Attachment G:

Stormwater Report, Calculations

& Supporting Information

Devens Public Safety Building
Level 2 Unified Permit Application

STORMWATER MANAGEMENT REPORT

FOR

DEVENS PUBLIC SAFETY BUILDING

Submitted to:

Devens Enterprise Commission
33 Andrews Parkway
Devens, MA 01434

01 31, 2022
Revised:

Prepared for:

Devens Enterprise Commission
33 Andrews Parkway
Devens, MA 01434

Prepared by:

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Report Summary

Project Overview:

MassDevelopment is proposing the development of an existing building to accommodate a new public safety building located at 270 Barnum Road. The parcel is located at the southwest corner of the intersection of Barnum Road and Queenstown Street, and contains 3.46 Ac of land. The site is previously developed, with an existing 1-story 24,000 sf partially vacant building which houses a regional dispatch facility and parking. The proposed development will include development of the vacant portion of the building and the addition of a new 7,200 sf Apparatus Bay and 1,040 sf Sally Port on the western side of the existing building, as well as parking, access, and drainage improvements associated with the development. The project will also include the construction of a new public parking lot off of Queenstown Street to prevent conflicts between visitors and civilian users and official users of the site. Total lot coverage will be 1.80 acres and total land disturbance will be over an acre. The existing public safety building is serviced by the municipal sewer system which will be partially relocated on site to accommodate the new apparatus bay. The existing stormwater runoff from the site is captured on site through the use of a closed drainage system, which is then piped across the Barnum Road-Queenstown Street intersection to an existing stormwater detention pond located to the east of the site. The existing treatment train includes a stormceptor vortechnic units and forebay prior to discharge to the detention basin. The increases in stormwater runoff generated by the new facility will be contained on the site, collected via deep-sump catch basins with oil/debris traps and and infiltrated into the ground through a new surface infiltration basin after being pretreated through the use of particle separators. The site is not located within any wetland resource area or buffer, or within the jurisdiction of the FEMA Flood Zone.

The natural topography of the lot within the area of the proposed work ranges from elevation 271 to elevation 252, with steeper slopes in the back of the site sloping down to the existing parking lot while the rest of the site is relatively flat. The proposed Apparatus Bay and Sally Port will match the existing facility's finished floor elevation of 257.

Soil erosion and sedimentation control measures are being taken to prevent silt and construction debris runoff during construction. The control measures include a construction entrance to the site and the installation of hay bales at the perimeter of the construction limits. Existing catch basins within and adjacent to the project limits will be protected from construction discharge through the use of hay bales and slope protection will be provided as required by installing temporary soil stabilization matting.

Stormwater Management Objectives:

The purpose of this analysis is to design a stormwater management system utilizing Best Management Practices (BMP's) that collects both roof and surface run-off through the use of proposed catch basins which will be piped to forebays leading to surface and subsurface infiltration ponds. Runoff coming from pavement will be pretreated through the use of a particle separator before being discharged into the basin to meet with Devens Enterprise Commission (DEC) stormwater management regulations for pretreatment and TSS removal. The ponds will

then discharge to the existing drainage infrastructure which directs the runoff across the Barnum Road-Queenstown Street intersection to an existing stormwater detention pond located to the east of the site.

Selection of Storm Events:

The storm events have been compiled from Technical Paper No. 40, Rainfall Frequency Atlas of the United States, prepared by the U.S. Department of Commerce, Weather Bureau, for the Engineering Division, Soil Conservation Service, U.S. Department of Agriculture, as required in conformance to Mass DEP regulations under the Wetlands Protection Act; 310 CMR 10.00:

Frequency (years)	Rainfall [24-hour event (inches)]
2	3.1
10	4.5
25	5.3
50	6.0
100	6.5

Classification of Soils:

Existing soil conditions within the limits of the project were taken from the Worcester County, Massachusetts, soils maps published by the U.S. Department of Agriculture Natural Resources Conservation Service in cooperation with the Massachusetts Agriculture Experiment Station.

The following soil groups have been identified at the site:

245A: Hinckley loamy sand, 0 to 3 percent slopes, Hydrologic Group A.

262B: Quonset loamy sand, 3 to 8 percent slopes, Hydrologic Group A.

262C: Quonset loamy sand, 8 to 15 percent slopes, Hydrologic Group A.

651: Udorthents, smoothed.

Flood Rate:

According to Federal Emergency Management Agency (FEMA) flood insurance rate maps (FIRM), the project area is designated as a Zone X. The project site can be found on the Community of Devens, Massachusetts, Worchester County, Community Panel No. 311 of 1075, Map Number 25027C0311E, Effective Date July 4, 2011.

Total Suspended Solids (TSS) Removal

This project is subject to the Massachusetts Department of Environmental Protection's (DEP) Stormwater Management Policy which requires mitigation to both stormwater quantity and quality, as well as the Devens Enterprise Commission Stormwater Management Regulations which requires that the DEP standards must be met which will both decrease the amount of run-off and provide the required amount of pollutant (TSS) removal from the project site. The DEC stormwater management regulations also require an 80% TSS removal rate prior to infiltration.

Storm water runoff will be collected in proposed deep sump catch basins which will be piped to forebays leading to surface and subsurface infiltration ponds. Runoff coming from pavement will be pretreated through the use of particle separators before being discharged into the infiltration basins to meet the required pretreatment and TSS removal prior to discharge to the existing drainage infrastructure.

See Water Quality and Recharge Calculations Sheet

Summary of Peak Rate Runoff:

The tables below illustrate the existing and proposed peak stormwater flow in cubic feet per second for each storm event listed.

TOTAL PEAK FLOW SUMMARY FOR PROJECT SITE

	2 Year	10 Year	25 Year	50 Year	100 Year
DP-1					
Existing	0.61 cfs	3.86 cfs	6.70 cfs	9.43 cfs	11.53 cfs
Proposed	0.43 cfs	1.89 cfs	2.88 cfs	3.82 cfs	4.53 cfs

Stormwater Management (BMP'S):

The combination of pretreatment and infiltration best management practices (BMPs) described in the proposed conditions above will provide peak flow and volume reduction, groundwater recharge, and total suspended solids (TSS) removal as well as decrease the amount of runoff onto community property, all as required by DEP Stormwater Management Policy and the DEC stormwater management regulations.

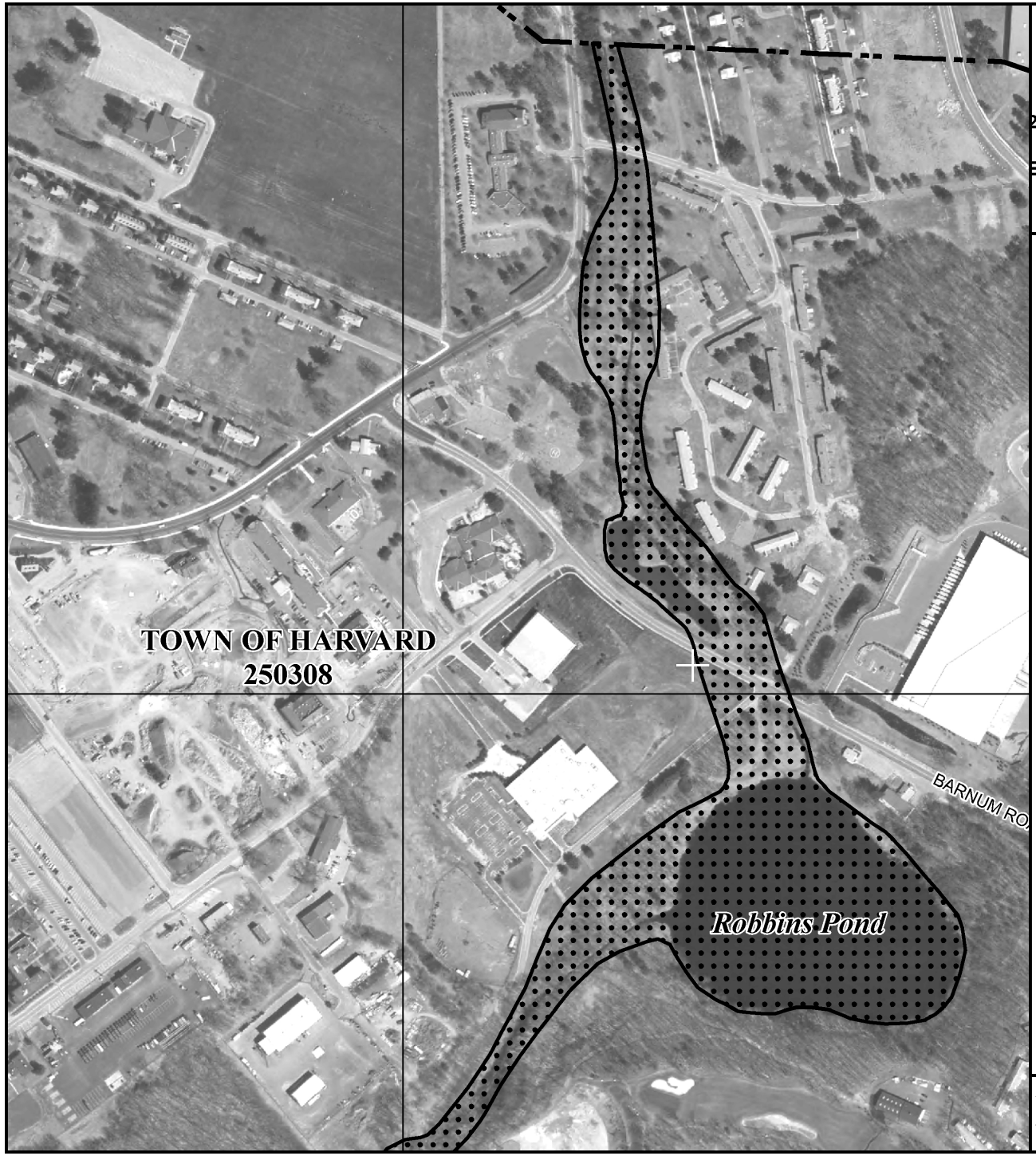
Conclusion:

The HydroCAD stormwater model calculations indicate an overall decrease in the peak rate of offsite runoff for the 2, 10, 25, 50, and 100 year 24 hour storm events. Combined with the of use of BMP's, it can be predicted that no adverse impacts will result due to the stormwater quantity or quality from the construction or future operation of this project.

PROJECT SUMMARY

SITE PLAN

FEMA FLOOD MAP



MAP SCALE 1" = 500'

250 0 500 1000

FEET

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

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

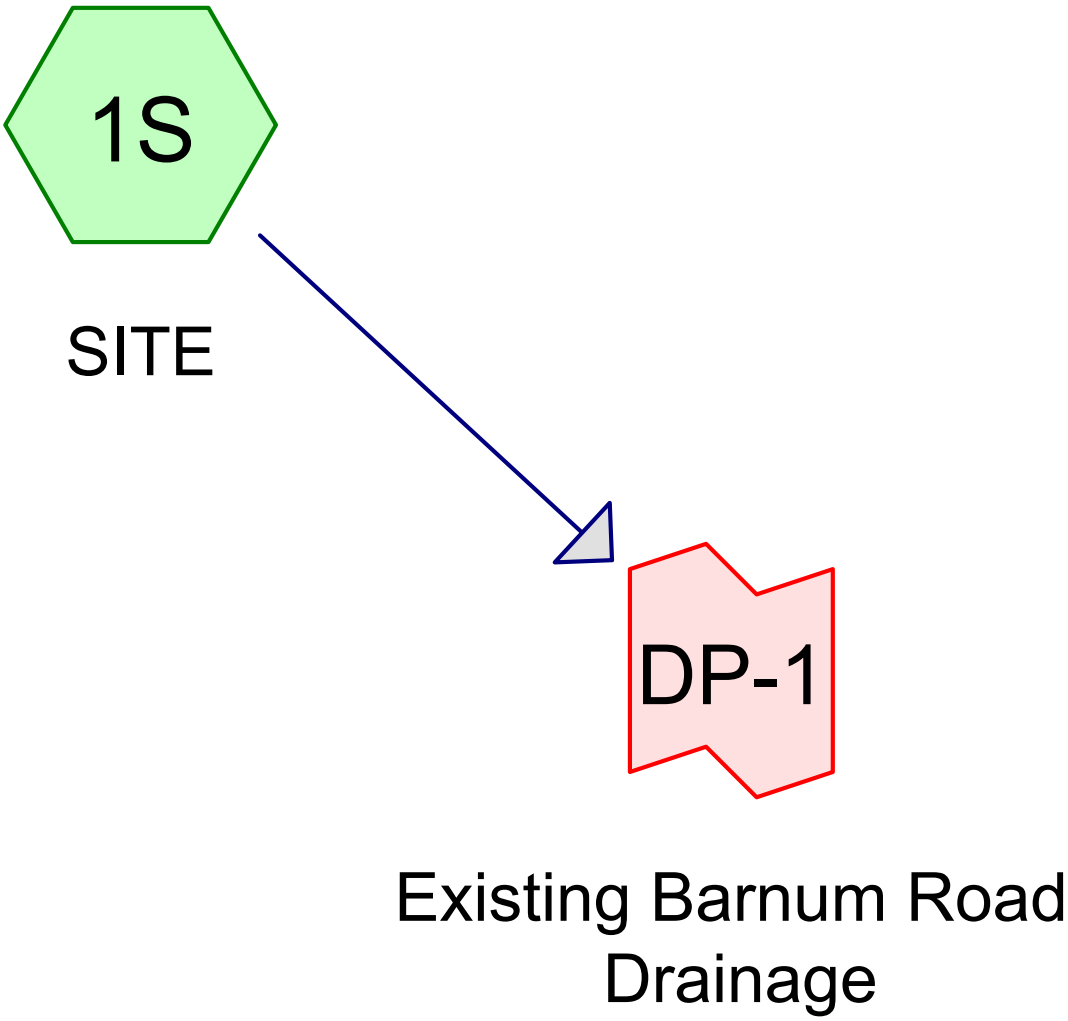
Performance Standards #1 - 10

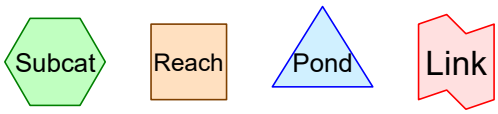
Standard 1: *No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.*

Response: There are no new stormwater conveyances designed for this project that discharge untreated stormwater.

Standard 2: *Stormwater management systems shall be designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates. This standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.*

Response: Post-development peak discharge rates designed for this project do not exceed pre-development discharge rates. (See table summarizing pre and post peak rate runoffs.)





Routing Diagram for 21113-EX
Prepared by Microsoft, Printed 1/3/2022
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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.10	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.50	2
3	25-Year	Type III 24-hr		Default	24.00	1	5.30	2
4	50-Year	Type III 24-hr		Default	24.00	1	6.00	2
5	100-Year	Type III 24-hr		Default	24.00	1	6.50	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
185,400	39	>75% Grass cover, Good, HSG A (1S)
73,181	98	Paved parking, HSG A (1S)
258,581	**56**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
258,581	HSG A	1S
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
258,581		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
185,400	0	0	0	0	185,400	>75% Grass cover, Good	
73,181	0	0	0	0	73,181	Paved parking	
258,581	**0**	**0**	**0**	**0**	**258,581**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1S	0.00	0.00	714.0	0.0078	0.012	24.0	0.0	0.0

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: SITE Runoff Area=258,581 sf 28.30% Impervious Runoff Depth=0.25"
Flow Length=1,163' Tc=7.3 min CN=56 Runoff=0.61 cfs 5,364 cf

Link DP-1: Existing Barnum Road Drainage Inflow=0.61 cfs 5,364 cf
Primary=0.61 cfs 5,364 cf

Total Runoff Area = 258,581 sf Runoff Volume = 5,364 cf Average Runoff Depth = 0.25"
71.70% Pervious = 185,400 sf 28.30% Impervious = 73,181 sf

Summary for Subcatchment 1S: SITE

Runoff = 0.61 cfs @ 12.35 hrs, Volume= 5,364 cf, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
185,400	39	>75% Grass cover, Good, HSG A
73,181	98	Paved parking, HSG A
258,581	56	Weighted Average
185,400		71.70% Pervious Area
73,181		28.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.0300	0.41		**Sheet Flow,** Fallow n= 0.050 P2= 3.10"
2.2	188	0.0404	1.41		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.5	85	0.1435	2.65		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	126	0.0130	2.31		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.7	714	0.0078	6.89	21.64	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
7.3	1,163	Total			

Summary for Link DP-1: Existing Barnum Road Drainage

Inflow Area = 258,581 sf, 28.30% Impervious, Inflow Depth = 0.25" for 2-Year event
Inflow = 0.61 cfs @ 12.35 hrs, Volume= 5,364 cf
Primary = 0.61 cfs @ 12.35 hrs, Volume= 5,364 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: SITE Runoff Area=258,581 sf 28.30% Impervious Runoff Depth=0.80"
Flow Length=1,163' Tc=7.3 min CN=56 Runoff=3.86 cfs 17,135 cf

Link DP-1: Existing Barnum Road Drainage Inflow=3.86 cfs 17,135 cf
Primary=3.86 cfs 17,135 cf

Total Runoff Area = 258,581 sf Runoff Volume = 17,135 cf Average Runoff Depth = 0.80"
71.70% Pervious = 185,400 sf 28.30% Impervious = 73,181 sf

Summary for Subcatchment 1S: SITE

Runoff = 3.86 cfs @ 12.14 hrs, Volume= 17,135 cf, Depth= 0.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
185,400	39	>75% Grass cover, Good, HSG A
73,181	98	Paved parking, HSG A
258,581	56	Weighted Average
185,400		71.70% Pervious Area
73,181		28.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.0300	0.41		**Sheet Flow,** Fallow n= 0.050 P2= 3.10"
2.2	188	0.0404	1.41		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.5	85	0.1435	2.65		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	126	0.0130	2.31		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.7	714	0.0078	6.89	21.64	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
7.3	1,163	Total			

Summary for Link DP-1: Existing Barnum Road Drainage

Inflow Area = 258,581 sf, 28.30% Impervious, Inflow Depth = 0.80" for 10-Year event
Inflow = 3.86 cfs @ 12.14 hrs, Volume= 17,135 cf
Primary = 3.86 cfs @ 12.14 hrs, Volume= 17,135 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: SITE Runoff Area=258,581 sf 28.30% Impervious Runoff Depth=1.20"
Flow Length=1,163' Tc=7.3 min CN=56 Runoff=6.70 cfs 25,857 cf

Link DP-1: Existing Barnum Road Drainage Inflow=6.70 cfs 25,857 cf
Primary=6.70 cfs 25,857 cf

Total Runoff Area = 258,581 sf Runoff Volume = 25,857 cf Average Runoff Depth = 1.20"
71.70% Pervious = 185,400 sf 28.30% Impervious = 73,181 sf

Summary for Subcatchment 1S: SITE

Runoff = 6.70 cfs @ 12.12 hrs, Volume= 25,857 cf, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
185,400	39	>75% Grass cover, Good, HSG A
73,181	98	Paved parking, HSG A
258,581	56	Weighted Average
185,400		71.70% Pervious Area
73,181		28.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.0300	0.41		**Sheet Flow,** Fallow n= 0.050 P2= 3.10"
2.2	188	0.0404	1.41		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.5	85	0.1435	2.65		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	126	0.0130	2.31		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.7	714	0.0078	6.89	21.64	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
7.3	1,163	Total			

Summary for Link DP-1: Existing Barnum Road Drainage

Inflow Area = 258,581 sf, 28.30% Impervious, Inflow Depth = 1.20" for 25-Year event
Inflow = 6.70 cfs @ 12.12 hrs, Volume= 25,857 cf
Primary = 6.70 cfs @ 12.12 hrs, Volume= 25,857 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: SITE Runoff Area=258,581 sf 28.30% Impervious Runoff Depth=1.60"
Flow Length=1,163' Tc=7.3 min CN=56 Runoff=9.43 cfs 34,399 cf

Link DP-1: Existing Barnum Road Drainage Inflow=9.43 cfs 34,399 cf
Primary=9.43 cfs 34,399 cf

Total Runoff Area = 258,581 sf Runoff Volume = 34,399 cf Average Runoff Depth = 1.60"
71.70% Pervious = 185,400 sf 28.30% Impervious = 73,181 sf

Summary for Subcatchment 1S: SITE

Runoff = 9.43 cfs @ 12.12 hrs, Volume= 34,399 cf, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=6.00"

Area (sf)	CN	Description
185,400	39	>75% Grass cover, Good, HSG A
73,181	98	Paved parking, HSG A
258,581	56	Weighted Average
185,400		71.70% Pervious Area
73,181		28.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.0300	0.41		**Sheet Flow,** Fallow n= 0.050 P2= 3.10"
2.2	188	0.0404	1.41		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.5	85	0.1435	2.65		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	126	0.0130	2.31		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.7	714	0.0078	6.89	21.64	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
7.3	1,163	Total			

Summary for Link DP-1: Existing Barnum Road Drainage

Inflow Area = 258,581 sf, 28.30% Impervious, Inflow Depth = 1.60" for 50-Year event
Inflow = 9.43 cfs @ 12.12 hrs, Volume= 34,399 cf
Primary = 9.43 cfs @ 12.12 hrs, Volume= 34,399 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: SITE Runoff Area=258,581 sf 28.30% Impervious Runoff Depth=1.90"
Flow Length=1,163' Tc=7.3 min CN=56 Runoff=11.53 cfs 40,939 cf

Link DP-1: Existing Barnum Road Drainage Inflow=11.53 cfs 40,939 cf
Primary=11.53 cfs 40,939 cf

Total Runoff Area = 258,581 sf Runoff Volume = 40,939 cf Average Runoff Depth = 1.90"
71.70% Pervious = 185,400 sf 28.30% Impervious = 73,181 sf

Summary for Subcatchment 1S: SITE

Runoff = 11.53 cfs @ 12.12 hrs, Volume= 40,939 cf, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

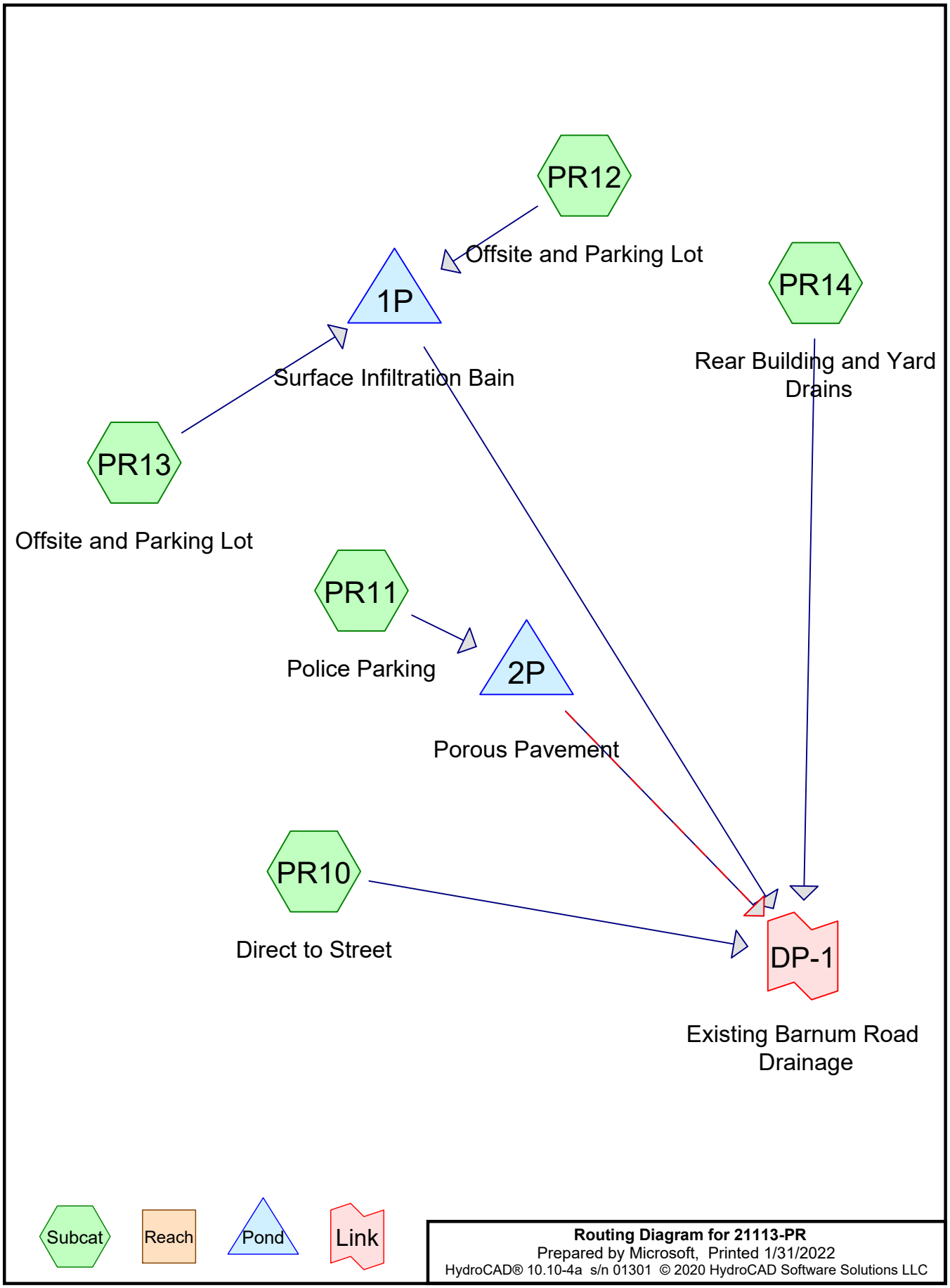
Area (sf)	CN	Description
185,400	39	>75% Grass cover, Good, HSG A
73,181	98	Paved parking, HSG A
258,581	56	Weighted Average
185,400		71.70% Pervious Area
73,181		28.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.0300	0.41		**Sheet Flow,** Fallow n= 0.050 P2= 3.10"
2.2	188	0.0404	1.41		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.5	85	0.1435	2.65		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	126	0.0130	2.31		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.7	714	0.0078	6.89	21.64	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
7.3	1,163	Total			

Summary for Link DP-1: Existing Barnum Road Drainage

Inflow Area = 258,581 sf, 28.30% Impervious, Inflow Depth = 1.90" for 100-Year event
Inflow = 11.53 cfs @ 12.12 hrs, Volume= 40,939 cf
Primary = 11.53 cfs @ 12.12 hrs, Volume= 40,939 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



Routing Diagram for 21113-PR
Prepared by Microsoft, Printed 1/31/2022
HydroCAD® 10.10-4a s/n 01301 © 2020 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.10	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.50	2
3	25-Year	Type III 24-hr		Default	24.00	1	5.30	2
4	50-Year	Type III 24-hr		Default	24.00	1	6.00	2
5	100-Year	Type III 24-hr		Default	24.00	1	6.50	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
175,119	39	>75% Grass cover, Good, HSG A (PR10, PR11, PR12, PR13, PR14)
83,429	98	Paved parking, HSG A (PR10, PR11, PR12, PR13, PR14)
258,548	**58**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
258,548	HSG A	PR10, PR11, PR12, PR13, PR14
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
258,548		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
175,119	0	0	0	0	175,119	>75% Grass cover, Good	
83,429	0	0	0	0	83,429	Paved parking	
258,548	**0**	**0**	**0**	**0**	**258,548**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	PR13	0.00	0.00	47.0	0.0362	0.012	12.0	0.0	0.0
2	1P	250.00	249.00	50.0	0.0200	0.012	12.0	0.0	0.0
3	2P	252.50	252.00	50.0	0.0100	0.010	4.0	0.0	0.0

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR10: Direct to Street Runoff Area=63,840 sf 32.63% Impervious Runoff Depth=0.31"
Tc=6.0 min CN=58 Runoff=0.22 cfs 1,632 cf

Subcatchment PR11: Police Parking Runoff Area=19,845 sf 60.28% Impervious Runoff Depth=1.03"
Tc=6.0 min CN=75 Runoff=0.51 cfs 1,698 cf

Subcatchment PR12: Offsite and Parking Runoff Area=58,696 sf 28.98% Impervious Runoff Depth=0.25"
Tc=6.0 min CN=56 Runoff=0.14 cfs 1,218 cf

Subcatchment PR13: Offsite and Parking Runoff Area=103,946 sf 27.17% Impervious Runoff Depth=0.22"
Flow Length=355' Tc=4.7 min CN=55 Runoff=0.21 cfs 1,924 cf

Subcatchment PR14: Rear Building and Runoff Area=12,221 sf 44.04% Impervious Runoff Depth=0.55"
Tc=6.0 min CN=65 Runoff=0.14 cfs 563 cf

Pond 1P: Surface Infiltration Bain Peak Elev=250.99' Storage=439 cf Inflow=0.35 cfs 3,142 cf
Discarded=0.12 cfs 3,142 cf Primary=0.00 cfs 0 cf Outflow=0.12 cfs 3,142 cf

Pond 2P: Porous Pavement Peak Elev=252.77' Storage=308 cf Inflow=0.51 cfs 1,698 cf
Discarded=0.08 cfs 1,356 cf Primary=0.14 cfs 342 cf Outflow=0.22 cfs 1,698 cf

Link DP-1: Existing Barnum Road Drainage Inflow=0.43 cfs 2,537 cf
Primary=0.43 cfs 2,537 cf

Total Runoff Area = 258,548 sf Runoff Volume = 7,034 cf Average Runoff Depth = 0.33"
67.73% Pervious = 175,119 sf 32.27% Impervious = 83,429 sf

Summary for Subcatchment PR10: Direct to Street

Runoff = 0.22 cfs @ 12.26 hrs, Volume= 1,632 cf, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
43,006	39	>75% Grass cover, Good, HSG A
20,834	98	Paved parking, HSG A
63,840	58	Weighted Average
43,006		67.37% Pervious Area
20,834		32.63% Impervious Area

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

Summary for Subcatchment PR11: Police Parking

Runoff = 0.51 cfs @ 12.10 hrs, Volume= 1,698 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
7,883	39	>75% Grass cover, Good, HSG A
11,962	98	Paved parking, HSG A
19,845	75	Weighted Average
7,883		39.72% Pervious Area
11,962		60.28% Impervious Area

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

Summary for Subcatchment PR12: Offsite and Parking Lot

Runoff = 0.14 cfs @ 12.33 hrs, Volume= 1,218 cf, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
41,683	39	>75% Grass cover, Good, HSG A
17,013	98	Paved parking, HSG A
58,696	56	Weighted Average
41,683		71.02% Pervious Area
17,013		28.98% Impervious Area

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

Summary for Subcatchment PR13: Offsite and Parking Lot

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.21 cfs @ 12.33 hrs, Volume= 1,924 cf, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
75,708	39	>75% Grass cover, Good, HSG A
28,238	98	Paved parking, HSG A
103,946	55	Weighted Average
75,708		72.83% Pervious Area
28,238		27.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.0300	0.41		**Sheet Flow,** Fallow n= 0.050 P2= 3.10"
2.2	188	0.0404	1.41		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	70	0.1500	2.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	47	0.0362	9.35	7.34	**Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
4.7	355	Total			

Summary for Subcatchment PR14: Rear Building and Yard Drains

Runoff = 0.14 cfs @ 12.11 hrs, Volume= 563 cf, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
6,839	39	>75% Grass cover, Good, HSG A
5,382	98	Paved parking, HSG A
12,221	65	Weighted Average
6,839		55.96% Pervious Area
5,382		44.04% Impervious Area

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

Summary for Pond 1P: Surface Infiltration Bain

Inflow Area = 162,642 sf, 27.82% Impervious, Inflow Depth = 0.23" for 2-Year event
Inflow = 0.35 cfs @ 12.33 hrs, Volume= 3,142 cf
Outflow = 0.12 cfs @ 13.67 hrs, Volume= 3,142 cf, Atten= 65%, Lag= 80.6 min
Discarded = 0.12 cfs @ 13.67 hrs, Volume= 3,142 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 250.99' @ 13.67 hrs Surf.Area= 640 sf Storage= 439 cf

Plug-Flow detention time= 36.5 min calculated for 3,139 cf (100% of inflow)
Center-of-Mass det. time= 36.5 min (994.7 - 958.2)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	10,632 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
250.00	273	77.0	0	0	273
251.00	644	119.0	445	445	935
252.00	1,100	153.0	862	1,307	1,684
253.00	1,659	188.0	1,370	2,677	2,649
254.00	2,304	217.0	1,973	4,650	3,605
255.00	2,984	236.0	2,637	7,287	4,326
256.00	3,721	255.0	3,346	10,632	5,108

Device	Routing	Invert	Outlet Devices
#1	Discarded	250.00'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Device 3	255.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	250.00'	**12.0" Round RCP_Round 12"** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 250.00' / 249.00' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Discarded OutFlow Max=0.12 cfs @ 13.67 hrs HW=250.99' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=250.00' TW=0.00' (Dynamic Tailwater)
└─**3=RCP_Round 12"** (Controls 0.00 cfs)
  └─**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 2P: Porous Pavement

Inflow Area = 19,845 sf, 60.28% Impervious, Inflow Depth = 1.03" for 2-Year event
Inflow = 0.51 cfs @ 12.10 hrs, Volume= 1,698 cf
Outflow = 0.22 cfs @ 12.38 hrs, Volume= 1,698 cf, Atten= 58%, Lag= 16.7 min
Discarded = 0.08 cfs @ 11.90 hrs, Volume= 1,356 cf
Primary = 0.14 cfs @ 12.38 hrs, Volume= 342 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 252.77' @ 12.38 hrs Surf.Area= 1,458 sf Storage= 308 cf

Plug-Flow detention time= 12.3 min calculated for 1,697 cf (100% of inflow)
Center-of-Mass det. time= 12.3 min (873.0 - 860.8)

Volume	Invert	Avail.Storage	Storage Description
#1	254.50'	125 cf	**Finished Grade (Prismatic)** Listed below (Recalc) -Impervious
#2	254.17'	97 cf	**Porous Pavement** Listed below -Impervious 486 cf Overall x 20.0% Voids
#3	253.83'	194 cf	**3/4 Crushed Stone** Listed below -Impervious 486 cf Overall x 40.0% Voids
#4	253.17'	605 cf	**Bank Run Gravel** Listed below -Impervious 1,512 cf Overall x 40.0% Voids
#5	252.92'	137 cf	**Peastone** Listed below -Impervious 342 cf Overall x 40.0% Voids
#6	252.50'	148 cf	**3/4 Crushed Stone** Listed below -Impervious 378 cf Overall - 7 cf Embedded = 371 cf x 40.0% Voids
#7	252.42'	292 cf	**18.00'W x 81.00'L x 0.50'H 3/4 Crushed Stone** 729 cf Overall x 40.0% Voids
#8	252.50'	7 cf	**4.0" Round Pipe Storage** Inside #6 L= 81.0' S= 0.0005 '/'
		1,605 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
254.50	0	0	0
255.00	500	125	125

Elevation (feet)	Cum.Store (cubic-feet)
254.17	0
254.50	486

Elevation (feet)	Cum.Store (cubic-feet)
253.83	0
254.17	486

Elevation (feet)	Cum.Store (cubic-feet)
253.17	0
253.83	1,512

Elevation (feet)	Cum.Store (cubic-feet)
252.92	0
253.17	342

Elevation (feet)	Cum.Store (cubic-feet)
252.50	0
252.92	378

Device	Routing	Invert	Outlet Devices
#1	Primary	254.50'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	252.42'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#3	Primary	252.50'	**4.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 252.50' / 252.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Discarded OutFlow Max=0.08 cfs @ 11.90 hrs HW=252.45' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.14 cfs @ 12.38 hrs HW=252.77' TW=0.00' (Dynamic Tailwater)
├─**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**3=Culvert** (Inlet Controls 0.14 cfs @ 1.78 fps)

Summary for Link DP-1: Existing Barnum Road Drainage

Inflow Area = 258,548 sf, 32.27% Impervious, Inflow Depth = 0.12" for 2-Year event
Inflow = 0.43 cfs @ 12.28 hrs, Volume= 2,537 cf
Primary = 0.43 cfs @ 12.28 hrs, Volume= 2,537 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR10: Direct to Street Runoff Area=63,840 sf 32.63% Impervious Runoff Depth=0.90"
Tc=6.0 min CN=58 Runoff=1.24 cfs 4,813 cf

Subcatchment PR11: Police Parking Runoff Area=19,845 sf 60.28% Impervious Runoff Depth=2.05"
Tc=6.0 min CN=75 Runoff=1.07 cfs 3,391 cf

Subcatchment PR12: Offsite and Parking Runoff Area=58,696 sf 28.98% Impervious Runoff Depth=0.80"
Tc=6.0 min CN=56 Runoff=0.94 cfs 3,889 cf

Subcatchment PR13: Offsite and Parking Runoff Area=103,946 sf 27.17% Impervious Runoff Depth=0.74"
Flow Length=355' Tc=4.7 min CN=55 Runoff=1.55 cfs 6,431 cf

Subcatchment PR14: Rear Building and Runoff Area=12,221 sf 44.04% Impervious Runoff Depth=1.33"
Tc=6.0 min CN=65 Runoff=0.40 cfs 1,355 cf

Pond 1P: Surface Infiltration Bain Peak Elev=253.29' Storage=3,187 cf Inflow=2.48 cfs 10,320 cf
Discarded=0.35 cfs 10,321 cf Primary=0.00 cfs 0 cf Outflow=0.35 cfs 10,321 cf

Pond 2P: Porous Pavement Peak Elev=253.36' Storage=758 cf Inflow=1.07 cfs 3,391 cf
Discarded=0.08 cfs 2,086 cf Primary=0.30 cfs 1,304 cf Outflow=0.38 cfs 3,391 cf

Link DP-1: Existing Barnum Road Drainage Inflow=1.89 cfs 7,473 cf
Primary=1.89 cfs 7,473 cf

Total Runoff Area = 258,548 sf Runoff Volume = 19,880 cf Average Runoff Depth = 0.92"
67.73% Pervious = 175,119 sf 32.27% Impervious = 83,429 sf

Summary for Subcatchment PR10: Direct to Street

Runoff = 1.24 cfs @ 12.11 hrs, Volume= 4,813 cf, Depth= 0.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
43,006	39	>75% Grass cover, Good, HSG A
20,834	98	Paved parking, HSG A
63,840	58	Weighted Average
43,006		67.37% Pervious Area
20,834		32.63% Impervious Area

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

Summary for Subcatchment PR11: Police Parking

Runoff = 1.07 cfs @ 12.10 hrs, Volume= 3,391 cf, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
7,883	39	>75% Grass cover, Good, HSG A
11,962	98	Paved parking, HSG A
19,845	75	Weighted Average
7,883		39.72% Pervious Area
11,962		60.28% Impervious Area

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

Summary for Subcatchment PR12: Offsite and Parking Lot

Runoff = 0.94 cfs @ 12.11 hrs, Volume= 3,889 cf, Depth= 0.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
41,683	39	>75% Grass cover, Good, HSG A
17,013	98	Paved parking, HSG A
58,696	56	Weighted Average
41,683		71.02% Pervious Area
17,013		28.98% Impervious Area

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

Summary for Subcatchment PR13: Offsite and Parking Lot

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.55 cfs @ 12.10 hrs, Volume= 6,431 cf, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
75,708	39	>75% Grass cover, Good, HSG A
28,238	98	Paved parking, HSG A
103,946	55	Weighted Average
75,708		72.83% Pervious Area
28,238		27.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.0300	0.41		**Sheet Flow,** Fallow n= 0.050 P2= 3.10"
2.2	188	0.0404	1.41		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	70	0.1500	2.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	47	0.0362	9.35	7.34	**Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
4.7	355	Total			

Summary for Subcatchment PR14: Rear Building and Yard Drains

Runoff = 0.40 cfs @ 12.10 hrs, Volume= 1,355 cf, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
6,839	39	>75% Grass cover, Good, HSG A
5,382	98	Paved parking, HSG A
12,221	65	Weighted Average
6,839		55.96% Pervious Area
5,382		44.04% Impervious Area

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

Summary for Pond 1P: Surface Infiltration Bain

Inflow Area = 162,642 sf, 27.82% Impervious, Inflow Depth = 0.76" for 10-Year event
Inflow = 2.48 cfs @ 12.11 hrs, Volume= 10,320 cf
Outflow = 0.35 cfs @ 13.64 hrs, Volume= 10,321 cf, Atten= 86%, Lag= 92.3 min
Discarded = 0.35 cfs @ 13.64 hrs, Volume= 10,321 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.29' @ 13.64 hrs Surf.Area= 1,836 sf Storage= 3,187 cf

Plug-Flow detention time= 117.6 min calculated for 10,314 cf (100% of inflow)
Center-of-Mass det. time= 117.6 min (1,018.7 - 901.1)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	10,632 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
250.00	273	77.0	0	0	273
251.00	644	119.0	445	445	935
252.00	1,100	153.0	862	1,307	1,684
253.00	1,659	188.0	1,370	2,677	2,649
254.00	2,304	217.0	1,973	4,650	3,605
255.00	2,984	236.0	2,637	7,287	4,326
256.00	3,721	255.0	3,346	10,632	5,108

Device	Routing	Invert	Outlet Devices
#1	Discarded	250.00'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Device 3	255.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	250.00'	**12.0" Round RCP_Round 12"** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 250.00' / 249.00' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Discarded OutFlow Max=0.35 cfs @ 13.64 hrs HW=253.29' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.35 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=250.00' TW=0.00' (Dynamic Tailwater)
└─**3=RCP_Round 12"** (Controls 0.00 cfs)
  └─**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 2P: Porous Pavement

Inflow Area =	19,845 sf, 60.28% Impervious, Inflow Depth = 2.05" for 10-Year event				
Inflow =	1.07 cfs @	12.10 hrs,	Volume=	3,391 cf	
Outflow =	0.38 cfs @	12.40 hrs,	Volume=	3,391 cf,	Atten= 64%, Lag= 18.5 min
Discarded =	0.08 cfs @	11.70 hrs,	Volume=	2,086 cf	
Primary =	0.30 cfs @	12.40 hrs,	Volume=	1,304 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.36' @ 12.40 hrs Surf.Area= 1,458 sf Storage= 758 cf

Plug-Flow detention time= 17.9 min calculated for 3,388 cf (100% of inflow)
Center-of-Mass det. time= 17.9 min (857.9 - 840.1)

Volume	Invert	Avail.Storage	Storage Description
#1	254.50'	125 cf	**Finished Grade (Prismatic)** Listed below (Recalc) -Impervious
#2	254.17'	97 cf	**Porous Pavement** Listed below -Impervious 486 cf Overall x 20.0% Voids
#3	253.83'	194 cf	**3/4 Crushed Stone** Listed below -Impervious 486 cf Overall x 40.0% Voids
#4	253.17'	605 cf	**Bank Run Gravel** Listed below -Impervious 1,512 cf Overall x 40.0% Voids
#5	252.92'	137 cf	**Peastone** Listed below -Impervious 342 cf Overall x 40.0% Voids
#6	252.50'	148 cf	**3/4 Crushed Stone** Listed below -Impervious 378 cf Overall - 7 cf Embedded = 371 cf x 40.0% Voids
#7	252.42'	292 cf	**18.00'W x 81.00'L x 0.50'H 3/4 Crushed Stone** 729 cf Overall x 40.0% Voids
#8	252.50'	7 cf	**4.0" Round Pipe Storage** Inside #6 L= 81.0' S= 0.0005 '/'
		1,605 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
254.50	0	0	0
255.00	500	125	125

Elevation (feet)	Cum.Store (cubic-feet)
254.17	0
254.50	486

Elevation (feet)	Cum.Store (cubic-feet)
253.83	0
254.17	486

Elevation (feet)	Cum.Store (cubic-feet)
253.17	0
253.83	1,512

Elevation (feet)	Cum.Store (cubic-feet)
252.92	0
253.17	342

Elevation (feet)	Cum.Store (cubic-feet)
252.50	0
252.92	378

Device	Routing	Invert	Outlet Devices
#1	Primary	254.50'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	252.42'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#3	Primary	252.50'	**4.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 252.50' / 252.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Discarded OutFlow Max=0.08 cfs @ 11.70 hrs HW=252.45' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.30 cfs @ 12.40 hrs HW=253.36' TW=0.00' (Dynamic Tailwater)
├─**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**3=Culvert** (Barrel Controls 0.30 cfs @ 3.46 fps)

Summary for Link DP-1: Existing Barnum Road Drainage

Inflow Area = 258,548 sf, 32.27% Impervious, Inflow Depth = 0.35" for 10-Year event
Inflow = 1.89 cfs @ 12.11 hrs, Volume= 7,473 cf
Primary = 1.89 cfs @ 12.11 hrs, Volume= 7,473 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR10: Direct to Street Runoff Area=63,840 sf 32.63% Impervious Runoff Depth=1.34"
Tc=6.0 min CN=58 Runoff=2.01 cfs 7,115 cf

Subcatchment PR11: Police Parking Runoff Area=19,845 sf 60.28% Impervious Runoff Depth=2.69"
Tc=6.0 min CN=75 Runoff=1.41 cfs 4,456 cf

Subcatchment PR12: Offsite and Parking Runoff Area=58,696 sf 28.98% Impervious Runoff Depth=1.20"
Tc=6.0 min CN=56 Runoff=1.60 cfs 5,869 cf

Subcatchment PR13: Offsite and Parking Runoff Area=103,946 sf 27.17% Impervious Runoff Depth=1.13"
Flow Length=355' Tc=4.7 min CN=55 Runoff=2.70 cfs 9,815 cf

Subcatchment PR14: Rear Building and Runoff Area=12,221 sf 44.04% Impervious Runoff Depth=1.86"
Tc=6.0 min CN=65 Runoff=0.58 cfs 1,890 cf

Pond 1P: Surface Infiltration Bain Peak Elev=254.41' Storage=5,661 cf Inflow=4.28 cfs 15,685 cf
Discarded=0.49 cfs 15,685 cf Primary=0.00 cfs 0 cf Outflow=0.49 cfs 15,685 cf

Pond 2P: Porous Pavement Peak Elev=253.75' Storage=1,117 cf Inflow=1.41 cfs 4,456 cf
Discarded=0.08 cfs 2,457 cf Primary=0.36 cfs 1,999 cf Outflow=0.44 cfs 4,456 cf

Link DP-1: Existing Barnum Road Drainage Inflow=2.88 cfs 11,004 cf
Primary=2.88 cfs 11,004 cf

Total Runoff Area = 258,548 sf Runoff Volume = 29,146 cf Average Runoff Depth = 1.35"
67.73% Pervious = 175,119 sf 32.27% Impervious = 83,429 sf

Summary for Subcatchment PR10: Direct to Street

Runoff = 2.01 cfs @ 12.10 hrs, Volume= 7,115 cf, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
43,006	39	>75% Grass cover, Good, HSG A
20,834	98	Paved parking, HSG A
63,840	58	Weighted Average
43,006		67.37% Pervious Area
20,834		32.63% Impervious Area

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

Summary for Subcatchment PR11: Police Parking

Runoff = 1.41 cfs @ 12.09 hrs, Volume= 4,456 cf, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
7,883	39	>75% Grass cover, Good, HSG A
11,962	98	Paved parking, HSG A
19,845	75	Weighted Average
7,883		39.72% Pervious Area
11,962		60.28% Impervious Area

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

Summary for Subcatchment PR12: Offsite and Parking Lot

Runoff = 1.60 cfs @ 12.11 hrs, Volume= 5,869 cf, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
41,683	39	>75% Grass cover, Good, HSG A
17,013	98	Paved parking, HSG A
58,696	56	Weighted Average
41,683		71.02% Pervious Area
17,013		28.98% Impervious Area

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

Summary for Subcatchment PR13: Offsite and Parking Lot

[49] Hint: Tc<2dt may require smaller dt

Runoff = 2.70 cfs @ 12.09 hrs, Volume= 9,815 cf, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
75,708	39	>75% Grass cover, Good, HSG A
28,238	98	Paved parking, HSG A
103,946	55	Weighted Average
75,708		72.83% Pervious Area
28,238		27.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.0300	0.41		**Sheet Flow,** Fallow n= 0.050 P2= 3.10"
2.2	188	0.0404	1.41		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	70	0.1500	2.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	47	0.0362	9.35	7.34	**Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
4.7	355	Total			

Summary for Subcatchment PR14: Rear Building and Yard Drains

Runoff = 0.58 cfs @ 12.10 hrs, Volume= 1,890 cf, Depth= 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
6,839	39	>75% Grass cover, Good, HSG A
5,382	98	Paved parking, HSG A
12,221	65	Weighted Average
6,839		55.96% Pervious Area
5,382		44.04% Impervious Area

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

Summary for Pond 1P: Surface Infiltration Bain

Inflow Area = 162,642 sf, 27.82% Impervious, Inflow Depth = 1.16" for 25-Year event
Inflow = 4.28 cfs @ 12.10 hrs, Volume= 15,685 cf
Outflow = 0.49 cfs @ 13.70 hrs, Volume= 15,685 cf, Atten= 88%, Lag= 96.4 min
Discarded = 0.49 cfs @ 13.70 hrs, Volume= 15,685 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 254.41' @ 13.70 hrs Surf.Area= 2,575 sf Storage= 5,661 cf

Plug-Flow detention time= 152.0 min calculated for 15,674 cf (100% of inflow)
Center-of-Mass det. time= 152.0 min (1,037.3 - 885.2)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	10,632 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
250.00	273	77.0	0	0	273
251.00	644	119.0	445	445	935
252.00	1,100	153.0	862	1,307	1,684
253.00	1,659	188.0	1,370	2,677	2,649
254.00	2,304	217.0	1,973	4,650	3,605
255.00	2,984	236.0	2,637	7,287	4,326
256.00	3,721	255.0	3,346	10,632	5,108

Device	Routing	Invert	Outlet Devices
#1	Discarded	250.00'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Device 3	255.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	250.00'	**12.0" Round RCP_Round 12"** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 250.00' / 249.00' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Discarded OutFlow Max=0.49 cfs @ 13.70 hrs HW=254.41' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.49 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=250.00' TW=0.00' (Dynamic Tailwater)
└─**3=RCP_Round 12"** (Controls 0.00 cfs)
  └─**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 2P: Porous Pavement

Inflow Area =	19,845 sf, 60.28% Impervious, Inflow Depth = 2.69" for 25-Year event				
Inflow =	1.41 cfs @	12.09 hrs,	Volume=	4,456 cf	
Outflow =	0.44 cfs @	12.44 hrs,	Volume=	4,456 cf,	Atten= 69%, Lag= 20.9 min
Discarded =	0.08 cfs @	11.60 hrs,	Volume=	2,457 cf	
Primary =	0.36 cfs @	12.44 hrs,	Volume=	1,999 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.75' @ 12.44 hrs Surf.Area= 1,458 sf Storage= 1,117 cf

Plug-Flow detention time= 22.2 min calculated for 4,453 cf (100% of inflow)
Center-of-Mass det. time= 22.1 min (854.3 - 832.1)

Volume	Invert	Avail.Storage	Storage Description
#1	254.50'	125 cf	**Finished Grade (Prismatic)** Listed below (Recalc) -Impervious
#2	254.17'	97 cf	**Porous Pavement** Listed below -Impervious 486 cf Overall x 20.0% Voids
#3	253.83'	194 cf	**3/4 Crushed Stone** Listed below -Impervious 486 cf Overall x 40.0% Voids
#4	253.17'	605 cf	**Bank Run Gravel** Listed below -Impervious 1,512 cf Overall x 40.0% Voids
#5	252.92'	137 cf	**Peastone** Listed below -Impervious 342 cf Overall x 40.0% Voids
#6	252.50'	148 cf	**3/4 Crushed Stone** Listed below -Impervious 378 cf Overall - 7 cf Embedded = 371 cf x 40.0% Voids
#7	252.42'	292 cf	**18.00'W x 81.00'L x 0.50'H 3/4 Crushed Stone** 729 cf Overall x 40.0% Voids
#8	252.50'	7 cf	**4.0" Round Pipe Storage** Inside #6 L= 81.0' S= 0.0005 '/'
		1,605 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
254.50	0	0	0
255.00	500	125	125

Elevation (feet)	Cum.Store (cubic-feet)
254.17	0
254.50	486

Elevation (feet)	Cum.Store (cubic-feet)
253.83	0
254.17	486

Elevation (feet)	Cum.Store (cubic-feet)
253.17	0
253.83	1,512

Elevation (feet)	Cum.Store (cubic-feet)
252.92	0
253.17	342

Elevation (feet)	Cum.Store (cubic-feet)
252.50	0
252.92	378

Device	Routing	Invert	Outlet Devices
#1	Primary	254.50'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	252.42'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#3	Primary	252.50'	**4.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 252.50' / 252.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Discarded OutFlow Max=0.08 cfs @ 11.60 hrs HW=252.46' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.35 cfs @ 12.44 hrs HW=253.75' TW=0.00' (Dynamic Tailwater)
├─**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**3=Culvert** (Barrel Controls 0.35 cfs @ 4.07 fps)

Summary for Link DP-1: Existing Barnum Road Drainage

Inflow Area = 258,548 sf, 32.27% Impervious, Inflow Depth = 0.51" for 25-Year event
Inflow = 2.88 cfs @ 12.11 hrs, Volume= 11,004 cf
Primary = 2.88 cfs @ 12.11 hrs, Volume= 11,004 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR10: Direct to Street Runoff Area=63,840 sf 32.63% Impervious Runoff Depth=1.76"
Tc=6.0 min CN=58 Runoff=2.75 cfs 9,346 cf

Subcatchment PR11: Police Parking Runoff Area=19,845 sf 60.28% Impervious Runoff Depth=3.28"
Tc=6.0 min CN=75 Runoff=1.72 cfs 5,428 cf

Subcatchment PR12: Offsite and Parking Runoff Area=58,696 sf 28.98% Impervious Runoff Depth=1.60"
Tc=6.0 min CN=56 Runoff=2.24 cfs 7,808 cf

Subcatchment PR13: Offsite and Parking Runoff Area=103,946 sf 27.17% Impervious Runoff Depth=1.52"
Flow Length=355' Tc=4.7 min CN=55 Runoff=3.84 cfs 13,147 cf

Subcatchment PR14: Rear Building and Runoff Area=12,221 sf 44.04% Impervious Runoff Depth=2.35"
Tc=6.0 min CN=65 Runoff=0.74 cfs 2,395 cf

Pond 1P: Surface Infiltration Bain Peak Elev=255.07' Storage=7,491 cf Inflow=6.06 cfs 20,956 cf
Discarded=0.58 cfs 19,850 cf Primary=0.46 cfs 1,107 cf Outflow=1.04 cfs 20,957 cf

Pond 2P: Porous Pavement Peak Elev=254.39' Storage=1,449 cf Inflow=1.72 cfs 5,428 cf
Discarded=0.08 cfs 2,751 cf Primary=0.43 cfs 2,677 cf Outflow=0.51 cfs 5,428 cf

Link DP-1: Existing Barnum Road Drainage Inflow=3.82 cfs 15,525 cf
Primary=3.82 cfs 15,525 cf

Total Runoff Area = 258,548 sf Runoff Volume = 38,124 cf Average Runoff Depth = 1.77"
67.73% Pervious = 175,119 sf 32.27% Impervious = 83,429 sf

Summary for Subcatchment PR10: Direct to Street

Runoff = 2.75 cfs @ 12.10 hrs, Volume= 9,346 cf, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=6.00"

Area (sf)	CN	Description
43,006	39	>75% Grass cover, Good, HSG A
20,834	98	Paved parking, HSG A
63,840	58	Weighted Average
43,006		67.37% Pervious Area
20,834		32.63% Impervious Area

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

Summary for Subcatchment PR11: Police Parking

Runoff = 1.72 cfs @ 12.09 hrs, Volume= 5,428 cf, Depth= 3.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=6.00"

Area (sf)	CN	Description
7,883	39	>75% Grass cover, Good, HSG A
11,962	98	Paved parking, HSG A
19,845	75	Weighted Average
7,883		39.72% Pervious Area
11,962		60.28% Impervious Area

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

Summary for Subcatchment PR12: Offsite and Parking Lot

Runoff = 2.24 cfs @ 12.10 hrs, Volume= 7,808 cf, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=6.00"

Area (sf)	CN	Description
41,683	39	>75% Grass cover, Good, HSG A
17,013	98	Paved parking, HSG A
58,696	56	Weighted Average
41,683		71.02% Pervious Area
17,013		28.98% Impervious Area

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

Summary for Subcatchment PR13: Offsite and Parking Lot

[49] Hint: Tc<2dt may require smaller dt

Runoff = 3.84 cfs @ 12.09 hrs, Volume= 13,147 cf, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=6.00"

Area (sf)	CN	Description
75,708	39	>75% Grass cover, Good, HSG A
28,238	98	Paved parking, HSG A
103,946	55	Weighted Average
75,708		72.83% Pervious Area
28,238		27.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.0300	0.41		**Sheet Flow,** Fallow n= 0.050 P2= 3.10"
2.2	188	0.0404	1.41		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	70	0.1500	2.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	47	0.0362	9.35	7.34	**Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
4.7	355	Total			

Summary for Subcatchment PR14: Rear Building and Yard Drains

Runoff = 0.74 cfs @ 12.10 hrs, Volume= 2,395 cf, Depth= 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=6.00"

Area (sf)	CN	Description
6,839	39	>75% Grass cover, Good, HSG A
5,382	98	Paved parking, HSG A
12,221	65	Weighted Average
6,839		55.96% Pervious Area
5,382		44.04% Impervious Area

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

Summary for Pond 1P: Surface Infiltration Bain

Inflow Area = 162,642 sf, 27.82% Impervious, Inflow Depth = 1.55" for 50-Year event
Inflow = 6.06 cfs @ 12.09 hrs, Volume= 20,956 cf
Outflow = 1.04 cfs @ 12.74 hrs, Volume= 20,957 cf, Atten= 83%, Lag= 38.6 min
Discarded = 0.58 cfs @ 12.74 hrs, Volume= 19,850 cf
Primary = 0.46 cfs @ 12.74 hrs, Volume= 1,107 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 255.07' @ 12.74 hrs Surf.Area= 3,031 sf Storage= 7,491 cf

Plug-Flow detention time= 163.4 min calculated for 20,942 cf (100% of inflow)
Center-of-Mass det. time= 163.4 min (1,038.6 - 875.2)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	10,632 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
250.00	273	77.0	0	0	273
251.00	644	119.0	445	445	935
252.00	1,100	153.0	862	1,307	1,684
253.00	1,659	188.0	1,370	2,677	2,649
254.00	2,304	217.0	1,973	4,650	3,605
255.00	2,984	236.0	2,637	7,287	4,326
256.00	3,721	255.0	3,346	10,632	5,108

Device	Routing	Invert	Outlet Devices
#1	Discarded	250.00'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Device 3	255.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	250.00'	**12.0" Round RCP_Round 12"** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 250.00' / 249.00' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Discarded OutFlow Max=0.58 cfs @ 12.74 hrs HW=255.07' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.58 cfs)

Primary OutFlow Max=0.46 cfs @ 12.74 hrs HW=255.07' TW=0.00' (Dynamic Tailwater)
└─**3=RCP_Round 12"** (Passes 0.46 cfs of 8.08 cfs potential flow)
└─**2=Orifice/Grate** (Weir Controls 0.46 cfs @ 0.85 fps)

Summary for Pond 2P: Porous Pavement

Inflow Area =	19,845 sf, 60.28% Impervious, Inflow Depth = 3.28" for 50-Year event				
Inflow =	1.72 cfs @	12.09 hrs,	Volume=	5,428 cf	
Outflow =	0.51 cfs @	12.45 hrs,	Volume=	5,428 cf,	Atten= 70%, Lag= 21.4 min
Discarded =	0.08 cfs @	11.40 hrs,	Volume=	2,751 cf	
Primary =	0.43 cfs @	12.45 hrs,	Volume=	2,677 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 254.39' @ 12.45 hrs Surf.Area= 1,458 sf Storage= 1,449 cf

Plug-Flow detention time= 25.6 min calculated for 5,424 cf (100% of inflow)
Center-of-Mass det. time= 25.6 min (852.0 - 826.4)

Volume	Invert	Avail.Storage	Storage Description
#1	254.50'	125 cf	**Finished Grade (Prismatic)** Listed below (Recalc) -Impervious
#2	254.17'	97 cf	**Porous Pavement** Listed below -Impervious 486 cf Overall x 20.0% Voids
#3	253.83'	194 cf	**3/4 Crushed Stone** Listed below -Impervious 486 cf Overall x 40.0% Voids
#4	253.17'	605 cf	**Bank Run Gravel** Listed below -Impervious 1,512 cf Overall x 40.0% Voids
#5	252.92'	137 cf	**Peastone** Listed below -Impervious 342 cf Overall x 40.0% Voids
#6	252.50'	148 cf	**3/4 Crushed Stone** Listed below -Impervious 378 cf Overall - 7 cf Embedded = 371 cf x 40.0% Voids
#7	252.42'	292 cf	**18.00'W x 81.00'L x 0.50'H 3/4 Crushed Stone** 729 cf Overall x 40.0% Voids
#8	252.50'	7 cf	**4.0" Round Pipe Storage** Inside #6 L= 81.0' S= 0.0005 '/'
		1,605 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
254.50	0	0	0
255.00	500	125	125

Elevation (feet)	Cum.Store (cubic-feet)
254.17	0
254.50	486

Elevation (feet)	Cum.Store (cubic-feet)
253.83	0
254.17	486

Elevation (feet)	Cum.Store (cubic-feet)
253.17	0
253.83	1,512

Elevation (feet)	Cum.Store (cubic-feet)
252.92	0
253.17	342

Elevation (feet)	Cum.Store (cubic-feet)
252.50	0
252.92	378

Device	Routing	Invert	Outlet Devices
#1	Primary	254.50'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	252.42'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#3	Primary	252.50'	**4.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 252.50' / 252.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Discarded OutFlow Max=0.08 cfs @ 11.40 hrs HW=252.45' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.43 cfs @ 12.45 hrs HW=254.39' TW=0.00' (Dynamic Tailwater)
├─**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**3=Culvert** (Barrel Controls 0.43 cfs @ 4.90 fps)

Summary for Link DP-1: Existing Barnum Road Drainage

Inflow Area = 258,548 sf, 32.27% Impervious, Inflow Depth = 0.72" for 50-Year event
Inflow = 3.82 cfs @ 12.10 hrs, Volume= 15,525 cf
Primary = 3.82 cfs @ 12.10 hrs, Volume= 15,525 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR10: Direct to Street Runoff Area=63,840 sf 32.63% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=58 Runoff=3.32 cfs 11,044 cf

Subcatchment PR11: Police Parking Runoff Area=19,845 sf 60.28% Impervious Runoff Depth=3.71"
Tc=6.0 min CN=75 Runoff=1.94 cfs 6,139 cf

Subcatchment PR12: Offsite and Parking Runoff Area=58,696 sf 28.98% Impervious Runoff Depth=1.90"
Tc=6.0 min CN=56 Runoff=2.74 cfs 9,293 cf

Subcatchment PR13: Offsite and Parking Runoff Area=103,946 sf 27.17% Impervious Runoff Depth=1.81"
Flow Length=355' Tc=4.7 min CN=55 Runoff=4.71 cfs 15,707 cf

Subcatchment PR14: Rear Building and Runoff Area=12,221 sf 44.04% Impervious Runoff Depth=2.72"
Tc=6.0 min CN=65 Runoff=0.87 cfs 2,771 cf

Pond 1P: Surface Infiltration Bain Peak Elev=255.19' Storage=7,867 cf Inflow=7.42 cfs 25,000 cf
Discarded=0.60 cfs 21,265 cf Primary=2.17 cfs 3,737 cf Outflow=2.77 cfs 25,002 cf

Pond 2P: Porous Pavement Peak Elev=254.56' Storage=1,482 cf Inflow=1.94 cfs 6,139 cf
Discarded=0.08 cfs 2,948 cf Primary=0.98 cfs 3,191 cf Outflow=1.06 cfs 6,139 cf

Link DP-1: Existing Barnum Road Drainage Inflow=4.53 cfs 20,743 cf
Primary=4.53 cfs 20,743 cf

Total Runoff Area = 258,548 sf Runoff Volume = 44,954 cf Average Runoff Depth = 2.09"
67.73% Pervious = 175,119 sf 32.27% Impervious = 83,429 sf

Summary for Subcatchment PR10: Direct to Street

Runoff = 3.32 cfs @ 12.10 hrs, Volume= 11,044 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
43,006	39	>75% Grass cover, Good, HSG A
20,834	98	Paved parking, HSG A
63,840	58	Weighted Average
43,006		67.37% Pervious Area
20,834		32.63% Impervious Area

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

Summary for Subcatchment PR11: Police Parking

Runoff = 1.94 cfs @ 12.09 hrs, Volume= 6,139 cf, Depth= 3.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
7,883	39	>75% Grass cover, Good, HSG A
11,962	98	Paved parking, HSG A
19,845	75	Weighted Average
7,883		39.72% Pervious Area
11,962		60.28% Impervious Area

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

Summary for Subcatchment PR12: Offsite and Parking Lot

Runoff = 2.74 cfs @ 12.10 hrs, Volume= 9,293 cf, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
41,683	39	>75% Grass cover, Good, HSG A
17,013	98	Paved parking, HSG A
58,696	56	Weighted Average
41,683		71.02% Pervious Area
17,013		28.98% Impervious Area

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

Summary for Subcatchment PR13: Offsite and Parking Lot

[49] Hint: Tc<2dt may require smaller dt

Runoff = 4.71 cfs @ 12.09 hrs, Volume= 15,707 cf, Depth= 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
75,708	39	>75% Grass cover, Good, HSG A
28,238	98	Paved parking, HSG A
103,946	55	Weighted Average
75,708		72.83% Pervious Area
28,238		27.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.0300	0.41		**Sheet Flow,** Fallow n= 0.050 P2= 3.10"
2.2	188	0.0404	1.41		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	70	0.1500	2.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	47	0.0362	9.35	7.34	**Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
4.7	355	Total			

Summary for Subcatchment PR14: Rear Building and Yard Drains

Runoff = 0.87 cfs @ 12.10 hrs, Volume= 2,771 cf, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
6,839	39	>75% Grass cover, Good, HSG A
5,382	98	Paved parking, HSG A
12,221	65	Weighted Average
6,839		55.96% Pervious Area
5,382		44.04% Impervious Area

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

Summary for Pond 1P: Surface Infiltration Bain

Inflow Area = 162,642 sf, 27.82% Impervious, Inflow Depth = 1.84" for 100-Year event
Inflow = 7.42 cfs @ 12.09 hrs, Volume= 25,000 cf
Outflow = 2.77 cfs @ 12.43 hrs, Volume= 25,002 cf, Atten= 63%, Lag= 20.4 min
Discarded = 0.60 cfs @ 12.43 hrs, Volume= 21,265 cf
Primary = 2.17 cfs @ 12.43 hrs, Volume= 3,737 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 255.19' @ 12.43 hrs Surf.Area= 3,118 sf Storage= 7,867 cf

Plug-Flow detention time= 149.6 min calculated for 24,984 cf (100% of inflow)
Center-of-Mass det. time= 149.7 min (1,019.1 - 869.4)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	10,632 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
250.00	273	77.0	0	0	273
251.00	644	119.0	445	445	935
252.00	1,100	153.0	862	1,307	1,684
253.00	1,659	188.0	1,370	2,677	2,649
254.00	2,304	217.0	1,973	4,650	3,605
255.00	2,984	236.0	2,637	7,287	4,326
256.00	3,721	255.0	3,346	10,632	5,108

Device	Routing	Invert	Outlet Devices
#1	Discarded	250.00'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Device 3	255.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	250.00'	**12.0" Round RCP_Round 12"** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 250.00' / 249.00' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Discarded OutFlow Max=0.60 cfs @ 12.43 hrs HW=255.19' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.60 cfs)

Primary OutFlow Max=2.13 cfs @ 12.43 hrs HW=255.19' TW=0.00' (Dynamic Tailwater)
└─**3=RCP_Round 12"** (Passes 2.13 cfs of 8.19 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 2.13 cfs @ 1.42 fps)

Summary for Pond 2P: Porous Pavement

Inflow Area =	19,845 sf, 60.28% Impervious, Inflow Depth = 3.71" for 100-Year event				
Inflow =	1.94 cfs @	12.09 hrs,	Volume=	6,139 cf	
Outflow =	1.06 cfs @	12.26 hrs,	Volume=	6,139 cf,	Atten= 45%, Lag= 10.1 min
Discarded =	0.08 cfs @	11.25 hrs,	Volume=	2,948 cf	
Primary =	0.98 cfs @	12.26 hrs,	Volume=	3,191 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 254.56' @ 12.25 hrs Surf.Area= 1,458 sf Storage= 1,482 cf

Plug-Flow detention time= 25.2 min calculated for 6,135 cf (100% of inflow)
Center-of-Mass det. time= 25.1 min (848.0 - 822.9)

Volume	Invert	Avail.Storage	Storage Description
#1	254.50'	125 cf	**Finished Grade (Prismatic)** Listed below (Recalc) -Impervious
#2	254.17'	97 cf	**Porous Pavement** Listed below -Impervious 486 cf Overall x 20.0% Voids
#3	253.83'	194 cf	**3/4 Crushed Stone** Listed below -Impervious 486 cf Overall x 40.0% Voids
#4	253.17'	605 cf	**Bank Run Gravel** Listed below -Impervious 1,512 cf Overall x 40.0% Voids
#5	252.92'	137 cf	**Peastone** Listed below -Impervious 342 cf Overall x 40.0% Voids
#6	252.50'	148 cf	**3/4 Crushed Stone** Listed below -Impervious 378 cf Overall - 7 cf Embedded = 371 cf x 40.0% Voids
#7	252.42'	292 cf	**18.00'W x 81.00'L x 0.50'H 3/4 Crushed Stone** 729 cf Overall x 40.0% Voids
#8	252.50'	7 cf	**4.0" Round Pipe Storage** Inside #6 L= 81.0' S= 0.0005 '/'
		1,605 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
254.50	0	0	0
255.00	500	125	125

Elevation (feet)	Cum.Store (cubic-feet)
254.17	0
254.50	486

Elevation (feet)	Cum.Store (cubic-feet)
253.83	0
254.17	486

Elevation (feet)	Cum.Store (cubic-feet)
253.17	0
253.83	1,512

Elevation (feet)	Cum.Store (cubic-feet)
252.92	0
253.17	342

Elevation (feet)	Cum.Store (cubic-feet)
252.50	0
252.92	378

Device	Routing	Invert	Outlet Devices
#1	Primary	254.50'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	252.42'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#3	Primary	252.50'	**4.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 252.50' / 252.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Discarded OutFlow Max=0.08 cfs @ 11.25 hrs HW=252.45' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.91 cfs @ 12.26 hrs HW=254.56' TW=0.00' (Dynamic Tailwater)
├─**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.47 cfs @ 0.80 fps)
└─**3=Culvert** (Barrel Controls 0.44 cfs @ 5.10 fps)

Summary for Link DP-1: Existing Barnum Road Drainage

Inflow Area = 258,548 sf, 32.27% Impervious, Inflow Depth = 0.96" for 100-Year event
Inflow = 4.53 cfs @ 12.10 hrs, Volume= 20,743 cf
Primary = 4.53 cfs @ 12.10 hrs, Volume= 20,743 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Standard 3: *Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater best management best management practices, and good operation and maintenance. At minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.*

Response: The loss of groundwater recharge has been computed as prescribed in Standard 3 of the Stormwater Management Policy. Required recharge volumes were calculated by utilizing the depth of runoff corresponding to the soil type times the impervious areas covering that soil type at the post-development site.

All impervious areas in the existing and proposed site area are in hydrologic soil group A, according to the soil data. In accordance with Stormwater Management Policy, a recharge depth factor of 0.60 inches will be used to calculate groundwater recharge.

Required Recharge Volume			
Hydrologic Group	Impervious Area	inches	Recharge Volume
A	83407.0 sf	0.60	4170.4 cf
B	0.0 sf	0.35	0.0 cf
C	0.0 sf	0.25	0.0 cf
D	0.0 sf	0.10	0.0 cf
Total	83407.0 sf		4170.4 cf
Provided Recharge Volume			
Infiltration Basin=	7,287 cf		

$$Time_{drawdown} = \frac{Rv}{(K)(Bottom\ Area)}$$

Where:
Rv = Storage Volume
K = Saturated Hydraulic Conductivity For "Static" and "Simple Dynamic" Methods, use Rawls Rate (see Table 2.3.3). For "Dynamic Field" Method, use 50% of the in-situ saturated hydraulic conductivity.
Bottom Area = Bottom Area of Recharge Structure[22]

Infiltration Basin		
Rv=	7287 cf	
K=	8.27 in/hr	(Rawls)
Bottom Area=	574 sf	
Time =	18.42 hours	

Standard 4: *Stormwater management systems shall be designed to remove 80% of the average annual post-condition load of Total Suspended Solids (TSS). This standard is met when:*

a.) Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;
b.) Structural stormwater best management practices are sized to capture the required water quality volume as determined in accordance with the Massachusetts Stormwater Handbook; and
c.) Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

The required water quality volume equals 1.0 inch of runoff times the total impervious area of the post-development project site and greater than 80% TSS removal prior to discharge to the infiltration BMP.

(See Water Quality and TSS Removal Calculations Sheet.)

Standard 5: *For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If, through source control and/or pollution prevention, all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow melt and stormwater runoff, the proponent shall use the specific structural stormwater BMP's determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L.c. 21, ss 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.*

The proposed Devens Public Safety Building is not a land use with higher potential pollutant loads.

Required Water Quality Volume

Imp Area = 83,407 sf

Runoff Depth= 1 in

WQV = Impervious Area x Runoff Depth = 83,407 sf x 1 in x (1 ft/12 in)

WQV = 6,951 cf

Provided Water Quality Volume

WQV = 7,287 cf (Volume below lowest orifice for surface infiltration basin)

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: P10 - Direct to Street

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump and Hooded Catch Basin	0.25	**1.00**	0.25	0.75
Stormceptor 450i	0.75	0.75	0.5625	0.1875

Total TSS Removal = 81.25%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Devens Public Safety Facility

Prepared By: CG

Date: 1/31/2022

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: P11 - Police Parking

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Porous Pavement	**0.80**	**1.00**	**0.80**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**

Total TSS Removal = **80%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **Devens Public Safety Facility**
Prepared By: **CG**
Date: **1/31/2022**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: P12 and P13 - Offsite and Parking Lot

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump and Hooded Catch Basin	0.25	**1.00**	0.25	0.75
Stormceptor 450i	0.75	0.75	0.5625	0.1875
Infiltration Basin	0.80	0.1875	0.15	0.0375

Total TSS Removal = 96.25%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Devens Public Safety Facility

Prepared By: CG

Date: 1/31/2022

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

Standard 6: *Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1. or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 4.00. Stormwater discharge to a Zone I or Zone A are prohibited unless essential to the operation of the public water supply.*

A stormwater discharge within a Zone II or Interim Wellhead Protection Area or near or to an Outstanding Resource Water, a Special Resource Water, a bathing beach, shellfish growing area, or cold-water fishery requires the use of a treatment train that provides 80% TSS removal prior to discharge. With the exception of runoff from a non-metal roof, and runoff from metal roofs located outside the Zone II or Interim Wellhead Protection Area of a public water supply or an industrial site, the treatment train shall provide for at least 44% TSS removal prior to discharge to the infiltration structure. For discharges within a Zone II or Interim Wellhead Protection Area or near or to an Outstanding Resource Water, a Special Resource Water, a shellfish growing area, a bathing beach, or a cold-water fishery, the treatment BMPs must be designed to treat the required water quality volume, a volume equal to one inch times the total impervious surfaces at the post-development site.

The proposed Devens Public Safety Building is not located within a Zone II or Interim Wellhead Protection Area or to any other critical area.

Standard 7: *A redevelopment project is required to meet the following Stormwater Management Standards only to the Maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.*

The Devens Public Safety Building is not a redevelopment project and therefore will comply with all required standards.

Standard 8: *A plan to control construction-related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.*

The Devens Public Safety Building will disturb more than an acre of land and therefore will require a Federal NPDES permit with a standard Stormwater Pollution Prevention Plan (SWPPP). A SWPPP for the project is submitted as a separate document.

Standard 9: *A Long-Term Operation and Maintenance (O&M) Plan shall be developed and maintained to ensure that stormwater management systems function as designed.*

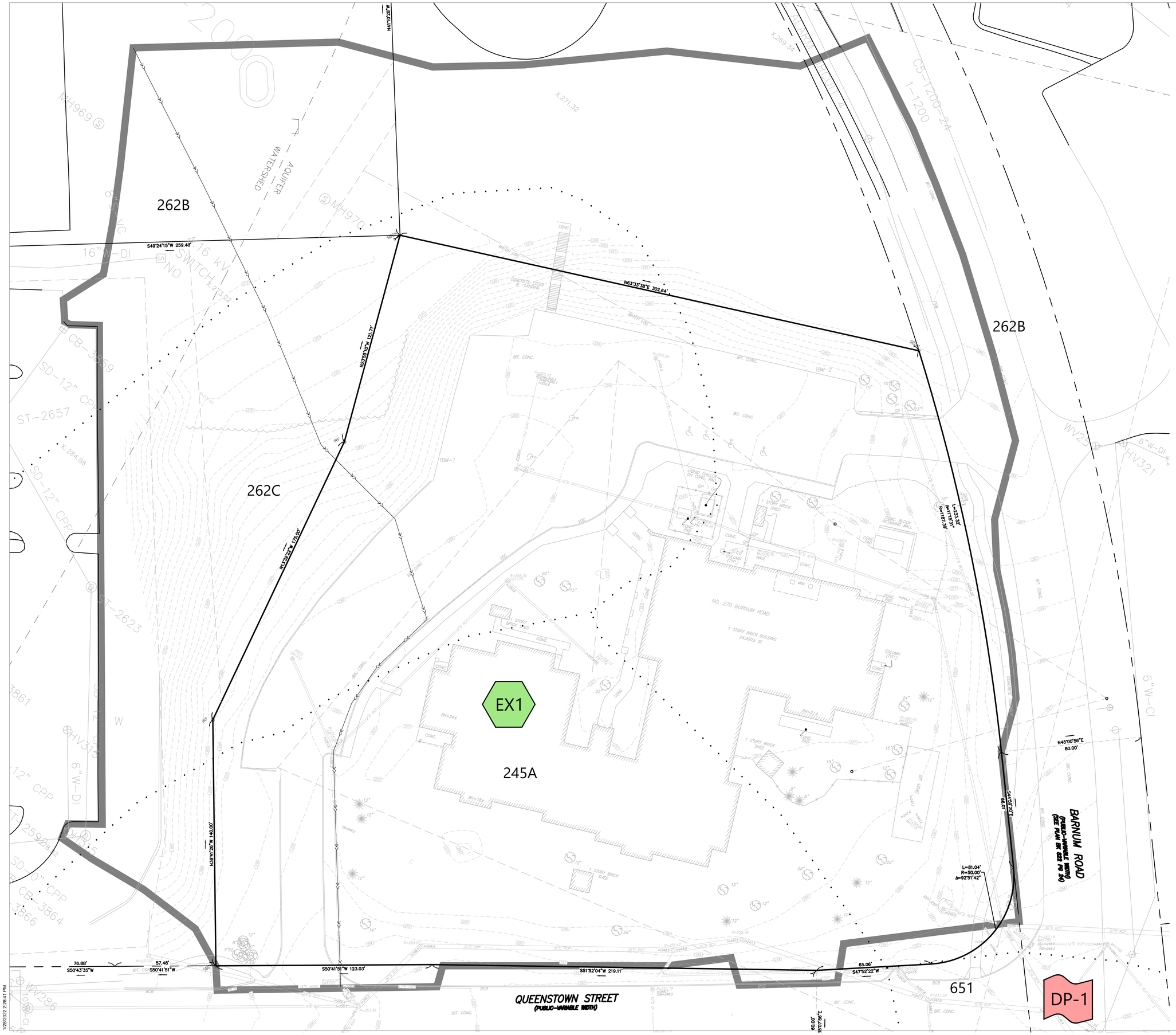
A long term O&M Plan is attached as a separate document.

Standard 10: *All illicit discharges to the stormwater management system are prohibited.*

No Illicit Discharge Compliance Statement is attached but will be submitted prior to the discharge of any stormwater to post-construction BMPs.

STORMWATER ANALYSIS

EXISTING CONDITION



X - CATCHMENT AREA

X - POND

X - DESIGN POINT

- CATCHMENT BOUNDARY

- SOIL BOUNDARY

- TIME OF CONCENTRATION

WINTER STREET ARCHITECTS INC
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Salem, MA 01970
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WSArchitects.com

DEVENS PUBLIC SAFETY BUILDING

270 Barnum Road
Devens, Massachusetts

Project Number: 4143.0000

DEC UNIFIED PERMITTING SET

Date: 3 FEBRUARY 2022

Issued

NO.	DESCRIPTION	DATE

EXISTING CONDITIONS DRAINAGE PLAN

D-1

FIRM NAME

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1/28/2022 2:28:41 PM

PROPOSED CONDITION

X - CATCHMENT AREA

X - POND

X - DESIGN POINT

- CATCHMENT BOUNDARY

- SOIL BOUNDARY

- TIME OF CONCENTRATION

WINTER STREET ARCHITECTS INC
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DEVENS PUBLIC SAFETY BUILDING

270 Barnum Road
Devens, Massachusetts

Project Number: 4143.0000

DEC UNIFIED PERMITTING SET

Date: 22 FEBRUARY 2022

Issued

NO.	DESCRIPTION	DATE

PROPOSED CONDITIONS DRAINAGE PLAN

FIRM NAME

D-2

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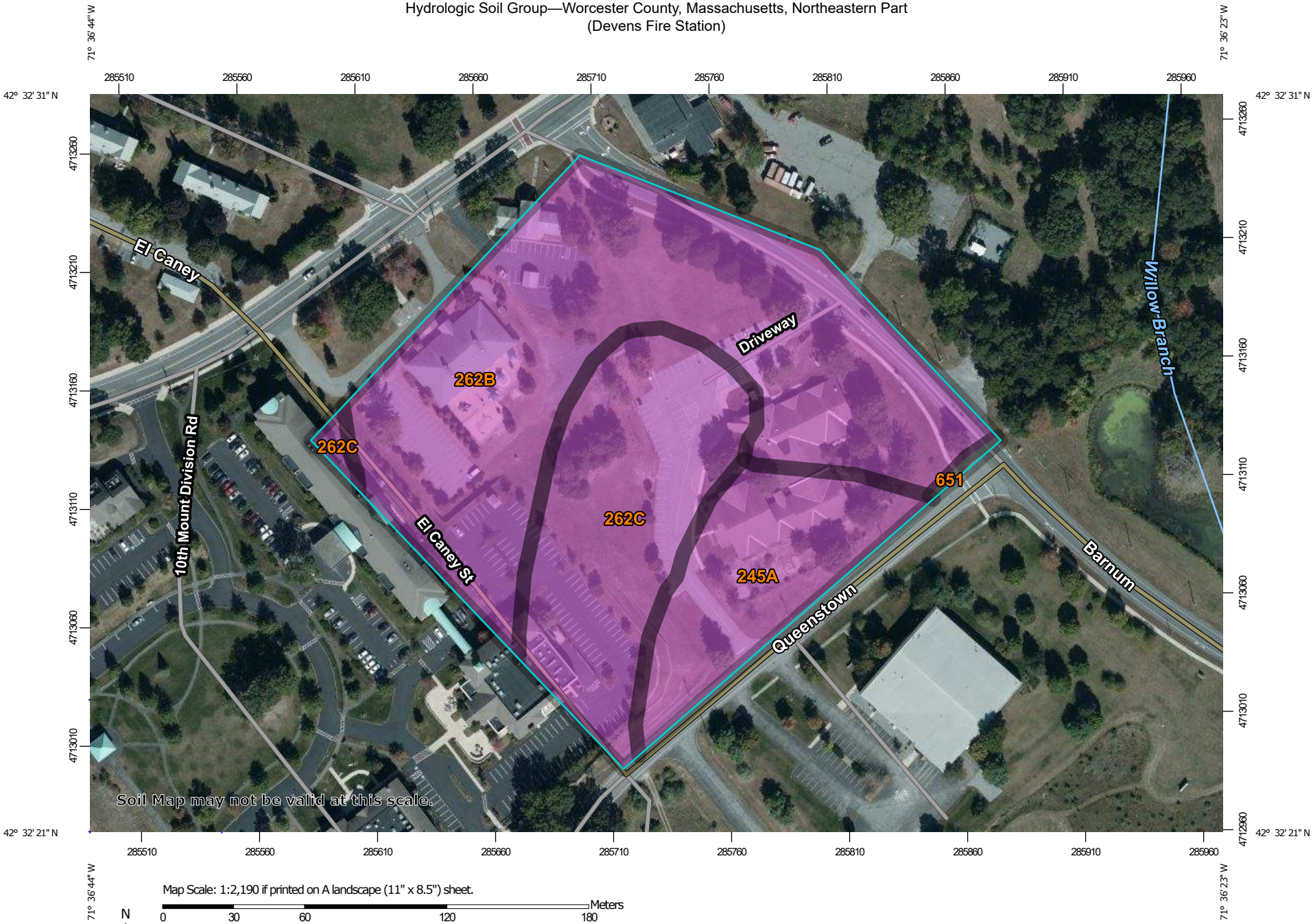
1/28/2022 2:26:41 PM

APPENDIX

SOIL REPORTS

Hydrologic Soil Group—Worcester County, Massachusetts, Northeastern Part
(Devens Fire Station)



Map Scale: 1:2,190 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

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 15, Jun 10, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 12, 2019—Sep 29, 2019

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

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
245A	Hinckley loamy sand, 0 to 3 percent slopes	A	1.7	16.5%
262B	Quonset loamy sand, 3 to 8 percent slopes	A	5.7	56.4%
262C	Quonset loamy sand, 8 to 15 percent slopes	A	2.7	26.8%
651	Udorthents, smoothed		0.0	0.3%
Totals for Area of Interest			**10.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Commonwealth of Massachusetts
City/Town of Devens

270 Barnum Road

Soil Evaluator:
John D. Sullivan III
Lic #: 2378

Form 11 - Soil Suitability Assessment [redacted]

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

Deep Observation Hole Number: TP-1 (Hole #) | 10/14/21 (Date) | 10:00 am (Time) | 70 Degrees (Weather) | Latitude: | Longitude:

1. Land Use: developed site (e.g., woodland, agricultural field, vacant lot, etc.) | grassed (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2-4 (Slope (%))

   Description of Location: see attached soil testpit ~~map~~ map

2. Soil Parent Material: Sandy Glaciofluvial Deposit | Terrace (Landform) | Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >200 feet | Drainage Way N/A feet | Wetlands > 200 feet
   Property Line >20 feet | Drinking Water Well N/A feet | Other ____ feet

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

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

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	A	SL	10 YR 3/3						Massive		
6-16	Bw	LS	10 YR 6/8								
16-84	C1	SAND	2.5 Y 5/4						Coarse		
84-120	C2	SAND	2.5 Y 5/4								

Additional Notes: C-LAYER TO USE RAWLS RATE FOR SAND - CLASS 1 SOIL

Commonwealth of Massachusetts
City/Town of DEVENS

270 Barnum Road

Soil Evaluator:
John D. Sullivan III
Lic #: 2378

Form 11 - Soil Suitability Assessment [redacted]

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

Deep Observation Hole Number: TP-2 (Hole #) 10/14/21 (Date) 10:00 AM (Time) 70 Degrees (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: developed site (e.g., woodland, agricultural field, vacant lot, etc.) grassed (Vegetation) none (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-4 (Slope (%))

Description of Location: see attached test pit location sketch

2. Soil Parent Material: Sandy Glaciofluvial Deposit Terrace (Landform) _____ (Position on Landscape (SU, SH, BS, FS, TS))

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

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

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

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-48	FILL										
48-52	RESTRICTIVE LAYER (FINE SANDY LOAM) TO BE REMOVED										
52-80	C1	LS	2.5 Y 6/4	80							
80-96	C2	SL	2.5 Y 6/3	80					FINE		

Additional Notes:
REMOVE RESTRICTIVE LAYER

Commonwealth of Massachusetts
City/Town of Devens

270 Barnum Road

Soil Evaluator:
John D. Sullivan III
Lic> #: 2378

Form 11 - Soil Suitability Assessment [redacted]

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

Deep Observation Hole Number: TP-3 (Hole #) | 10/14/21 (Date) | 10:00 AM (Time) | 70 Degrees (Weather) | Latitude: | Longitude:

1. Land Use: Developed (e.g., woodland, agricultural field, vacant lot, etc.) | Vegetation: Grassed | Surface Stones (e.g., cobbles, stones, boulders, etc.): none | Slope (%): 2-4

Description of Location: See attached sketch

2. Soil Parent Material: Sandy Glaciofluvial Deposit | Landform: Terrace | Position on Landscape (SU, SH, BS, FS, TS):

3. Distances from: Open Water Body > 200 feet | Drainage Way n/a feet | Wetlands > 200 feet | Property Line 30 feet | Drinking Water Well n/a feet | Other ____ feet

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

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

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-56	FILL										
56-62	A	SL	10 YR 3/3								
62-72	B	LS	10 YR 6/8	72							
72-84	C	SL	2.5 Y 6/4	72					Fine		

Additional Notes: No groundwater observed;

Commonwealth of Massachusetts 270 Barnum Road
City/Town of DEVENS

Form 11 - Soil Suitability Assessment [redacted]

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

Deep Observation Hole Number: TP 4 (Hole #) | 10/14 (Date) | 10:00 AM (Time) | 70 degrees (Weather) | _____ (Latitude) | _____ (Longitude:)

1. Land Use: Developed Site (e.g., woodland, agricultural field, vacant lot, etc.) | grassed (Vegetation) | none (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2-4 (Slope (%))

Description of Location: see attached sketch

2. Soil Parent Material: Sandy Glaciofluvial Deposit | Terrace (Landform) | _____ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body > 200 feet | Drainage Way n/a feet | Wetlands > 200 feet
Property Line 25 feet | Drinking Water Well _____ feet | Other _____ feet

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

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

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-48	Fill										
48-72	C	SL		48					Fine		

Additional Notes: No groundwater observed; the C-Layer is extremely fine

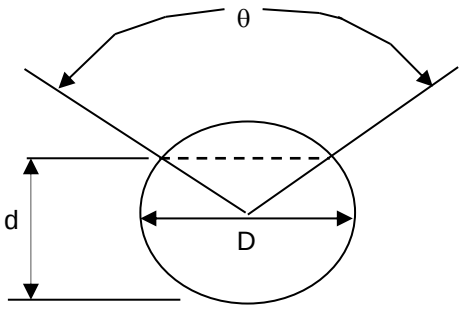
PIPE AND DRAINGAGE SIZING

MANNING'S EQUATION FOR PIPE FLOW

Project:	Devens Public Saferty Facility	Location:	CB-302 OUT
By:	CG	Date:	1/31/2022
Chk. By:	JG	Date:	1/31/2022

mdo version 12.8.00

Clear Data Entry Cells



INPUT

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d=	7.4	inches
n=	0.012	mannings coeff
θ=	153.0	degrees
S=	0.01	slope in/in

Mannings Formula

$Q=(1.486/n)AR_h^{2/3}S^{1/2}$

R=A/P

A=cross sectional area

P=wetted perimeter

S=slope of channel

n=Manning's roughness coefficient

$V=(1.49/n)R_h^{2/3}S^{1/2}$

Q=V x A

Area,ft^2	Wetted Perimeter, ft	Hydraulic Radius, ft	Solution to Mannings Equation: velocity ft/s	flow, cfs
0.51	1.81	0.28	5.32	2.70

Manning's n-values	
PVC	0.01
PE (<9"dia)	0.015
PE (>12"dia)	0.02
PE(9-12"dia)	0.017
CMP	0.025
ADS N12	0.012
HCMP	0.023
Conc	0.013

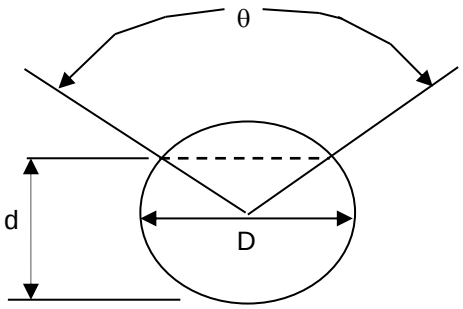
Created by: Mike O'Shea

MANNING'S EQUATION FOR PIPE FLOW

Project:	Devens Public Saferty Facility	Location:	WQU-101 OUT
By:	CG	Date:	1/31/2022
Chk. By:	JG	Date:	1/31/2022

mdo version 12.8.00

Clear Data Entry Cells



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d=	5.38	inches
n=	0.012	mannings coeff
θ=	168.1	degrees
S=	0.01	slope in/in

Mannings Formula

$Q=(1.486/n)AR_h^{2/3}S^{1/2}$

R=A/P

A=cross sectional area

P=wetted perimeter

S=slope of channel

n=Manning's roughness coefficient

$V=(1.49/n)R_h^{2/3}S^{1/2}$

Q=V x A

Solution to Mannings Equation

Area,ft^2	Wetted Perimeter, ft	Hydraulic Radius, ft	velocity ft/s	flow, cfs
0.34	1.47	0.23	4.68	1.60

Manning's n-values

PVC	0.01
PE (<9"dia)	0.015
PE (>12"dia)	0.02
PE(9-12"dia)	0.017
CMP	0.025
ADS N12	0.012
HCMP	0.023
Conc	0.013

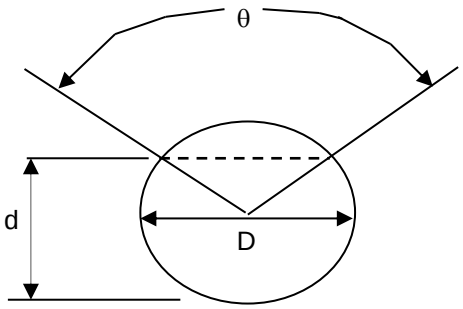
Created by: Mike O'Shea

MANNING'S EQUATION FOR PIPE FLOW

Project:	Devens Public Saferty Facility	Location:	CB-401 OUT
By:	CG	Date:	1/31/2022
Chk. By:	JG	Date:	1/31/2022

mdo version 12.8.00

Clear Data Entry Cells



INPUT

D=	12	inches
d=	6.15	inches
n=	0.012	mannings coeff
θ=	177.1	degrees
S=	0.01	slope in/in

Mannings Formula

$Q=(1.486/n)AR_h^{2/3}S^{1/2}$

R=A/P

A=cross sectional area

P=wetted perimeter

S=slope of channel

n=Manning's roughness coefficient

$V=(1.49/n)R_h^{2/3}S^{1/2}$

Q=V x A

Area,ft^2	Wetted Perimeter, ft	Hydraulic Radius, ft	Solution to Mannings Equation: velocity ft/s	Solution to Mannings Equation: flow, cfs
0.41	1.60	0.25	4.97	2.01

Manning's n-values	
PVC	0.01
PE (<9"dia)	0.015
PE (>12"dia)	0.02
PE(9-12"dia)	0.017
CMP	0.025
ADS N12	0.012
HCMP	0.023
Conc	0.013

Created by: Mike O'Shea

LONG TERM POLLUTION AND OPERATION & MAINTENANCE PLAN

DEVENS PUBLIC SAFETY BUILDING

LONG TERM POLLUTION PREVENTION AND OPERATION AND MAINTENANCE PLAN

As required by Standards 4 and 9 of the Storm Water Management Handbook, this Long-Term Pollution Prevention and Operation and Maintenance Plan have been developed for source control and pollution prevention at the site after construction.

MAINTENANCE RESPONSIBILITY

The responsibility of the Long-Term Pollution Prevention and Operation and Maintenance Plan will be the responsibility of the Owner.

GOOD HOUSEKEEPING PRACTICES

The site to be kept clean of trash and debris at all times. Trash, junk, etc. is not to be left outside and will be subject to removal at the owner's expense.

REQUIREMENTS FOR ROUTINE INSPECTIONS AND MAINTENANCE OF STORM WATER BMPS

All storm water BMPs are to be inspected and maintained as follows:

Deep Sump Hooded Catch Basins
Regular maintenance is essential. Deep sump catch basins remain effective at removing pollutants only if they are cleaned out regularly. Inspect at least four times per year and at the end of the foliage and snow removal seasons. Sediments shall be removed two times per year or whenever the depth of the deposits in the catch basin sump is greater than or equal to one foot from the bottom of the basin.

Infiltration Basins
Infiltration basins dispose of water by holding it in an area where it can soak into the ground and when the water gets to specific elevations they will discharge via piping or overflow and similar to structural BMPs they regular maintenance. The facilities should be inspected four a year, each inspection should be after a rainstorm. Clear inlets and outlets of debris. Remove litter and trash when it collects. Where possible use a rake and/or shovel to remove sediment accumulations greater than 2 inches thick in 10% of the treatment area.

STC 450i Stormceptor
The Stormceptor STC targets hydrocarbons and total suspended solids (TSS) in stormwater runoff. It improves water quality by removing contaminants through the gravitational settling of fine sediments and floatation of hydrocarbons while preventing the re-suspension or scour of previously captured pollutants. Stormceptor shall be inspected monthly and maintained quarterly or as necessary.

Trench Drain
Regular maintenance is essential. Trench drain shall be inspected monthly and inspected quarterly as necessary.

PROVISIONS FOR MAINTENANCE OF LAWNS, GARDENS AND OTHER LANDSCAPE AREAS

Proper maintenance of vegetated areas can prevent the pollution of stormwater runoff by controlling the source of pollutants such as suspended sediments, excess nutrients, and chemicals from landscape care products. Practices that should be followed under the regular maintenance of the vegetated landscape include:

- Inspect planted areas on a semi-annual basis and remove any litter.
- Maintain planted areas adjacent to pavement to prevent soil washout.
- Immediately clean any soil deposited on pavement.
- Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming.
- Plant alternative mixture of grass species in the event of unsuccessful establishment.
- The grass vegetation should be cut to a height between three and four inches.
- Pesticide/Herbicide Usage – No pesticides are to be used unless a single spot treatment is required for a specific control application.
- Fertilizer usage should be avoided. If deemed necessary, slow release fertilizer should be used. Fertilizer may be used to begin the establishment of vegetation in bare or damaged areas, but should not be applied on a regular basis unless necessary.
- Fertilizers shall be phosphorous free

SNOW DISPOSAL AND PLOWING

The purpose of the snow and snowmelt management plan is to provide guidelines regarding snow disposal site selection, site preparation and maintenance that are acceptable to the Department of Environmental Protection. For the areas that require snow removal, snow storage onsite will largely be accomplished by using pervious upland areas along the shoulder of the roadway as windrowed by plows. No snow shall be pushed into the detention ponds. Any excess snow will be trucked off-site.

- Avoid dumping of snow into any water body, including coastal, rivers, ponds, or wetlands. In addition to water quality impacts and flooding, snow disposed of in open water can cause navigational hazards when it freezes into ice blocks.

- Avoid disposing of snow on top of storm drain catch basins or in storm water basins. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.

SNOW DISPOSAL AND PLOWING

The purpose of the snow and snowmelt management plan is to provide guidelines regarding snow disposal site selection

STREET SWEEPING SCHEDULES

There are three types of sweepers: Mechanical, Regenerative Air and Vacuum Filter.

1. Mechanical – Mechanical sweepers use brooms or rotary brushes to scour the pavement.

2. Regenerative Air – These sweepers blow air onto the road or parking lot surface, causing fines to rise where they are vacuumed.

3. Vacuum Filter – These sweepers remove fines along roads. Two general types of vacuum filter sweepers are available – wet and dry. The dry type uses a broom in combination with the vacuum. The wet type uses water for dust suppression.

Regardless of the type chosen, the efficiency of street sweeping is increased when sweepers are operated in tandem.

This project has not included street sweeping as part of the TSS removal calculations. However, it is recommended that street sweeping of the parking areas occur four times a year, including once after the spring snow melt.

REUSE AND DISPOSAL OF STREET SWEEPINGS

Once removed from paved surfaces, the sweepings must be handled and disposed of properly. Mass DEP's Bureau of Waste Prevention has issued a written policy regarding the reuse and disposal of street sweepings. These sweepings are regulated as a solid waste, and can be used in three ways:

- In one of the ways already approved by Mass DEP (e.g., daily cover in a landfill, additive to compost, fill in a public way)

- If approved under a Beneficial Use Determination

- Disposed in a landfill

TRAINING OF STAFF OR PERSONNEL INVOLVED WITH IMPLEMENTING LONG-TERM POLLUTION PREVENTION PLAN

The Long-Term Pollution Prevention Plan is to be implemented by property owner of the site. Trained and, if required, licensed Professionals are to be hired by the owner as applicable to implement the Long-Term Pollution Prevention Plan.

LIST OF EMERGENCY CONTACTS FOR IMPLEMENTING LONG-TERM POLLUTION PREVENTION PLAN

The Owner will be required to maintain an updated list of Emergency Contacts for the site. This list will be provided during construction.

Drainage Operation and Maintenance Log

Site Maintenance Supervisor:_____ Date:_____

Routine △ Response to Rainfall Event____in △ Other _____

BMP	Frequency	Date Performed	Comments
Catch Basins and Drain Manholes	Monthly Inspections		
	Maintenance Quarterly and as necessary		
Stormceptor STC450i	Monthly for first 3 months/Bi-annually after		
	Maintenance Quarterly and as necessary		
ACO K300 Trench Drain	Monthly Inspections		
	Maintenance Quarterly and as necessary		
Pavement Areas (parking, driveways, service areas)	Monthly Sweeping		
	Trash & Litter Removal as necessary		
Landscaped & Vegetated Areas	Maintenance as necessary		
Sediment Forebays	Inspect Annually. Clean when sediment depth reaches ¼ of inlet pipe diameter.		
	Maintenance as necessary		
	Bi-Annual Mowing		
Infiltration Basin*	Bi-Annual Inspections		
	Mow twice a year		

Inspection Form

***Inspect infiltration basin after each 1" rainfall for the first 3 months after construction.**

Stormceptor® STC
Inspection and Maintenance Information

Stormceptor® Inspection and Maintenance

Regular inspection and maintenance is a proven, cost-effective way to maximize water resource protection for all stormwater pollution control practices, and are required to insure proper functioning of the Stormceptor System. Both inspection and maintenance of the Stormceptor system is easily performed from the surface. Stormceptor's patented technology has no moving parts, simplifying the inspection and maintenance process.

Please refer to the following information and guidelines before conducting inspection and maintenance activities.

When is inspection needed?

- Post-construction inspection is required prior to putting the Stormceptor System into service.
- Routine inspections are recommended during the first year of operation to accurately assess the sediment accumulation.
- Specifically for New Jersey installations, regulations require all BMPs to be inspected a minimum four times per year and after every storm with greater than one inch of rainfall.
- Inspection frequency in subsequent years is based on the maintenance plan developed in the first year.
- Inspections should also be performed immediately after an oil, fuel or other chemical spill.

When is maintenance cleaning needed?

- For optimum performance, the unit should be cleaned out once the sediment depth reaches 15% of the unit's total storage capacity (see Table 1). Generally, the minimum cleaning frequency is once annually, although the frequency can be based on historical inspection results.
- The unit should be cleaned out immediately after an oil, fuel or chemical spill.

Table 1

Sediment Maintenance Depth* and Oil Capacity		
STC Model	**Sediment Depth*** (inches)	**Oil Capacity** (gallons)
450i	8	86
900	8	251
1200	10	251
1800	15	251
2400	12	840

3600	17	840
4800	15	909
6000	18	909
7200	15	1059
11000	17	2797
13000	20	2797
16000	17	3055
* based on 15% of the lower chamber volume		

What conditions can compromise the Stormceptor System performance?

- If the system is not maintained regularly and fills with sediment and debris beyond the capacity indicated in Table 1, sediment removal efficiency may be reduced.
- If an oil spill(s) exceeds the oil capacity of the system, subsequent spills may not be captured.
- If debris clogs the inlet of the system, removal efficiency of sediment and hydrocarbons may be reduced.
- If a downstream blockage occurs, a backwater condition may occur in the system and removal efficiency of sediment and hydrocarbons may be reduced.

What training is required?

The Stormceptor System is inspected and maintained by professional vacuum cleaning service providers with experience in the maintenance of underground tanks, sewers and catch basins. For typical inspection and maintenance activities, no specific supplemental training is required for the Stormceptor System. Information provided in this document or the Stormceptor Operation and Maintenance Manual (provided to the system owner) contains sufficient guidance to maintain the system properly.

In unusual circumstances, such as if a damaged component needs replacement or some other condition requires manned entry into the vessel, confined space entry procedures must be followed. Only professional maintenance service providers trained in these procedures should enter the vessel. Service provider companies typically have personnel who are trained and certified in confined space entry procedures according to local, state, and federal standards.

What equipment is typically required for inspection?

- Manhole access cover lifting tool
- Oil dipstick
- Sediment probe
- Flashlight
- Camera
- Data log
- Safety cones and caution tape
- Hard hat, safety shoes, safety glasses, and chemical-resistant gloves

How is the Stormceptor System inspected?

- The Stormceptor System can be inspected through a standard surface manhole

access cover.

- Sediment and oil depth inspections are performed with a sediment probe and oil dipstick. Oil depth is measured through the oil inspection port. Sediment depth can be measured through the oil inspection port or exit riser pipe.
- Inspections also involve a visual inspection of the internal components of the system.

What equipment is typically required for maintenance?

- Vacuum truck equipped with water hose and jet nozzle
- Small pump and tubing for oil removal
- Manhole access cover lifting tool
- Oil dipstick
- Sediment probe
- Flashlight
- Camera
- Data log
- Safety cones and caution tape
- Hard hats, safety shoes, safety glasses, chemical-resistant gloves, and hearing protection for service providers
- Gas analyzer, respiratory gear, and safety harness for specially trained personnel if confined space entry is required

How is the Stormceptor System maintained?

- The Stormceptor System can be maintained through a standard surface manhole access cover.
- Insert the oil dipstick into the oil inspection port. If oil is present, pump off the oil layer into separate containment using a small pump and tubing.
- Maintenance cleaning of accumulated sediment is performed with a vacuum truck.
- For 6-ft diameter models and larger, the vacuum hose is inserted into the lower chamber via the 24-inch outlet riser pipe.
- For 4-ft diameter model, the removable drop tee is lifted out, and the vacuum hose is inserted into the lower chamber via the 12-inch drop tee hole.
- Using the vacuum hose, decant the water from the lower chamber to the sanitary sewer, if permitted by the local regulating authority, or into a separate containment tank.
- Remove the sludge from the bottom of the unit using the vacuum hose.
- Re-fill the lower chamber with water where required by the local jurisdiction.
- Units that have not been maintained regularly, have surpassed the maximum recommended sediment capacity, or contain damaged components may require manned entry by trained personnel using proper confined space entry procedures.

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What is required for proper disposal?

- Disposal requirements for recovered pollutants may vary depending on local guidelines. In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as hazardous waste.

What about oil spills?

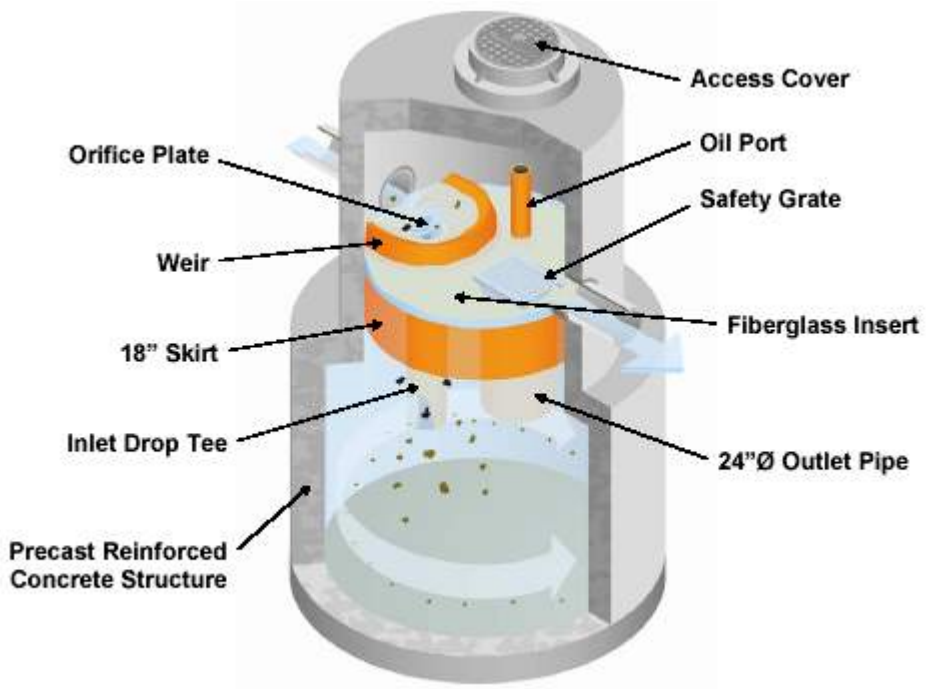
- Petroleum-based pollutants captured by the Stormceptor system (oil/chemical/fuel spills) should be removed and disposed of by a licensed waste management company.
- Although Stormceptor captures virtually all free oil, a sheen at the outlet **does not** mean the unit isn't working. A rainbow or sheen can be visible at oil concentrations of less than 10 mg/L (ppm).

What factors affect the costs involved with inspection/maintenance?

- Inspection and maintenance costs are based on unit size, sediment/oil/hazardous material loads, transportation distances, tipping fees, disposal requirements and other local regulations.

System schematic and component functions

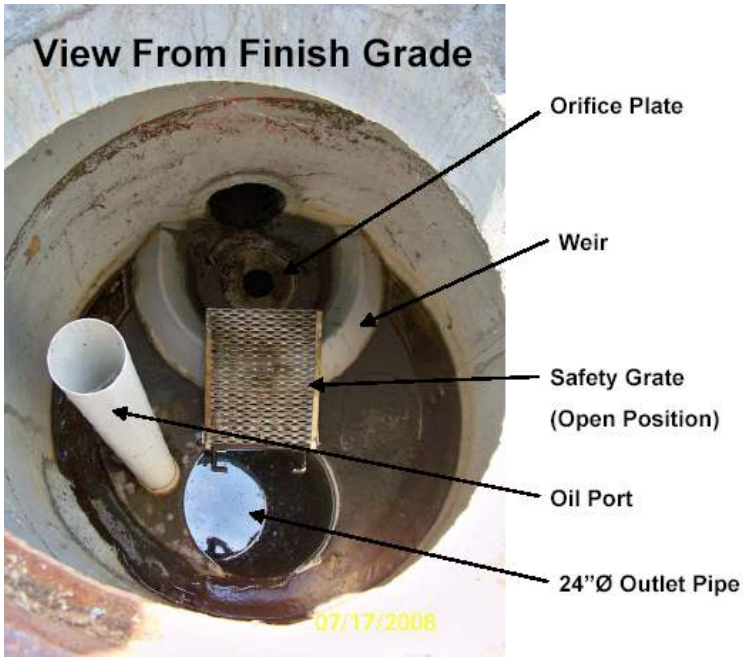
Below is a schematic of the Stormceptor System with key components identified and their functions briefly described.



- **Manhole access cover** – provides access to the subsurface components
- **Precast reinforced concrete structure** – provides the vessel's watertight structural support
- **Fiberglass insert** – separates vessel into upper and lower chambers
- **Weir** – directs incoming stormwater and oil spills into the lower treatment chamber
- **Orifice plate** – controls water flow rate into the lower treatment chamber and prevents scour of accumulated pollutants
- **Inlet drop tee** – conveys stormwater into the lower treatment chamber and splits flow into two opposite tangential streams
- **Fiberglass skirt** – provides double-wall containment of hydrocarbons
- **Outlet riser pipe** – conveys treated water to the upper chamber; primary vactor access port for sediment removal

- **Oil inspection port** – primary access for measuring oil depth and oil removal
- **Safety grate** – safety measure to cover riser pipe in the event of manned entry into vessel

The Stormceptor System has no moving parts to wear out and therefore maintenance activities are generally focused on pollutant removal.



The depth of sediment can be measured from the surface by using a sediment probe or dipstick tube equipped with a ball check valve and inserted through the 24-inch outlet riser pipe. Oil level can similarly be checked through the oil inspection port.

A maintenance worker stationed on the surface uses a vacuum hose to evacuate water, sediment, and debris from the system.

Purchasing replacement parts

Since there are no moving parts in the Stormceptor System, broken, damaged, or worn parts are not typically encountered. However, if replacements parts are necessary, they may be obtained by contacting the following supplier of authentic Stormceptor components.

In New Jersey, contact:

Camtek Construction Products Corp.
3481 Treeline Drive
Murrysville, PA 15668
Phone: (724) 327-3400

The benefits of regular inspection and maintenance are many – from ensuring maximum operation efficiency, to keeping maintenance costs low, to the continued protection of natural waterways – and provide the key to Stormceptor's long and effective service life.

Brief Stormceptor Sizing Report - WQU 101

Project Information & Location			
Project Name	Devens PS	**Project Number**	21113
City	Devens	**State/ Province**	Massachusetts
Country	United States of America	**Date**	1/31/2022
Designer Information		**EOR Information (optional)**	
Name	William Gosine	**Name**	
Company	Brennan Consultants	**Company**	
Phone #	603-494-6676	**Phone #**	
Email	wgosine@gmail.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQU 101
Target TSS Removal (%)	75
TSS Removal (%) Provided	86
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	86
STC 900	91
STC 1200	91
STC 1800	91
STC 2400	93
STC 3600	94
STC 4800	95
STC 6000	95
STC 7200	96
STC 11000	98
STC 13000	98
STC 16000	98

Sizing Details

Drainage Area	
Total Area (acres)	1.35
Imperviousness %	29.0

Rainfall	
Station Name	WORCESTER WSO AP
State/Province	Massachusetts
Station ID #	9923
Years of Records	58
Latitude	42°16'2"N
Longitude	71°52'34"W

Water Quality Objective	
TSS Removal (%)	75.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

Brief Stormceptor Sizing Report - WQU 301

Project Information & Location			
Project Name	Devens PS	**Project Number**	21113
City	Devens	**State/ Province**	Massachusetts
Country	United States of America	**Date**	1/31/2022
Designer Information		**EOR Information (optional)**	
Name	William Gosine	**Name**	
Company	Brennan Consultants	**Company**	
Phone #	603-494-6676	**Phone #**	
Email	wgosine@gmail.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQU 301
Target TSS Removal (%)	75
TSS Removal (%) Provided	77
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	77
STC 900	83
STC 1200	83
STC 1800	83
STC 2400	86
STC 3600	87
STC 4800	89
STC 6000	90
STC 7200	91
STC 11000	93
STC 13000	94
STC 16000	94

Sizing Details

Drainage Area	
Total Area (acres)	2.39
Imperviousness %	27.0

Rainfall	
Station Name	WORCESTER WSO AP
State/Province	Massachusetts
Station ID #	9923
Years of Records	58
Latitude	42°16'2"N
Longitude	71°52'34"W

Water Quality Objective	
TSS Removal (%)	75.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

Brief Stormceptor Sizing Report - WQU 400

Project Information & Location			
Project Name	Devens PS	**Project Number**	21113
City	Devens	**State/ Province**	Massachusetts
Country	United States of America	**Date**	1/31/2022
Designer Information		**EOR Information (optional)**	
Name	William Gosine	**Name**	
Company	Brennan Consultants	**Company**	
Phone #	603-494-6676	**Phone #**	
Email	wgosine@gmail.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQU 400
Target TSS Removal (%)	75
TSS Removal (%) Provided	85
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	85
STC 900	89
STC 1200	90
STC 1800	90
STC 2400	92
STC 3600	93
STC 4800	94
STC 6000	95
STC 7200	96
STC 11000	97
STC 13000	97
STC 16000	98

Sizing Details

Drainage Area	
Total Area (acres)	0.57
Imperviousness %	37.0

Rainfall	
Station Name	WORCESTER WSO AP
State/Province	Massachusetts
Station ID #	9923
Years of Records	58
Latitude	42°16'2"N
Longitude	71°52'34"W

Water Quality Objective	
TSS Removal (%)	75.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

Brief Stormceptor Sizing Report - WQU 501

Project Information & Location			
Project Name	Devens PS	**Project Number**	21113
City	Devens	**State/ Province**	Massachusetts
Country	United States of America	**Date**	1/31/2022
Designer Information		**EOR Information (optional)**	
Name	William Gosine	**Name**	
Company	Brennan Consultants	**Company**	
Phone #	603-494-6676	**Phone #**	
Email	wgosine@gmail.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQU 501
Target TSS Removal (%)	80
TSS Removal (%) Provided	90
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	90
STC 900	94
STC 1200	94
STC 1800	95
STC 2400	96
STC 3600	97
STC 4800	97
STC 6000	98
STC 7200	98
STC 11000	99
STC 13000	99
STC 16000	99

Sizing Details

Drainage Area	
Total Area (acres)	0.13
Imperviousness %	60.0

Rainfall	
Station Name	WORCESTER WSO AP
State/Province	Massachusetts
Station ID #	9923
Years of Records	58
Latitude	42°16'2"N
Longitude	71°52'34"W

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

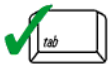
CHECKLIST FOR STORMWATER REPORT

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

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

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

Signature and Date

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.

STORMWATER POLLUTION PREVENTION PLAN

Stormwater Pollution Prevention Plan (SWPPP)

For Construction Activities At:

Devens Public Safety Building
270 Barnum Road
Devens, MA 01434

SWPPP Prepared For:

Devens Enterprise Commission
33 Andrews Parkway
Devens, MA 01434

SWPPP Prepared By:

Brennan Consulting
24 Ray Ave, Suite 203
Burlington, MA 01803
(781) 273-3434

SWPPP Preparation Date:

01/31/2022

Estimated Project Dates: TBD

Project Start Date: TBD

Project Completion Date: TBD

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SECTION 1: CONTACT INFORMATION/RESPONSIBLE PARTIES

1.1 Operator(s) / Subcontractor(s)

Operator(s): To Be Determined

Insert Company or Organization Name
Insert Name
Insert Address
Insert City, State, Zip Code
Insert Telephone Number
Insert Fax/Email
Insert area of control (if more than one operator at site)

Subcontractor(s): To Be Determined

Insert Company or Organization Name
Insert Name
Insert Address
Insert City, State, Zip Code
Insert Telephone Number
Insert Fax/Email
Insert area of control (if more than one operator at site)

Emergency 24-Hour Contact: To Be Determined

Insert Company or Organization Name
Insert Name
Insert Telephone Number

1.2 Stormwater Team: To Be Determined

Insert Role or Responsibility:
Insert Position:
Insert Name:
Insert Telephone Number:
Insert Email:

Insert Role or Responsibility:
Insert Position:
Insert Name:
Insert Telephone Number:
Insert Email:

SECTION 2: SITE EVALUATION, ASSESSMENT, AND PLANNING

2.1 Project/Site Information

Instructions (see "Project/Site Information," Section IV of Appendix H – NOI Form and Instructions):

- In this section, compile basic site information that will be helpful when you file your NOI.

Project Name and Address

Project/Site Name: **Devens Public Safety Building**
Project Street/Location: **270 Barnum Road**
City: **Devens**
State: **MA**
ZIP Code: **01434**
County or Similar Subdivision: **Middlesex/Worcester**

Project Latitude/Longitude

Latitude: 42° 32' 26.76"° N
(decimal degrees)

Longitude: - 71° 36' 31.69" W ° W
(decimal degrees)

Latitude/longitude data source: ☐ Map ☐ GPS ☒ Other (please specify): Google _____

Horizontal Reference Datum: ☐ NAD 27 ☒ NAD 83 ☐ WGS 84

Additional Site Information

Is your site located on Indian country lands, or on a property of religious or cultural significance to an Indian Tribe? ☐ Yes ☒ No

2.2 Discharge Information

Does your project/site discharge stormwater into a Municipal Separate Storm Sewer System (MS4)? ☒ Yes ☐ No

Are there any waters of the U.S. within 50 feet of your project's earth disturbances? ☐ Yes ☒ No

For each point of discharge, provide a point of discharge ID (a unique 3-digit ID, e.g., 001, 002), the name of the first receiving water that receives stormwater directly from the point of discharge and/or from the MS4 that the point of discharge discharges to, and the following receiving water information, if applicable:

Point of Discharge ID	Name of receiving water that receives stormwater discharge:	Is the receiving water impaired (on the CWA 303(d) list)?	If yes, list the pollutants that are causing the impairment:	Has a TMDL been completed for this receiving waterbody?	If yes, list TMDL Name and ID:	Pollutant(s) for which there is a TMDL:	Is this receiving water designated as a Tier 2, Tier 2.5, or Tier 3 water?	If yes, specify which Tier (2, 2.5, or 3)?
001	Existing Stormwater Basin	☐ Yes ☒ No		☐ Yes ☐ No			☐ Yes ☒ No	
		☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	
		☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	
		☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	
		☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	
		☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	

2.3 Nature of the Construction Activities

General Description of Project

MassDevelopment is proposing the development of an existing building to accommodate a new public safety building located at 270 Barnum Road. The parcel is located at the southwest corner of the intersection of Barnum Road and Queenstown Street, and contains 3.46 Ac of land. The site is previously developed, with an existing 1-story 24,000 sf partially vacant building which houses a regional dispatch facility and parking. The proposed development will include development of the vacant portion of the building and the addition of a new 7,200 sf Apparatus Bay and 1,040 sf Sally Port on the western side of the existing building, as well as parking, access, and drainage improvements associated with the development. The project will also include the construction of a new public parking lot off of Queenstown Street to prevent conflicts between visitors and civilian users and official users of the site.

Size of Construction Site

Size of Property	3.46 Acres
Total Area Expected to be Disturbed by Construction Activities	1.80 acres
Maximum Area Expected to be Disturbed at Any One Time, Including On-site and Off-site Construction Support Areas	1.80 acres

Type of Construction Site *(check all that apply):*

☐ Single-Family Residential ☐ Multi-Family Residential ☐ Commercial ☐ Industrial

☐ Institutional ☐ Highway or Road ☐ Utility ☒ Other: _Municipal__

Will you be discharging dewatering water from your site? ☐ Yes ☒ No

If yes, will you be discharging dewatering water from a current or former Federal or State remediation site? ☐ Yes ☐ No

Pollutant-Generating Activities

Pollutant-Generating Activity (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal; and dewatering operations)	**Pollutants or Pollutant Constituents** (e.g., sediment, fertilizers, pesticides, paints, caulks, sealants, fluorescent light ballasts, contaminated substrates, solvents, fuels)
Asphalt Paving	Oil, petroleum distillates
Concrete	Limestone, sand
Paints	Metal oxides, calcium carbonate
Fertilizer	Nitrogen, phosphorous

2.4 Sequence and Estimated Dates of Construction Activities – To Be Determined

Instructions (see CGP Part 7.2.3):

- Describe the intended construction sequence and duration of major activities.
- For each portion or phase of the construction site, include the following:
  - ✓ Commencement and duration of construction activities, including clearing and grubbing, mass grading, demolition activities, site preparation (i.e., excavating, cutting and filling), final grading, and creation of soil and vegetation stockpiles requiring stabilization;
  - ✓ Temporary or permanent cessation of construction activities in each portion of the site;
  - ✓ Temporary or final stabilization of exposed areas for each portion of the site. The dates for stabilization must reflect the applicable deadlines to which you are subject to in Part 2.2.14; and
  - ✓ Removal of temporary stormwater controls and construction equipment or vehicles, and cessation of any construction-related pollutant-generating activities.
- The construction sequence must reflect the following requirements:
  - ✓ Part 2.1.3 (installation of stormwater controls); and
  - ✓ Parts 2.2.14 (stabilization deadlines).

Phase I

Insert General Discription of Phase	
Estimated Start Date of Construction Activities for this Phase	Insert Estimated Date
Estimated End Date of Construction Activities for this Phase	Insert Estimated Date
Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized	Insert Estimated Date *[Add additional dates as necessary]*
Estimated Date(s) when Stormwater Controls will be Removed	Insert Estimated Date *[Add additional dates as necessary]*

Phase II

Insert General Discription of Phase	
Estimated Start Date of Construction Activities for this Phase	Insert Estimated Date
Estimated End Date of Construction Activities for this Phase	Insert Estimated Date
Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized	Insert Estimated Date *[Add additional dates as necessary]*
Estimated Date(s) when Stormwater Controls will be Removed	Insert Estimated Date *[Add additional dates as necessary]*

2.5 Authorized Non-Stormwater Discharges

List of Authorized Non-Stormwater Discharges Present at the Site

Authorized Non-Stormwater Discharge	Will or May Occur at Your Site?
Discharges from emergency fire-fighting activities	☒ Yes ☐ No
Fire hydrant flushings	☐ Yes ☒ No
Landscape irrigation	☐ Yes ☒ No
Water used to wash vehicles and equipment	☒ Yes ☐ No
Water used to control dust	☒ Yes ☐ No
Potable water including uncontaminated water line flushings	☒ Yes ☐ No
External building washdown (soaps/solvents are not used and external surfaces do not contain hazardous substances)	☐ Yes ☒ No
Pavement wash waters	☐ Yes ☒ No
Uncontaminated air conditioning or compressor condensate	☐ Yes ☒ No
Uncontaminated, non-turbid discharges of ground water or spring water	☐ Yes ☒ No
Foundation or footing drains	☐ Yes ☒ No
Uncontaminated construction dewatering water	☐ Yes ☒ No

2.6 Site Map (See Attached)

SECTION 3: DOCUMENTATION OF COMPLIANCE WITH OTHER FEDERAL REQUIREMENTS

3.1 Endangered Species Protection

Instructions (see CGP Parts 1.1.5, 7.2.9.a, Appendix D, and the "Endangered Species Protection" section of the Appendix H – NOI Form and Instructions as well as resources available at www.epa.gov/npdes/construction-general-permit-cgp-threatened-and-endangered-species-eligibility):

Using the instructions in Appendix D of the permit, determine which criterion listed below (A-F) applies with respect to the protection of endangered species. To make this determination, you must use information from **BOTH** the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). Both the NMFS and USFWS maintain lists of Endangered Species Act-listed (ESA-listed) species and designated critical habitat. Operators must consult both when determining their eligibility.

- Check only 1 box, include the required information, and provide a sound basis for supporting the criterion selected. Select the most conservative criterion that applies.
- Include documentation supporting your determination of eligibility required in the Endangered Species Protection section of the NOI in NeT or the ESA worksheet in CGP Appendix D.

Eligibility Criterion

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

☒ **Criterion A**: No ESA-listed species and/or designated critical habitat present in action area. Using the process outlined in Appendix D of the CGP, you certify that ESA-listed species and designated critical habitat(s) under the jurisdiction of the USFWS or NMFS are not likely to occur in your site's "action area" as defined in Appendix A of the CGP. *Please Note: NMFS' jurisdiction includes ESA-listed marine and estuarine species that spawn in inland rivers.*

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D (Note: reliance on State resources is not acceptable; see CGP Appendix D).

Documentation: Review of the MADEP Natural Heritage maps, NMFS and USFWS maps, and the MassGIS maps all indicated no environmental resources near the project site.

Eligibility Criterion

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

☐ **Criterion B:** Eligibility requirements met by another operator under the 2022 CGP. The construction site's discharges and discharge-related activities were already addressed in another operator's valid certification of eligibility for your "action area" under eligibility Criterion A, C, D, E, or F of the 2022 CGP and you have confirmed that no additional ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS not considered in the that certification may be present or located in the "action area." To certify your eligibility under this criterion, there must be no lapse of NPDES permit coverage in the other CGP operator's certification. By certifying eligibility under this criterion, you agree to comply with any conditions upon which the other CGP operator's certification was based. You must include in your NOI the NPDES ID from the other 2022 CGP operator's notification of authorization under this permit and list any measures that you must comply with. If your certification is based on another 2022 CGP operator's certification under criterion C, you must provide EPA with the relevant supporting information required of existing dischargers in Criterion C.

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

Documentation: Insert Text Here

☐ **Criterion C:** Discharges not likely to result in any short- or long-term adverse effects to ESA-listed species and/or designated critical habitat. ESA-listed species and/or designated critical habitat(s) under the jurisdiction of the USFWS and/or NMFS are likely to occur in or near your site's "action area," and you certify to EPA that your site's discharges and discharge-related activities are not likely to result in any short- or long-term adverse effects to ESA-listed threatened or endangered species and/or designated critical habitat. This certification may include consideration of any stormwater controls and/or management practices you will adopt to ensure that your discharges and discharge-related activities are not likely to result in any short- or long-term adverse effects to ESA-listed species and/or designated critical habitat. To certify your eligibility under this criterion, indicate 1) the ESA-listed species and/or designated habitat located in your "action area" using the process outlined in Appendix D of this permit; 2) the distance between the site and the listed species and/or designated critical habitat in the action area (in miles); and 3) a rationale describing specifically how short- or long-term adverse effects to ESA-listed species will be avoided from the discharges and discharge-related activities. (Note: You must include a copy of your site map from your SWPPP showing the upland and in-water extent of your "action area" with your NOI.)

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

Documentation: Insert Text Here

Eligibility Criterion

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

☐ **Criterion D**: Coordination with USFWS and/or NMFS has successfully concluded.

Coordination between you and the USFWS and/or NMFS has concluded. The coordination must have addressed the effects of your site's discharges and discharge-related activities on ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS, and resulted in a written confirmation from USFWS and/or NMFS that the effects of your site's discharges and discharge-related activities are not likely to result in any short- or long-term adverse effects. By certifying eligibility under this criterion, you agree to comply with any conditions you must meet for your site's discharges and discharge-related activities to not likely result in any short- or long-term adverse effects. You must include copies of the correspondence with the participating agencies in your SWPPP and this NOI.

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

Documentation: Insert Text Here

Eligibility Criterion

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

☐ **Criterion E:** ESA Section 7 consultation has successfully concluded. Consultation between a Federal agency and the USFWS and/or NMFS under section 7 of the ESA has concluded. Consultations can be either formal or informal, and would have occurred only as a result of a separate Federal action (e.g., during application for an individual wastewater discharge permit or the issuance of a wetlands dredge and fill permit), and the consultation must have addressed the effects of your construction activity's discharges and discharge-related activities on all ESA-listed threatened or endangered species and all designated critical habitat under the jurisdiction of each Service, as appropriate, in your action area. The result of this consultation must be either:

i. A biological opinion currently in effect that determined that the action in question (taking into account the effects of your facility's discharges and discharge-related activities) is likely to adversely affect, but is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The biological opinion must have included the effects of your facility's discharges and discharge-related activities on all the listed species and designated critical habitat in your action area under the jurisdiction of each Service, as appropriate. To be eligible under (i), any reasonable and prudent measures specified in the incidental take statement must be implemented;

ii. Written concurrence (e.g., letter of concurrence) from the applicable Service(s) with a determination that your facility's discharges and discharge-related activities are not likely to adversely affect ESA-listed species and/or designated critical habitat. The concurrence letter must have included the effects of your facility's discharges and discharge-related activities on all the ESA-listed species and/or designated critical habitat on your species list(s) acquired from USFWS and/or NMFS as part of this worksheet.

The consultation does not warrant reinitiation under 50 CFR §402.16; or, if reinitiation of consultation is required (e.g., due to a new species listing, critical habitat designation, or new information), the Federal action agency has reinitiated the consultation and the result of the consultation is consistent with the statements above. (Note: you must include any reinitiation documentation from the Services or consulting Federal agency with your NOI.) -

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

Documentation: Insert Text Here

Eligibility Criterion

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

☐ **Criterion F:** Issuance of section 10 permit. Potential take is authorized through the issuance of a permit under section 10 of the ESA by the USFWS and/or NMFS, and this authorization addresses the effects of the site's discharges and discharge-related activities on ESA-listed species and designated critical habitat. You must include copies of the correspondence between yourself and the participating agencies in your SWPPP and your NOI.

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

Documentation: Insert Text Here

3.2 Historic Property Screening Process

Appendix E, Step 1

Do you plan on installing any stormwater controls that require subsurface earth disturbance, including, but not limited to, any of the following stormwater controls at your site? Check all that apply below, and proceed to Appendix E, Step 2.

☐ Dike

☐ Berm

☒ Catch Basin

☒ Pond

☒ Constructed Site Drainage Feature (e.g., ditch, trench, perimeter drain, swale, etc.)

☒ Culvert

☐ Channel

☐ Other type of ground-disturbing stormwater control:

Appendix E, Step 2

If you answered yes in Step 1, have prior professional cultural resource surveys or other evaluations determined that historic properties do not exist, or have prior disturbances at the site have precluded the existence of historic properties? ☒ YES ☐ NO

- If yes, no further documentation is required for Section 3.2 of the Template and you may provide the prior documentation in your SWPPP.
- If no, proceed to Appendix E, Step 3.

3.3 Safe Drinking Water Act Underground Injection Control Requirements

Instructions (see CGP Part 7.2.9.c):

- If you will use any of the identified controls in this section, document any contact you have had with the applicable State agency or EPA Regional Office responsible for implementing the requirements for underground injection wells in the Safe Drinking Water Act and EPA's implementing regulations at 40 CFR Parts 144-147.
- For State UIC program contacts, refer to the following EPA website: https://www.epa.gov/uic.

Do you plan to install any of the following controls? Check all that apply below.

☐ Infiltration trenches (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system)

☐ Commercially manufactured pre-cast or pre-built proprietary subsurface detention vaults, chambers, or other devices designed to capture and infiltrate stormwater flow

☐ Drywells, seepage pits, or improved sinkholes (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system)

SECTION 4: EROSION AND SEDIMENT CONTROLS AND DEWATERING PRACTICES

General Instructions (See CGP Parts 2.2 and 7.2.6):

- Describe the erosion and sediment controls that will be implemented at your site to meet the requirements of CGP Part 2.2.
- Describe any applicable stormwater control design specifications (including references to any manufacturer specifications and/or erosion and sediment control manuals/ordinances relied upon).
- Describe any routine stormwater control maintenance specifications.
- Describe the projected schedule for stormwater control installation/implementation.

4.1 Natural Buffers or Equivalent Sediment Controls

Buffer Compliance Alternatives

Are there any receiving waters within 50 feet of your project's earth disturbances? ☐ YES ☒ NO

(Note: If no, no further documentation is required for Section 4.1 in the SWPPP Template. Continue to Section 4.2.)

SECTION 5: Construction Period Stormwater Pollution Prevention Plan

5.1 Stormwater Pollution Prevention Standards

Introduction

The purpose of this plan is to establish requirements and instruction for the management of construction related storm water discharges. These requirements have been established to comply with applicable federal, state and local laws, regulations and standards. Best Management Practices (BMPs) are one of the major issues addressed and they will be incorporated in order to mitigate for potential pollutants, sediments and storm water peak flows, and to dissipate storm water velocities.

The purpose of storm water management is to prevent erosion both on the construction site itself and on adjacent undisturbed areas, and to prevent sedimentation through both stabilization and structural control practices. Storm water management also addresses pollution prevention using measures to reduce pollutants in storm water as well as using good housekeeping practices on the construction site.

All contractors working on the project will be responsible for stormwater management from construction activities that are contractually their responsibility, and must ensure that their activities are not compromising another contractor's stormwater controls or Best Management Practices (BMPs).

Coordinator

The construction site coordinator for the building is the General Contractor. His duties include the following:

- Implementation of this plan;

- Oversee maintenance practices identified as BMPs;
- Conduct or provide for inspection and monitoring activities;
- Identify other potential pollutant sources and make sure they are added to the plan;
- Identify any deficiencies and make sure they are corrected;
- Ensure that any changes in construction plans are addressed.

Sequence of Construction Activity

The contractor shall ensure specified erosion and sedimentation controls are in place and functional prior to commencement of anticipated work associated with construction as shown on the approved plans. Similar erosion and sedimentation control measures shall be deployed prior to commencement of all incidental and unanticipated tasks to complete the work.

Minimum erosion and sedimentation control standards for the work shall be as outlined in the Massachusetts Erosion and Sedimentation Control Guidelines for urban and suburban areas, this document, and the approved Site Plans.

At a minimum, the contractor's construction schedule shall meet the following constraints and other measures listed in this document:

1. Install erosion control measures prior to earth disturbance.
2. Clear and grub to the limits of work proposed on this plan as required for construction.
3. Construct drainage facilities, temporary sediment traps, and temporary swales as soon as possible in the construction sequence.
4. Excavate for building foundation.
5. Install foundation and construct building.
6. Maintain erosion controls as needed.
7. When all exposed surfaces are stabilized, the drainage system components shall be cleaned of accumulated sediment. Erosion Control Measures shall be removed as directed by the Engineer.

Potential Sources for Storm Water Contamination

Any activities and processes that result either in the generation of storm water or the potential to add pollutants to run-off are subject to the requirements of this document. This includes all areas of land disturbed either through grading, excavating, and construction or material storage areas. Water that comes in contact with the surface of the project site as a result of precipitation (snow, hail, rain, etc.) is considered as storm water associated with construction activity and is subject to the requirements of this plan.

<u>Grading and Site Excavation Operations</u> – Exposed soils have the potential for erosion and discharge of sediment to off-site areas.

<u>Fugitive Dust</u> – Dust generated by construction vehicles can be deposited in wetlands and waterways.

<u>Foundation/Duct Bank Construction</u> – Excavating for foundations create soil stockpiles with the potential for erosion.

Materials Storage Areas – general construction materials, solvents, adhesives, paving materials, paints, aggregates, trash, etc….

Construction Vehicles – Refueling of vehicles may spill or drip gasoline and diesel fuel onto the ground. On-site maintenance of excavating equipment may drip hydraulic oil, lubricants and antifreeze onto the ground.

Concrete trucks are directed to wash out their chutes, etc. at designated areas only and the effluent must be discharged into an Owner approved BMP and cannot be discharged into the closed drainage system. These concrete washout area(s) shall be as remote and far away from the top of bank drainage structures as possible.

Temporary and Permanent Erosion Control Practices

The contractor shall be solely responsible for setting up erosion and sedimentation control prior to construction. The contractor will utilize a system of operations and all necessary erosion and sedimentation control measures, even if not specified herein or elsewhere, to minimize erosion damage at the site. The following information explains how potentially polluted discharges will be controlled, filtered, and on site. The locations of the proposed BMPs and control measures will be depicted on the site plans.

Erosion and Sediment Controls

Erosion and sediment controls have been incorporated in the design of the site with the objective of retaining sediment on site, filtering and reducing stormwater discharge and protecting undisturbed areas. A combination of stabilization and structural practices is included to meet the objective, as described in detail below. The following is a list of common temporary and permanent structural erosion control devices, which may be applied:

Temporary:
- Silt Fence
- Stone Check Dams/ Stone Protection Sediment Trap
- Stabilized Construction Entrance
- Stockpile, silt fabric liner and hay bale perimeter control
- Storm drain inlet protection (hay bales)

Permanent: Stabilization of all disturbed areas with pavement, stone, or loam/ seed.

Throughout the development project, erosion controls will be installed to prevent sedimentation from disturbed areas. The erosion and sedimentation control devices, as depicted in the Site Plans, must be installed prior to a land disturbance on the project site. The controls will be inspected on a regular basis (weekly) and as adequate supply of erosion control materials such as haybales and filter fabric will be approximately stored onsite in the instance immediate repairs are required. Existing and proposed catch basins and storm drain inlets will be protected from additional sedimentation via filter fabric inserts in the grates, or perimeter haybales placed around the inlet. The temporary measures will not be removed until permanent stabilization has occurred.

A gravel construction entry pad will be installed to reduce any offsite tracking. The location of this area or multiple areas shall be determined by site contractor. Street sweeping will also be utilized in an effort to reduce pollutants in the stormwater. Areas that will not be constructed for some time should not be cleared until the area is ready for development.

Stabilization Measures
Stabilization of surfaces includes the placement of pavement, stones, and building structures. Any remaining disturbed areas following construction will be loamed and seeded, mulched, landscaped, or planted for final stabilization.

Areas that have been completed or that will not be worked on for more than 14 days should be stabilized with permanent vegetative cover as soon as possible but not more than 14 days after the last construction activity. Surfaces that are disturbed by ongoing construction activities or erosion processes shall be stabilized as soon as possible. Loam will not be placed unless it is to be seeded or otherwise stabilized in an appropriate manner directly thereafter. All disturbed areas will have a minimum of 4" of loam placed before being seeded and mulched. Consideration will be given to hydro- mulching, especially on slopes in excess of 3 to 1. Loamed and seeded slopes will be protected from washout by mulching or other acceptable slope protection until vegetation begins to grow. All landscaping and plantings shall be conducted in accordance with approved plans.

Temporary seeding or mulching or stonework will be performed on areas that are left bare for more than 14 days but will be under construction sometime in the future. Soil stockpiles stored for twenty-four (24) hours or longer will be provided with any necessary erosion control to prevent erosion and sedimentation, including installation of perimeter haybales/silt fence, silt fabric liner and plastic sheeting, as shown on the Plans.

Solid Waste
Waste disposal receptacles and trailers will be used for the disposal of construction debris, which will be removed from site according to state, local and federal guidelines. Construction debris will include pavement, utility, earth and building materials, which cannot be reused. The receptacles will be located on-site, covered, and placed well away from catch basins as possible. All machinery will be operated and maintained so as to limit impacts avoiding leakage of fuel. If stockpiles of debris materials are necessary, perimeter controls or plastic sheeting/covering will be used if deemed necessary during regular site inspections. A concrete washout area will be established as necessary and utilized.

Portable sanitary units will be placed on-site during construction and will be serviced regularly.

Dust Control
To avoid sediment tracking and/or fugitive dust from leaving the site, a variety of mitigation measures are employed. As needed, a stone entrance for construction vehicles shall be established. Also, as necessary, water trucks shall be used to wet dry, dusty soil if it becomes an issue. Street sweeping shall be performed as needed to reduce the build-up of dust and sediment on roadways and parking areas.

Material Storage
Material storage yards are also covered by this SWPPP and must be managed appropriately. At this time, it is anticipated that all storage of materials will occur on site. The storage area will also include supplies of additional erosion control materials such as haybales. The contractor will mark the plans with the location of the storage area.

Hazardous materials necessary for construction will be stored in water tight containers or buildings in accordance with state and local regulations and that the manufacturer's recommendations, with appropriately sized spill kits on hand. The storage site will be

inspected for signs of leakage or unsafe storage and transfer practices. Any heavy equipment permitted to work adjacent to wetland areas, will be equipped with emergency spill kits.

Inspections

Maintenance of existing and proposed best management practices (BMPs) to address storm water management facilities during construction is an on-going process. The owner's appointed representative is responsible for performing regular inspections of erosion controls and ordering repairs as necessary. The inspections will observe all sources of storm water or non-storm water discharges as identified in this plan, as well as the status of the receiving waters. The inspector should also be concerned with the condition of all implemented BMPs and how well they are controlling or filtering run-off. The inspection will also recommend whether corrective actions to established BMPs are required or whether additional BMPs are necessary to prevent storm water contamination based on field conditions.

Status of slopes, stockpiles, or other disturbed surfaces during construction should also be noted, including whether an area is experiencing erosion or reaching stabilization. The inspector is responsible not only for the inspection of the condition of the construction site, but all material storage yards as well. Storage yards should be checked for leakage, unsafe storage, and for the presence of adequate spill kit materials. Inspectors must be aware of practices on site, which may lead to additional pollutants in discharges, such as locating dumpsters or stockpiles or refueling equipment near direct flow of storm water.

Inspections will be performed by qualified personnel as required or once a month. The inspections must be documented on the inspection form provided in Exhibit B and completed forms will be provided to the on-site supervisor and maintained at the Owner's office during the entire construction.

Each inspection report (Exhibit B) will summarize the scope of the inspection, name(s) and qualifications of personnel making the inspection, and major observations relating to the implementation of this plan including compliance and non-compliance items.

Maintenance of existing and proposed best management practices (BMPs) to address storm water management facilities during construction is an on-going process. Build-up of sediment must be cleared away and old materials replaced so that the controls are working to capacity. Silt must not be allowed to accumulate more than halfway up the height of the hay bales or silt fencing.

If a portion of the site/project area is permanently stabilized, inspections can cease in that are as long as the condition has been documented by amending this plan.

5.2 Potential Sources of Pollution

Construction Site Pollutants

The materials or substances listed below are expected to be present on site during construction:

- Concrete
- Detergents
- Paints (enamel and latex)
- Metal Studs
- Concrete
- Tar
- Fertilizers
- Petroleum Based Products
- Cleaning Solvents
- Wood
- Masonry Block
- Roofing Shingles

5.3 Spill Prevention and Response

Material Management Practices
The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff.

Good Housekeeping:
The following good housekeeping practices will be followed onsite during the construction project:

- An effort will be made to store only enough product required to do the job.
- All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
- Products will be kept in their original containers with the original manufacturer's label.
- Substances will not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of a product will be used up before disposing of the container
- Manufacturer's recommendations for proper use and disposal will be followed
- The site superintendent will inspect daily to ensure proper use and disposal of materials onsite.

Hazardous Products
These practices are used to reduce the risks associated with hazardous materials.

- Products will be kept in original containers unless they are not resalable.
- Original labels and material safety data will be retained; they contain important product information.

- If surplus product must be disposed of, manufacturers' or local State recommended methods for proper disposal will be followed.

Product Specific Practices
The following product specific practices will be followed onsite:

Petroleum Products
All onsite vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled. Any asphalt substances used onsite will be applied according to the manufacturer's recommendations.

Fertilizers
Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

Paints
All containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewer system but will be properly disposed of according to manufacturers' instructions or State and local regulations.

Concrete Trucks
Concrete trucks will not be allowed to wash out or discharge surplus concrete or drum wash water on the site.

Spill Control Practices
In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup:

- Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite. Equipment and materials will include but not be limited to brooms, dustpans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
- All spills will be cleaned up immediately after discovery.
- The spill area will be kept well ventilated and personnel will wear appropriate State or local government agency, regardless of the size.
- The spill prevention plan will be adjusted to include measures to prevent this type of spill from reoccurring and how to clean up the spill if there is another one. A description of the spill, what cause it, and the cleanup measures will also be included.

SECTION 6: INSPECTION AND MAINTENANCE REPORT

Inspection No.:_____ Location:
_____

To be completed as necessary during construction activities. After site stabilization, to be completed at least once per month for three years of until a Notice of Termination is filed.

Inspector Name/Qualifications:

Weather at the Time of Inspection:

Amount and Date of Last Precipitation Event:

Site Stabilization Status:

Project Section	Date and Type of Last Disturbance	Conditions/Stability	Recommendations
Perimeter Erosion Controls (Haybale/Silt Fence, etc.)			
Building Construction			
Exposed Slopes and Stockpiles			
Water Quality Inlet			
Hazardous Materials/Fuels Storage Conditions			
Catch Basins and Piping Network			
STC 450i Stormceptor			
Detention Ponds			

SECTION 7: CERTIFICATION AND NOTIFICATION

I certify under penalty of law 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. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____ Title: _____

Signature: _____ Date: _____

[Repeat as needed for multiple construction operators at the site.]

SWPPP APPENDICES

Attach the following documentation to the SWPPP:

Appendix A – Site Maps

Appendix B – Copy of 2022 CGP
(Note: The 2022 CGP is available at https://www.epa.gov/npdes/2022-construction-general-permit-cgp)

Appendix C – NOI and EPA Authorization Email

Appendix D – Site Inspection Form and Dewatering Inspection Form (if applicable)
(Note: EPA has developed a sample site inspection form template that CGP operators can use. The template is available at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates). Where the operator will be dewatering at the site, EPA has developed a separate dewatering inspection form template to use to document the required information. This template is available at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates.

Appendix E – Corrective Action Log
(Note: EPA has developed a sample corrective action log that CGP operators can use. The form is available at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates)

Appendix F – SWPPP Amendment Log

Appendix G – Subcontractor Certifications/Agreements

Appendix H – Grading and Stabilization Activities Log

Appendix I – Training Documentation

Appendix J – Delegation of Authority

Appendix K – Endangered Species Documentation

Appendix L – Historic Preservation Documentation

Appendix M – Rainfall Gauge Recording

Appendix N – Turbidity Meter Manual and Manufacturer's Instructions

Appendix A – Site Maps

INSERT SITE MAPS CONSISTENT WITH TEMPLATE SECTION 2.6

Appendix B – Copy of 2022 CGP

INSERT COPY OF 2022 CGP

(Note: The 2022 CGP is available at https://www.epa.gov/npdes/2022-construction-general-permit-cgp)

Appendix C – Copy of NOI and EPA Authorization Email

INSERT COPY OF NOI AND EPA'S AUTHORIZATION EMAIL PROVIDING COVERAGE UNDER THE CGP

Appendix D – Copy of Site and Dewatering Inspection Forms

INSERT COPIES OF SITE AND DEWATERING INSPECTION FORMS YOU WILL USE TO PREPARE INSPECTION REPORTS

(Note: EPA has developed a sample site inspection and dewatering inspection form templates that CGP operators can use. The template is available at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates)

Appendix E – Copy of Corrective Action Log

INSERT COPY OF CORRECTIVE ACTION LOG YOU WILL USE

(Note: EPA has developed a sample corrective action log that CGP operators can use. The form is available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources)

Appendix F – *Sample* SWPPP Amendment Log

Instructions (see CGP Part 7.4):

- Create a log here of changes and updates to the SWPPP. You may use the table below to track these modifications.
- SWPPP modifications are required pursuant to CGP Part 7.4.1 in the following circumstances:
  - ✓ Whenever new operators become active in construction activities on your site, or you make changes to your construction plans, stormwater controls, or other activities at your site that are no longer accurately reflected in your SWPPP (this includes changes made in response to corrective actions triggered under CGP Part 5);
  - ✓ To reflect areas on your site map where operational control has been transferred (and the date of transfer) since initiating permit coverage;
  - ✓ If inspections or investigations determine that SWPPP modifications are necessary for compliance with this permit;
  - ✓ Where EPA determines it is necessary to install and/or implement additional controls at your site in order to meet requirements of the permit;
  - ✓ To reflect any revisions to applicable Federal, State, Tribal, or local requirements that affect the stormwater control measures implemented at the site; and
  - ✓ If applicable, if a change in chemical treatment systems or chemically-enhanced stormwater control is made, including use of a different treatment chemical, different dosage rate, or different area of application.

No.	Description of the Amendment	Date of Amendment	Amendment Prepared by [Name(s) and Title]
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	

Appendix G – *Sample* Subcontractor Certifications/Agreements

SUBCONTRACTOR CERTIFICATION
STORMWATER POLLUTION PREVENTION PLAN

Project Number: _____

Project Title: _____

Operator(s): _____

As a subcontractor, you are required to comply with the Stormwater Pollution Prevention Plan (SWPPP) for any work that you perform on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

I certify under the penalty of law that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the practices described in the SWPPP.

This certification is hereby signed in reference to the above named project:

Company: _____

Address: _____

Telephone Number: _____

Type of construction service to be provided: _____

_____

_____

Signature: _____

Title: _____

Date: _____

Appendix H – *Sample* Grading and Stabilization Activities Log

Date Grading Activity Initiated	**Description of Grading Activity**	**Description of Stabilization Measure and Location**	**Date Grading Activity Ceased** (Indicate Temporary or Permanent)	**Date When Stabilization Measures Initiated**
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE

Appendix I –Training Documentation

INSERT DOCUMENTATION CONSISTENT WITH SWPPP TEMPLATE SECTION 1.2 AND CGP PART 7.2.2

Appendix J – *Sample* Delegation of Authority Form

Delegation of Authority

I, _____ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the EPA's Construction General Permit (CGP), at the _____ construction site. The designee is authorized to sign any reports, stormwater pollution prevention plans and all other documents required by the permit.

_____ (name of person or position)
_____ (company)
_____ (address)
_____ (city, State, zip)
_____ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in Appendix G of EPA's CGP, and that the designee above meets the definition of a "duly authorized representative" as set forth in Appendix G.

I certify under penalty of law 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. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____

Company: _____

Title: _____

Signature: _____

Date: _____

Appendix K – Endangered Species Documentation

INSERT DOCUMENTATION CONSISTENT WITH SWPPP TEMPLATE SECTION 3.1 AND CGP APPENDIX D

Appendix L – Historic Properties Documentation

INSERT DOCUMENTATION CONSISTENT WITH SWPPP TEMPLATE SECTION 3.2 AND CGP APPENDIX E

Appendix M – Rainfall Gauge Recording

Use the table below to record the rainfall gauge readings at the beginning and end of each work day. An example table follows.

Month/Year			Month/Year			Month/Year		
Day	Start time	End time	Day	Start time	End time	Day	Start time	End time
1			1			1		
2			2			2		
3			3			3		
4			4			4		
5			5			5		
6			6			6		
7			7			7		
8			8			8		
9			9			9		
10			10			10		
11			11			11		
12			12			12		
13			13			13		
14			14			14		
15			15			15		
16			16			16		
17			17			17		
18			18			18		
19			19			19		
20			20			20		
21			21			21		
22			22			22		
23			23			23		
24			24			24		
25			25			25		
26			26			26		
27			27			27		
28			28			28		
29			29			29		
30			30			30		
31			31			31		

Example Rainfall Gauge Recording

April 2022			May 2022			June 2022		
Day	7:00 am	4:400 pm	Day	7:00 am	4:00 pm	Day	7:00 am	4:00 pm
1	--	--	1	0.2	0	1	0	0.4
2	--	--	2	0	0	2	0	0
3	0	0	3	0.1	0.3	3	--	--
4	0	0.3	4	0	0	4	--	--
5	0	0	5	0	0	5	0	0

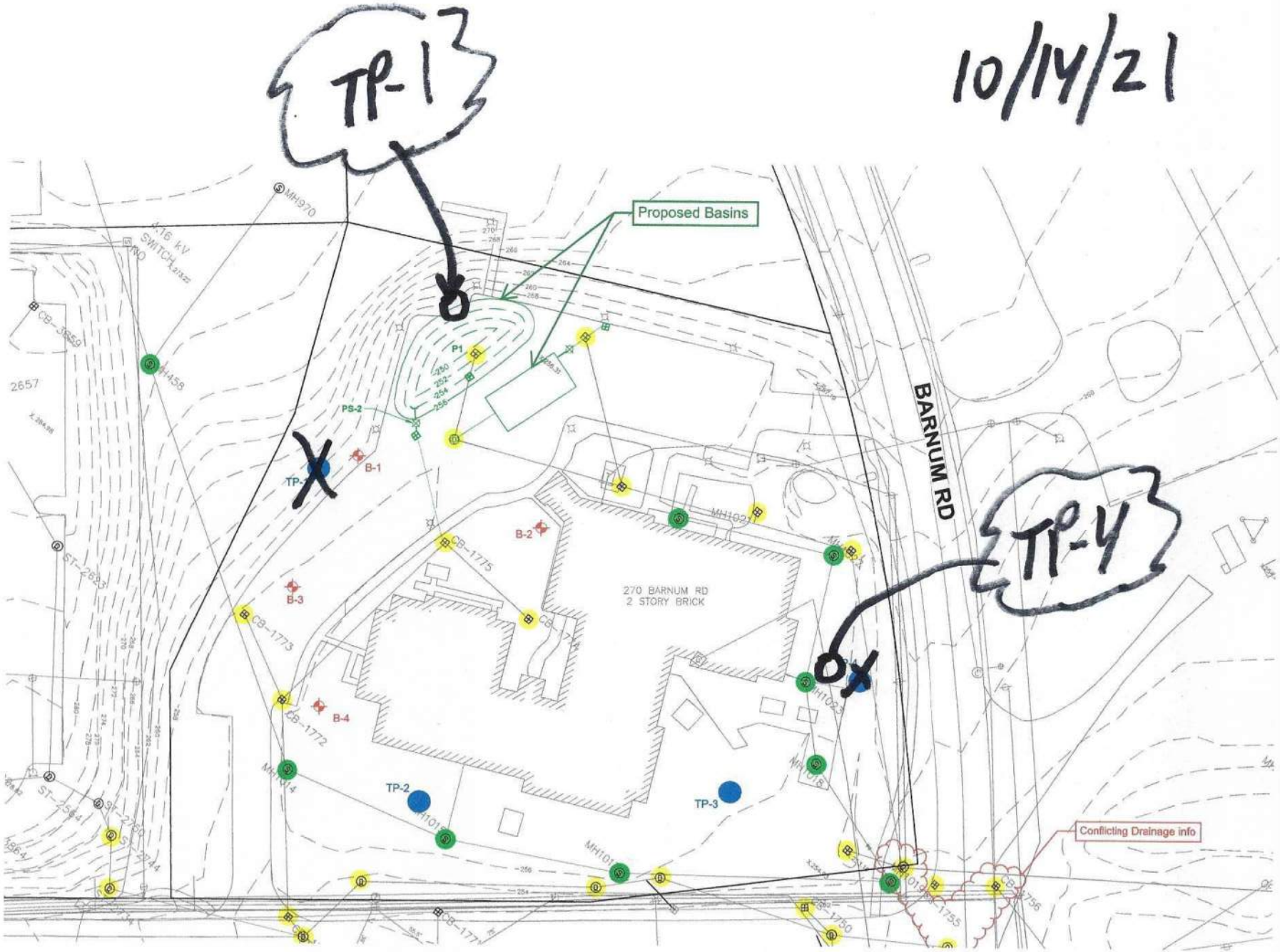
In this example (for only partial months), 0.25-inch rainfall inspections would have been conducted on April 4 and June 1.

Appendix N – Turbidity Monitoring Sampling Documentation

INSERT DOCUMENTATION CONSISTENT WITH SWPPP TEMPLATE SECTION 7.2.8 AND CGP PART 3.3.4

TEST PITS LOCATION

10/14/21


TP-1
Proposed Basins
P1
PS-2
B-1
B-2
B-3
B-4
TP-2
TP-3
TP-4
270 BARNUM RD
2 STORY BRICK
BARNUM RD
Conflicting Drainage info
MH970
MH458
CB-1775
CB-1773
CB-1772
CB-1774
MH1023
MH1018
CB-1755
CB-1756
CB-1750
ST-2657
ST-2744
2657