing agent made from a blend of magnesium chloride combined with an agricultural byproduct of the distilling process [i.e. grain and/or sugar based]. IBG allows for lower salt applications rates and has less impact on the environment [i.e. wells, plantings, vegetation etc.]
BG treated salt is a highly effective solid granular deicer. IBG treated salt starts out as ordinary rock salt which is treated with the liquid IBG transforming the rock salt into a new deicing material. This product reduces the levels of sodium and chloride ion exposure, eliminates the need for sand, provides lower working temperatures, provides better adherence to roadways resulting in a 30-40% salt reduction when compared to dry salt.

1. When Roads become icy, treatment will begin

2. When the depth of snow on the roadways is approximately two inches plowing shall begin

3. When snow in the parking lots is between two and four inches, parking lot plowing will begin. It should be noted that it is virtually impossible to clear parking spaces in the parking lots when cars are parked there. Snowstorms which happen during a workday are handled by keeping parking lot entrances and aisles open. The parking spaces areas for vehicles are cleared overnight after the cars have vacated.

4. During an especially concentrated storm, it may be necessary to continually return to plowing the roadways and aisles lanes of the parking lot. Areas on the lower end of the priority list may have to wait until the storm subsides to be cleared.

NOTE: Storage of deicing materials must be done in a contained area protected from the elements and stormwater runoff. Ensure spreading equipment is properly calibrated. No snow storage is allowed in Zone 2 areas from areas outside of Zone 2 areas.

PRIORITIES FOR SNOWPLOWING:

1. Roadways, parking aisles and ADA spaces and access

2. Parking Lot Spaces

3. Walkways [not ADA access routes]

SNOW STORAGE:

1. Snow is to be plowed to and stored in the locations indicated on C.2. Snow shall be stockpiled onsite until there is not enough space. As necessary, the snow will be removed and disposed of off-site. It will be the responsibility of the snow removal contractor to properly dispose of transported snow according to the Massachusetts DEP, Bureau of Resource Protection- Snow Disposal Guidelines BRP001-01. It is the responsibility of the snow removal contractor to follow these guidelines and all applicable laws and regulations.

2. Under no circumstances shall snow be placed in the Infiltration Basins.

STORMWATER POLLUTION PREVENTION PLAN

STORMWATER POLLUTION PREVENTION PLAN [SWPPP]

35 Saratoga Boulevard

Devens, Massachusetts

April 20, 2022

Prepared by:

EUGENE T. SULLIVAN, INC.

230 Lowell Street, Suite 2A

Wilmington, MA 01887

[978] 657.6469

EROSION AND SEDIMENT CONTROLS PLAN:

This report represents the Erosion and Sediment Controls Plan for the proposed Industrial Building at 35 Saratoga Boulevard, Devens, Massachusetts.

The purpose of this report is to outline the methods and procedures to provide Erosion and Sediment controls to eliminate any adverse impact thru stormwater runoff or sediment accumulations to the adjacent properties, wetlands, and or roadways.

Erosion Control Notes and a Construction Sequence are identified on drawing C.1. As outlined on drawing EC.1, the following Erosion Controls are to be Installed and Maintained throughout the Construction Project:

- Siltsoxx are to be installed around the perimeter of the Limit of Work.

Additional Erosion Controls Measures and Procedures are contained in the attached Stormwater Pollution Prevention Plan prepared for this project.

INSPECTIONS OF EROSION CONTROLS:

To ensure that ensure that erosion controls are installed and maintained throughout the construction project, the project Civil Engineer, Eugene T. Sullivan, Inc. will conduct onsite inspections of all erosion control measures at least once every fourteen [14] calendar days and within 24 hours of the end of a ½" or greater storm event from the start of construction until the site is permanently stabilized. For each inspection, a site inspection log [contained in Appendix A of the SWPPP] must be completed. The Inspection logs must be maintained and available for review by the Planning Commission or its representatives.

All erosion and sediment controls and other protective measures identified in the SWPPP must be maintained in effective condition. If the Inspections identify measures which need to be maintained or are not functioning effectively, repairs, maintenance or additional erosion control measures must be implemented immediately to correct any deficiencies.

Stormwater Pollution Prevention Plan

for:

35 Saratoga Boulevard
Devens, Massachusetts

Operators and Contacts:

35 Saratoga Property Owner, LLC
133 Pearl Street
Boston, Massachusetts

Prepared by:

EUGENE T. SULLIVAN, INC.
230 Lowell Street, Suite 2A
Wilmington, Massachusetts

SWPPP Preparation Date:

April 20, 2022

Estimated Project Dates:

Project Start Date: **08 / 01 / 2022**
Project Completion Date: **12 / 31 / 2023**

Contact Information/ Responsible Parties

Operator(s) / Emergency Contact:
35 Saratoga Property Owner, LLC
133 Pearl Street
Boston, MA 02110
Attention: Will Deshler
Phone: 617.292.0101
Email: wdeshler@gfipartners.com

This SWPPP was Prepared by:
Eugene T. Sullivan Inc.
Gene Sullivan
230 Lowell Street, Suite 2A
Wilmington, MA 01887
978.657.6469
etspe@outlook.com

SECTION 1: PROJECT DESCRIPTION

1.0 Nature 0f Construction Activity

The proposed project consists of a 154,000 SF Industrial Building and associated parking areas.

What is the function of the construction activity?

Residential Commercial X Industrial ☐ Road Construction ☐ Linear Utility

Other (please specify):

Estimated Project Start Date: 08 / 01 / 2022

Estimated Project Completion Date: 12 / 31 / 2023

1.1 Soils, Slopes, Vegetation, and Current Drainage Patterns

Soil type(s): Sands and Bedrock

Slopes (describe current slopes and note any changes due to grading or fill activities):
The property is relatively flat.

Drainage Patterns: The existing building and paved area runoff sheet flow untreated into a drainage system along the northern property line.

Vegetation: Existing vegetation will remain to the maximum extent possible.

1.2 Site Features and Sensitive Areas to be Protected

Siltsoxx will be installed at the limit of work perimeter. The erosion controls will be maintained throughout construction activities.

1.3 Potential Sources of Pollution

Potential sources of sediment to Stormwater runoff:
Clearing and Grubbing Operations
Topsoil stripping and stockpiling operations.
Grading and Site Excavation Operations
Landscaping Operations
Potential pollutants and sources, other than sediment, to Stormwater runoff:
Ordinary Construction Activities
Concrete washout of trucks.

1.4 Maps

Site Plans and Maps are attached to this SWPPP.

SECTION 2: EROSION AND SEDIMENT CONTROL BMPS

2.1 Minimize Disturbed Area and Protect Natural Features and Soil

After the installation of erosion controls has been completed, Topsoil will be removed from the construction area. The erosion controls shall be inspected weekly and after every significant [greater than ½"] storm event. Any erosion will be addressed and stabilized immediately.

2.2 Stabilize Soils

Temporary Stabilization:

The site topography has very little slope, therefore there should not be much need to stabilize exposed soils temporarily during construction activities. However, if stabilization is required, straw mulch will be applied to eliminate erosion. Disturbed areas will be inspected weekly or after storm events to check for movement or erosion. If erosion occurs, the surface will be repaired, and more mulch will be applied.

Permanent Stabilization:

Permanent stabilization will be done after final design grades have been achieved. All areas disturbed during construction will be loamed and seeded. All seeded areas will be inspected weekly and after during storm events after installation, if failure is noticed, the area will be addressed and reseeded.

Dust Control:

Dust from the site will be controlled using a mobile pressure-type water truck to apply water to disturbed areas as necessary.

2.3 Protect Slopes

If slopes need to be protected, Geotextile Erosion Control Blankets will be used on the slopes.

2.4 Protect Storm Drain Inlets

Catch basin siltsacks will be installed in the existing and new catch basins throughout the construction process until the drainage system is completed. The siltsacks will installed on the top of the structure beneath the catch basin grate to capture any sediments.

2.5 Establish Perimeter Controls and Sediment Barriers

Prior to any disturbances on-site siltsoxx will be installed along the project limit as indicated on the Erosion Controls drawing C.2. These erosion controls will prevent sediment from leaving the site. The siltsoxx will be secured using 2x2 wooden stakes.

2.6 Retain Sediment On-Site

Any sediment which may be created during the construction process will be collected by the erosion controls along the limit of work. The erosion controls will be inspected weekly and after every storm event. Any erosion will be addressed and stabilized immediately. Sediments which may be collected will be removed, hauled and disposed of off-site as necessary.

2.7 Establish Stabilized Construction Exits

A deep stone mud trap will be constructed at the southern driveway entrance from Dunham Road to prevent the off-site transport of sediment by construction vehicles. The stabilized exit will be installed before construction begins on the site. The stone will remain in place until the sub-base of the pavement is installed. The exit will be inspected weekly, after significant storm events, and after periods of heavy use. The exit will be maintained so that it will prevent the tracking of sediment off-site.

2.8 Additional BMPs

Eugene T. Sullivan Inc. [the project Civil Engineer] will perform bi-weekly inspections of the site to ensure compliance with this SWPPP. ETS Inc. will maintain the SWPPP documentation and will conduct and document inspections in all areas of the site.

SECTION 3: GOOD HOUSEKEEPING BMPS

3.1 Material Handling and Waste Management

Construction Waste:

All waste materials will be collected and disposed of into metal trash dumpsters. The dumpsters will be located away from the wetlands and/or property lines, stormwater conveyances and drains and will meet all federal, state, and municipal regulations. Only trash and construction debris from the site will be deposited in the dumpster. No debris and/or construction materials will be buried on-site. The dumpsters will be inspected weekly and after storm events. The dumpsters will be emptied as necessary and disposed of in accordance with regulations.

Sanitary Waste:

At a minimum, two temporary portable toilets will be provided onsite throughout the construction phase. The portable toilets will be located away from the wetland areas and/or property lines, stormwater conveyances and drains. Sanitary waste will be cleaned and collected from the portable toilets weekly.

3.2 Establish Proper Building Material Staging Areas

Construction Equipment and Materials will be staged in the area of the site away from the drainage systems and wetlands. The storage areas will be inspected weekly and after significant storm events to ensure that materials and/or sediment are not being created by the staging area. If necessary, erosion controls will be installed around the perimeter of the staging area.

3.3 Designate Washout Areas

A temporary above-grade concrete washout area will be constructed prior to any concrete deliveries to the site. A 10' x 10' washout will be constructed of staked hay bales and filter fabric. The washout area will be located adjacent to the materials staging area.

Concrete pours will not be conducted during or before an anticipated storm event. Concrete trucks and chutes will be washed in the designated area or concrete wastes will be properly disposed off-site. When the temporary washout area is no longer needed, the hardened concrete and materials used to construct the area will be removed and disposed of properly.

3.4 Establish Proper Equipment/Vehicle Fueling and Maintenance Practices

Vehicles and Equipment to be used on-site throughout the project include excavators, loaders, dump trucks and trailers, paving equipment etc. All major equipment/vehicle fueling will occur within the materials staging area. Absorbent, spill-cleanup materials will be available at the materials staging area. Vehicles and equipment will be inspected each day for leaks, leaks will be repaired immediately, or the problem equipment will be removed from the site immediately.

3.6 Spill Prevention and Control Plan

Contractor awareness is the key to an effective spill prevention and response program. Anticipated spills for this project would be a result of oil or gas leaks. These spills should be brought to the attention of the project manager immediately. The project manager should have an adequate supply of absorbent compounds, rags etc. readily available at all time. The project manager will be trained to handle small spill events using the following procedures:

1. Stop the spill at the source.
2. Contain the spilled materials.
3. Collect the spilled materials as necessary using absorbent compounds, rags etc.
4. Dispose of the materials properly.

If the spill occurs near a storm drain structure, absorbent pads and/or socks shall be placed around the drains to prevent the spill from entering the collection system.

Spills should not be washed down with water unless the water can be contained and disposed of properly.

If a significant spill event occurs and cannot be handled by the project manager, contact the Fire Department or Local Environmental Emergency Response Team as required.

SECTION 4: INSPECTIONS

4.1 Inspections

Eugene Sullivan PE, the Project Civil Engineer who prepared the Civil Engineering Drawings for the project, prepared this SWPPP is responsible for site compliance with this SWPPP and the EPA's Construction General Permit. Inspections will be conducted for all areas of the site disturbed during construction activities. Inspections will be performed weekly and after storm events as detailed in this SWPPP. These inspections will verify that all BMP's required in sections 2 and 3 of this plan are implemented, maintained and effectively minimizing erosion and preventing Stormwater contamination from construction activities.

4.2 Delegation of Authority

Duly Authorized Representative(s) or Position(s):

EUGENE T. SULLIVAN, INC.
Gene Sullivan
President
230 Lowell Street, Suite 2A
Wilmington, MA 01887
978.657.6469
etspe@aol.com

SECTION 5: FINAL STABILIZATION

After the entire site has been stabilized, any sediment collected during the construction process will be removed and hauled off-site. Construction debris, trash and temporary BMP's [material and equipment storage areas, portable toilets etc.] will be removed and areas disturbed will be prepared for final seeding. Permanent seeding will be applied after all final grades have been established.

SECTION 6: CERTIFICATION AND NOTIFICATION

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

Name: Eugene T. Sullivan PE Title: President

Signature:

Date: _____

APPENDIX “A”

Appendix A:

Stormwater Construction Site Inspection Report

General Information			
Project Name	***PROPOSED BUILDING***		
NPDES Tracking No.		**Location**	35 Saratoga Boulevard, Devens, MA
Date of Inspection		**Start/End Time**	
Inspector's Name(s)	GENE SULLIVAN, P.E.		
Inspector's Title(s)	PROJECT ENGINEER		
Inspector's Contact Information	978.657.6469 etspe@outlook.com		
Describe present phase of construction			
Type of Inspection: ❑ Regular ❑ Pre-storm event ❑ During storm event ❑ Post-storm event			
Weather Information			
Weather at time of this inspection? ❑ Clear ❑Cloudy ❑ Rain ❑ Sleet ❑ Fog ❑ Snowing ❑ High Winds ❑ Other: Temperature:			
Have any discharges occurred since the last inspection? ❑Yes ❑No **If yes, describe:**			
Are there any discharges at the time of inspection? ❑Yes ❑No **If yes, describe:**			

Overall Site Issues

Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.

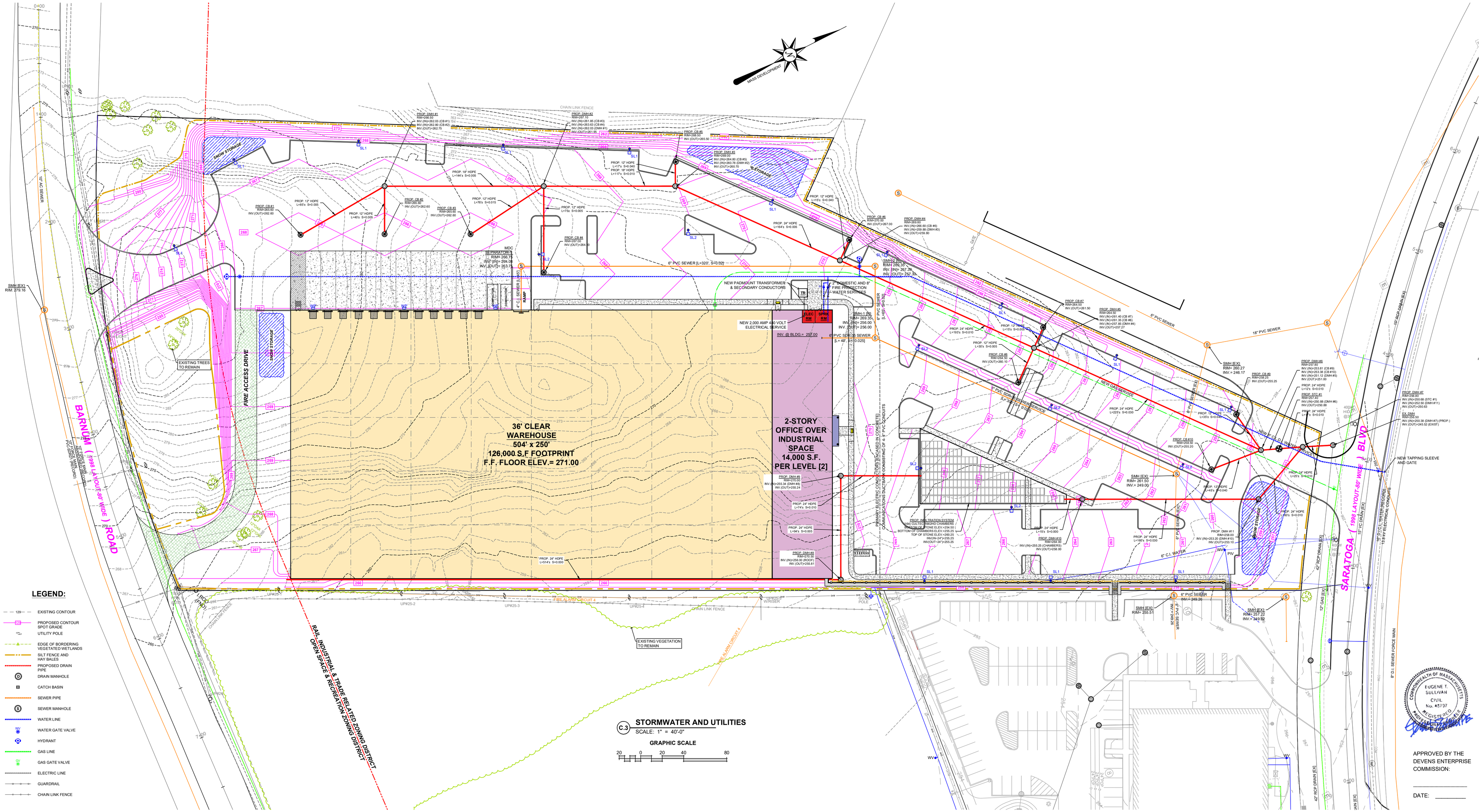
	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	❑Yes ❑No	❑Yes ❑No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	❑Yes ❑No	❑Yes ❑No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	❑Yes ❑No	❑Yes ❑No	

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
4	Are discharge points and receiving waters free of any sediment deposits?	❑Yes ❑No	❑Yes ❑No	
5	Are storm drain inlets properly protected?	❑Yes ❑No	❑Yes ❑No	
6	Is the construction exit preventing sediment from being tracked into the street?	❑Yes ❑No	❑Yes ❑No	
7	Is trash/litter from work areas collected and placed in covered dumpsters?	❑Yes ❑No	❑Yes ❑No	
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	❑Yes ❑No	❑Yes ❑No	
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	❑Yes ❑No	❑Yes ❑No	
10	Are materials that are potential stormwater contaminants stored inside or under cover?	❑Yes ❑No	❑Yes ❑No	
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	❑Yes ❑No	❑Yes ❑No	

CERTIFICATION STATEMENT

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

Signature:_____ **Date:**_____



APPROVED BY THE
DEVENS ENTERPRISE
COMMISSION:

DATE: __________

EUGENE T.
SULLIVAN
CIVIL
No. 48707

Eugene T. Sullivan, Inc.

Consulting Engineers
230 Lowell Street - Suite 2A
Wilmington, MA 01887
Phone: 978.657.6469
Fax: 978.657.8563
Email: etspe@outlook.com

NO	DATE	REVISIONS
1	4/20/22	REVISIONS FOR SUPPLEMENTAL FILING

PREPARED FOR:
35 SARATOGA PROPERTY
OWNER, LLC
133 PEARL STREET
BOSTON, MA

PROJECT:
PROPOSED BUILDING
AVANTOR FLUID
HANDLING
35 SARATOGA
BOULEVARD
DEVENS, MA

DRAWING:
STORMWATER AND UTILITIES PLAN

SCALE: 1" = 40'-0"
DATE: APRIL 6, 2022
DRAWING NUMBER
C.3