DOLLAR GENERAL
FRESH DISTRIBUTION CENTER

Amsterdam, New York

STORMWATER MANAGEMENT PLAN

Issued for Permit

DGC220025

OCTOBER 13, 2023

Élan DESIGN LAB
Élan Design Lab, Inc.
Flour Exchange Building
310 4th Ave S
Suite 1006
Mpls, MN 55415

CERTIFICATION OF SWMP PREPARER

Name: Stephen M. Johnston, PE

Title: Principal Civil Engineer

Signature: 

Date: October 13, 2023

Introduction

Dollar General (DG) Fresh Distribution Center will include the construction of a 167,500 square foot cold storage warehouse with dispatch and administrative offices, along with associated employee, truck, and trailer parking, loading docks, a 420 square foot guard house, a 524 square foot pumphouse with 1,406 square foot water tank, and an above ground fuel station.

The 21.47-acre site is currently entirely pervious and is used for agricultural purposes. The existing topography slopes from the southeast corner of the site at an elevation of 544 feet to the northwest corner at an elevation of 470 feet. Like the larger distribution center located across Highway 5S from the new cold storage warehouse, the site will be used for a large-scale warehousing and distribution facility. By their nature these facilities need to be relatively flat to readily enable truck movement and parking. As a result, large flat sites with expansive impervious areas generate significant runoff that must be collected and disposed of quickly to minimize disruption of the facility. The stormwater management system proposed will address site specific constraints and meet stormwater requirements of the New York State Pollution Discharge Elimination System.

Project Information

Owner/Developer	Dollar General Corporation 100 Mission Ridge Goodlettsville, TN 37072 Contact: Kacey Levine klevine@dollargeneral.com (404) 309-9846			
Site Address	20XX NY HWY 5S Amsterdam, NY			
Rainfall Intensity	Water Quality Volume (WQv)	1 yr. – 24 hr. Channel Protection Volume (Cpv)	10 yr. – 24 hr. Overbank Flood (Qp)	100 yr. – 24 hr. Extreme Storm (Qf)
	1.1”	2.2”	3.75”	6.5”

Regulatory Requirements

The stormwater management plan for this site shall meet the requirements of the New York State Pollution Discharge Elimination System (SPDES). Figure 1.0 is taken from Chapter 4 of the New York State Stormwater Management Design Manual (SWDM). The table summarizes the requirements for treatment of runoff from the site.

Table 4.1 New York Stormwater Sizing Criteria1	
Water Quality Volume (WQV) Water Quality	90% Rule: WQv(acre-feet) = [(P)(Rv)(A)] /12 Rv = 0.05+0.009(I) I = Impervious Cover (Percent) P(inch) = 90% Rainfall Event Number (See Figure 4.1)2 A = site area in acres
Runoff Reduction Volume(RRv)	RRv (acre-feet) = Reduction of the total WQv by application of runoff reduction techniques and standard SMPs with RRv capacity to replicate pre-development hydrology. The minimum required RRv is defined as the Specified Reduction Factor (S), provided objective technical justification is documented.
Channel Protection Volume(Cpv)	Default Criterion: Cpv(acre-feet) = 24 hour extended detention of post-developed 1-year, 24-hour storm event; remaining after runoff reduction. Where site conditions allow, Runoff reduction of total CPv , is encouraged tion for Sites Larger than 50 Acres: Distributed Runoff Control - geomorphic assessment to determine the bankfull channel characteristics and thresholds for channel stability and bedload movement.
Overbank Flood (Qp)	Qp(cfs)=Control the peak discharge from the 10-year storm to 10-year predevelopment rates.
Extreme Storm (Qf)h	Qf(cfs)=Control the peak discharge from the 100-year storm to 100-year predevelopment rates. Safely pass the 100-year storm event.
Alternative method (WQv):	Design, construct, and maintain systems sized to capture, reduce, reuse, treat, and manage rainfall on-site, and prevent the off-site discharge of the precipitation from all rainfall events less than or equal to the 95th percentile rainfall event, computed by an acceptable continuous simulation model.

Figure 1.0: NYS SWDM Table 4.1

Existing Site Conditions

At present the project drainage is split into three onsite sub catchments and two offsite sub catchments that drain to the northwest. The Existing Drainage Map visually accompanies this section and is included in the attachments of this report. The following is a summary of the drainage patterns for each sub catchment:

- Sub catchment 1E: 8.472 acres west of the ditch drains to the “Area of Potential effect”.
- Sub catchment 2E: 11.168 acres draining to the wetland and ditch.
- Sub catchment 3E: 1.876 acres draining offsite to north.
- Sub catchment 4E: 1.060 acres of run-on and ultimately to north offsite.
- Sub catchment 5E: 4.670 acres to the 18” culvert and run on to wetland & ditch.

The site includes an existing wetland that totals 0.51 acres. This wetland stretches along a narrow ditch that drains from the south where it picks up the road drainage ditch and existing 18-inch culvert along Highway 5S. The drainage continues north through the center of the site to the northern, widened portion of this wetland that is intended to be preserved. Wetland mitigation plans are to be provided by Prime AE and the preliminary mitigation report is included in the attachments of this report. The runoff that flows through the ditch will require a bypass culvert designed to NYS DOT standards to route the water around the west side of the site and to the northwest wetland mitigation area.

A geotechnical investigation was prepared by Daniel G. Loucks, P.E. in January, 2021. The report indicates large amounts of dense clayey silts (ML) not suitable for infiltration. The geotechnical report was also consistent with the USDA Soil Survey which indicated largely Hydrologic Soil Group C/D and trace amounts of B soils, see Figure 2 below. The Geotechnical Report is included in the attachments of this report.

The significant grade differential across the site along with the existing wetlands and poor draining soils start to limit stormwater options on the site. Given the nature of the site and the proposed project the best solution for managing stormwater on the site is to direct runoff in a way that follows existing hydrology and route runoff through SMPs to provide RRv.

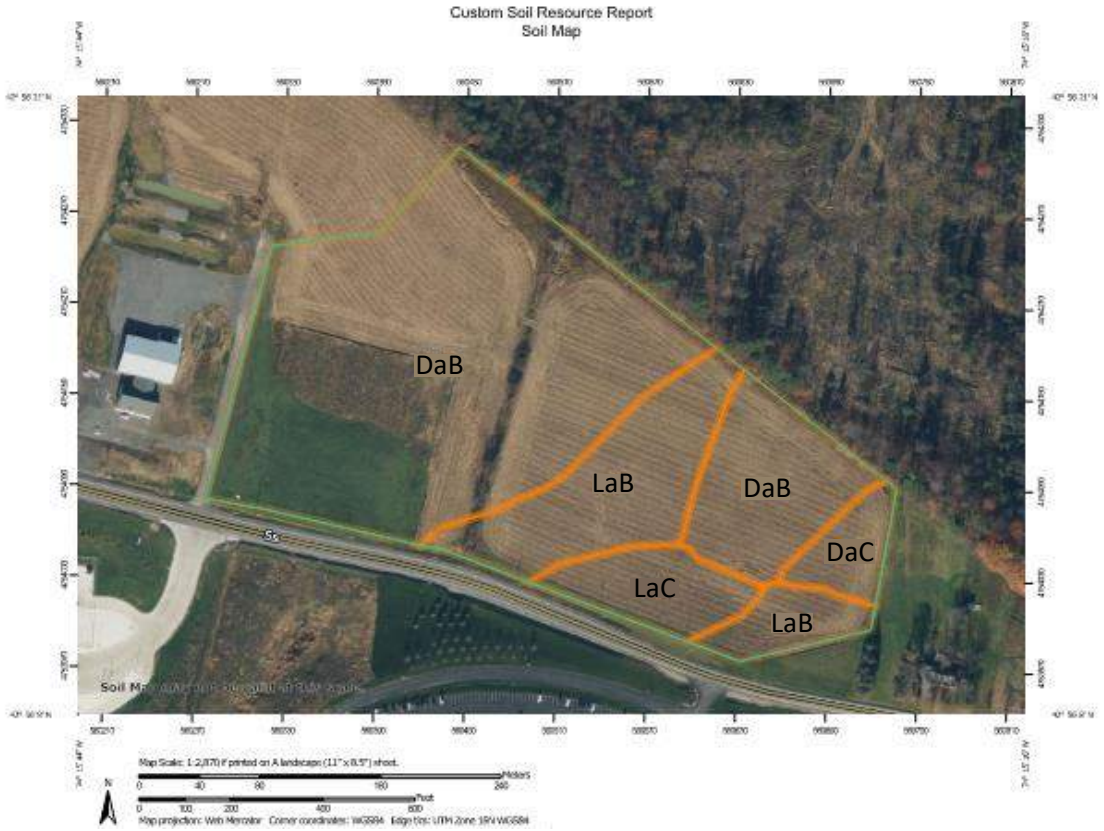


Figure 2: USDA Web Soil Survey Map

Table 1.0: USDA Web Soil Survey Key and Soil Types

Map Unit Symbol	Map Unit Name	Percent of AOI	Hydrologic Soil Group
DaB	Darien silt loam 3-8% slopes	71.2%	C/D
DaC	Darien silt loam 8-15% slopes	3.8%	C/D
LaB	Lansing silt loam 3-8% slopes	18.4%	B
LaC	Lansing silt loam 8-15% slopes	6.5%	B

Design Overview

Stormwater management is provided by three primary Stormwater Management Practices (SMPs): a wet pond, a bioretention basin and a dry swale. The wet pond is the largest of the SMP's on site and is the last feature runoff will reach prior to discharging from the site. The pond is sized to provide a large portion of the required WQv, and to provide rate control for the site. The RRv is provided by the dry swale and bioretention basin. The dry swale will treat a large portion of disconnected warehouse roof in addition to runoff from the south end of the parking area which will be pretreated by the dry swale forebay. Figure 3 below shows a basic layout of the site with SMP locations and can also be found in the attachments of this report within the O&M. The overall site areas are summarized in Table 2.0 below.

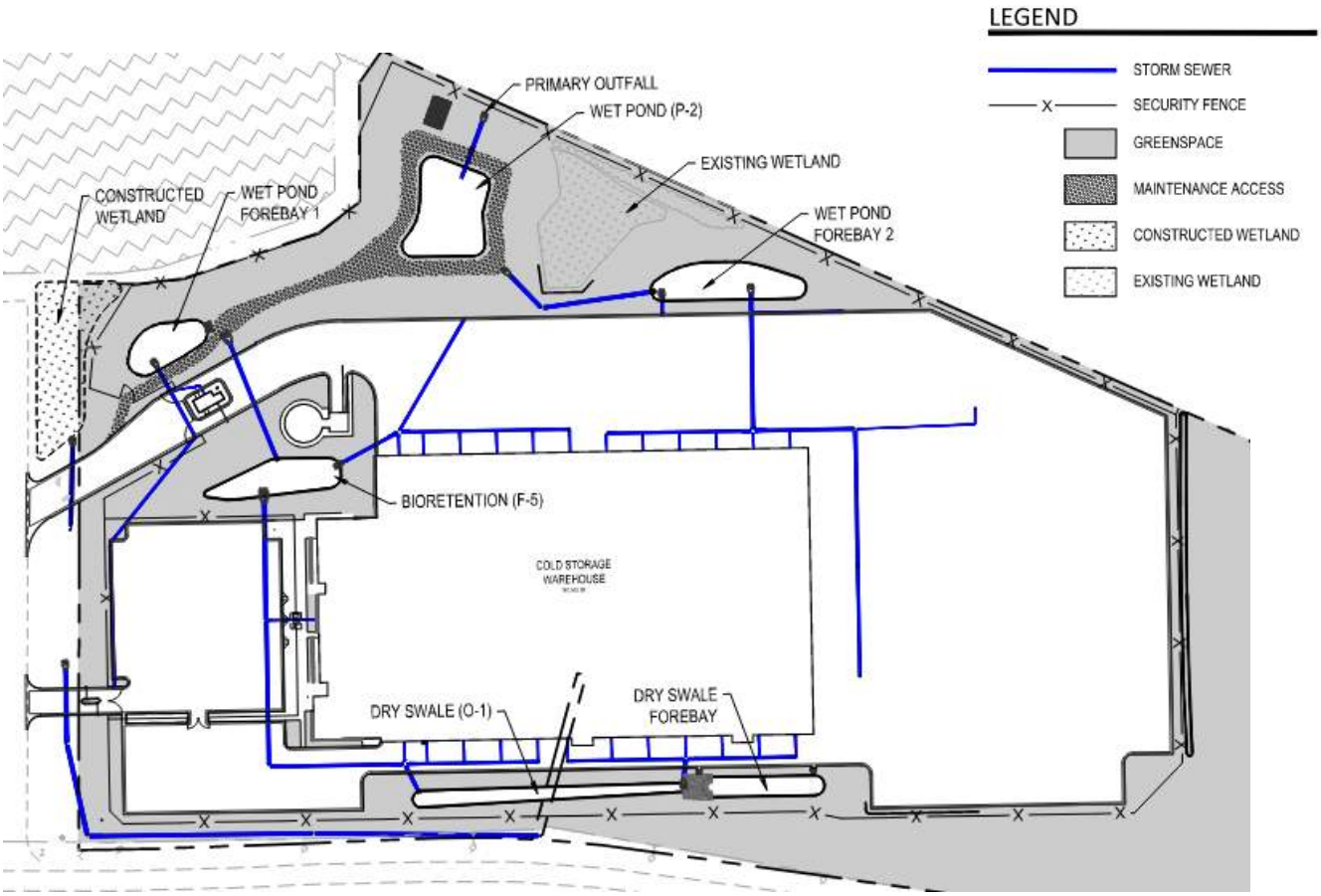


Figure 3.0: SMP Location Map

Table 2.0: Project Area Overview

	Pervious Area (Acres)	Impervious Area (Acres)	Total Area (Acres)
Existing Site	21.52*	0.00	21.52
Proposed Site	8.83*	12.69	21.52
Disturbed Area	9.06*	12.79	21.85

* Pervious area includes wetland area and stormwater pond area

The proposed project is split into 8 onsite sub catchments, and 2 offsite sub catchments. The Proposed Drainage Map attached visually accompanies this section. Their drainage pattens are summarized as follows:

- Sub catchment 1P: 2.515 acres on west and north edges of site draining direct to offsite.
- Sub catchment 2P: 3.817 acres including employee parking lot, wet pond, northwest drive and loading dock area draining to forebay 1 and the wet pond.
- Sub catchment 3P: 2.930 acres of north parking lot, west warehouse roof and admin roof to the bioretention basin.
- Sub catchment 4aP: 1.699 acres including the southeast warehouse roof, southern drive, and southern pervious edge of site to the dry swale.
- Sub catchment 4bP: 2.751 acres including the southeast warehouse roof, southeastern drive, and southeastern pervious edge of site to the dry swale forebay.
- Sub catchment 5P: 5.826 acres of north and east parking area, and northeast warehouse roof to forebay 2.
- Sub catchment 6P: 1.052 acres consisting of the western half of the east berm draining to the east swale and ultimately to the north offsite.
- Sub catchment 7P: 1.060 acres of run-on to the east side of the site and ultimately offsite to the north.
- Sub catchment 8P: 0.071 acres consisting of the south edge of the site draining to the highway ditch to the bypass culvert and ultimately to the northwest.
- Sub catchment 9P: 4.670 acres of run-on from HWY 5S and edge of south neighbors to the bypass culvert and ultimately to the northwest.
- Sub catchment 10P: 0.855 acres consisting of the east edge of the onsite berm ultimately draining offsite to the north.

The soils on site are not suitable for infiltration SMP's. The project will follow design guidelines for wet pond (P-2), bioretention (F-5) and dry swale (O-1) in the NYS Stormwater Design Manual.

The base criteria water quality volume is 49,882 cubic feet calculated through the GI Worksheet attached. This is adjusted to account for the cold climate per Stormwater Design Manual Appendix I. The cold climate WQv is 55,320 cubic feet. The calculation of this value is attached in this report. The cold

climate WQv is greater than the base criteria WQv, so the stormwater management system is designed to meet the more stringent WQv 55,320 cubic feet.

Volume Control

The cold climate WQv is 1.27 acre-ft, or 55,320 cubic feet of water. Table 3.0 below breaks down the volume reduction and water quality volume provided for each Standard Stormwater Management Practice (SMP) and area/volume reduction practices.

Table 3.0: RRv & WQv Summary Table

Standard SMP/ Volume Reduction /Area Reduction Practices	Total Contributing Area (acres)	Total Contributing Impervious Area (acres)	WQv Reduced RRv (cubic feet)	WQv Treated (cubic feet)
Wet Pond (P-2)	3.82	2.27	0.00	26,415
Forebay 1				10,291
Forebay 2 (Wet Pond)	5.83	5.55	0.00	12,455
Conservation of Natural Areas	0.26	0.00		
Disconnection of Rooftop Runoff		1.04		
Bioretention Basin (F-5)	2.93	2.57	4,896	0.00
Dry Swale (O-1)	4.45	1.11	1,012	0.00
Dry Swale Forebay				0.00
Total Area Reduction RRv	0.26	1.04	3,789	0.00
Total Standard SMPs w./ RRv Reduction RRv	7.38	3.68	5,908	0.00
Total	17.28	12.54	9,697	49,161

Note that the dry swale forebay does provide pretreatment prior to the dry swale, but does not contribute to WQv. The runoff from this practice is routed to others that do provide WQv. The RRv provided by the area reduction practices are calculated in the GI worksheet as the difference between the initial base WQv and the WQv after subtracting the 0.26 acres of conservation area and the 1.04 acres of disconnected rooftop area. The RRv provided by the dry swale and the bioretention basin SMPs is also included in the GI worksheet. The GI Worksheet Summary Table is included in the attachments of this report.

The minimum RRv for the site is calculated as follows:

Specified Reduction Factor for HSG D: S = 0.2

Impervious Area: A = 12.685

Precipitation: P =1.1

Rv = 0.95

$$\text{Min. RRv} = \frac{(S * A * P * Rv)}{12} * 43560$$

$$\frac{(0.2 * 12.685 * 1.1 * 0.95)}{12} * 43560 = 9{,}624\ ft^3$$

$$\boxed{9{,}697\ > 9{,}624}$$

The provided RRV is greater than the minimum RRv, so RRv for the site is met.

The WQv required to be treated by the SMPs is 45,623 cubic feet, the cold climate WQv minus the RRv provided:

$$55{,}320\ ft^3 - 9{,}697\ ft^3 = 45{,}623\ ft^3$$

$$\boxed{49{,}161\ ft^3 > 45{,}623\ ft^3}$$

The provided WQv is 49,161 cubic feet, and exceeds the required WQv 45,623 cu ft. This exceeds the required WQv and meets New York State requirements. The wet pond, forebay 1 and 2, and dry swale forebay storage tables are provided in the attachments of the report. Table 4.0 summarizes the design and performance of the wet pond, forebay 1, and forebay 2. The dry swale and bioretention basin design and performance are summarized below in Table 5.0.

Table 4.0: SMP Design Summary

	Wet Pond	Forebay 1	Forebay 2	Dry Swale Forebay
Bottom Elevation	468.0	473.0	485.0	492.0
NWL	475.5	479.0	489.0	494.3
Storage at NWL: WQv (cubic ft)	26,415	10,291	12,455	4,342
Forebay stores min 10% of WQv		Yes	Yes	Yes
100-year HWL	480.0	480.0	490.0	494.6
Storage Above Permanent Pond (cu ft)	108,319		14,970	3,033
Primary Outfall Velocity (ft/sec) For 100-Yr 24-Hr Storm Event	10.2		3.3	2.3
Secondary Outfall Velocity (ft/sec)	0.3		0.0	
Flow Path Length to Width Ratio (Min 1.5:1)	3.2:1			
Surface Area: Drainage Area (Min 1:100)	1.3:100			

Table 5.0 SMP Design Summary

	Bioretention	Dry Swale
Bottom Elevation	486.0	490.2
OCS Overflow Elevation	486.5	
Storage @ Outlet (cu ft)	2,096	0.0
100-year HWL	487.5	493.8
Storage Above Outlet (cu ft)	18,507	20,935
100-yr Storm Max Depth (ft)	1.5’	3.8’
Slope		0.5%
Length (ft)	200	290
Width (ft)	60	6

Rate Control

The primary outfall from the site is the northwest corner, both overland and via the wet pond outlet control structure and NYSDOT Bypass culvert. This outfall is consistent with existing hydrology. The rates of outflow from the site is modeled in HydroCAD for 1-yr, 10-yr, and 100-yr 24-hr storm events, and is summarized in table 6.0 below.

Table 6.0 Rate Control Summary

	Existing (CFS)	Proposed (CFS)	Difference (CFS)
1-Yr 24-Hr (Cpv)	15.9	16.0	0.1
10-Yr 24-Hr (Qp)	43.3	40.3	(3.0)
100-Yr 24-Hr (Qf)	97.9	83.1	(14.8)

Pipe Sizing

See attached pipe sizing spread sheet and inlet drainage map for proposed on-site storm sewer. Proposed NYSDOT Bypass culvert calculations and drainage map are also included in the attachments.

Soil Erosion and Sedimentation Control

See SWPPP narrative sheet and Erosion Control Plan sheets 1C2.10, 1C2.11, and 1C2.12.

Conclusion

The stormwater management system designed for the Dollar General Fresh Distribution Center appears to meet the requirements for water quality, rate control, and volume reduction for the New York State Department of Environmental Conservation. If you have any questions or need additional information regarding this report, please feel free to contact me at mweslock@elanlab.com.

Attachments

- Cold Weather WQv Calculations
- GI Worksheet Summary Table
- Existing Drainage Map
- Proposed Drainage Map
- Existing Conditions HydroCAD Report
- Proposed Conditions HydroCAD Report
- SMP Storage Tables
- Inlet Drainage Map
- Pipe Sizing Spreadsheet
- NYSDOT Bypass Culvert Calculations
- Wetland Delineation Report
- O&M Manual
- USGS 7.5 Minute Quadrangle Map
- Geotechnical Report

WQv CALCULATIONS

Dollar General Fresh Distribution Center
Amsterdam, NY

Cold Weather Adjusted WQv:

Key: M = Moisture in Spring Snowpack (inches)

S = Annual snowfall (inches) = 60 (See NOAA Snowfall Map Below)

T = Volume Treated (acre-feet)

R_s = Snowmelt Runoff (inches)

I = Impervious Fraction = 0.59

R = Annual Runoff Volume (inches)

P = Annual Rainfall (inches) = 45 (See NOAA Precipitation Map Below)

A = Area (acres) = 21.52

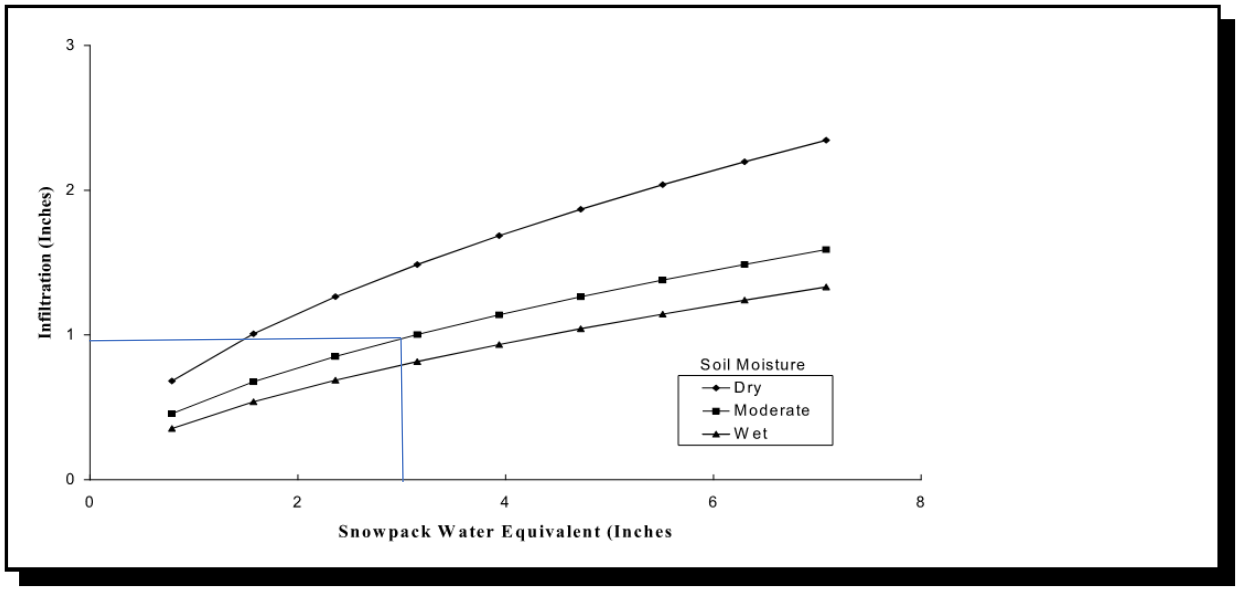
Inf = Infiltration (inches)

$$M = 0.1 * S - L$$

$$M = 0.1 * 60 = 6.0"$$

No snow is hauled offsite and sublimation losses (L) are considered negligible.

The adjusted M from winter snowmelt is 50%, so M_{adj} = 3.0”



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WQv CALCULATIONS CONT.

From the above graph pulled from the NYS Stormwater Design Manual (Figure I.2) assuming moderate soil moisture, Inf = 1”

$$R_s = [(1 - I)(M - Inf)] + (M * I)$$

$$R_s = [(1 - 0.59) * (3.0"\text{-}1)] + (0.59 * 3.0") = 2.59"$$

$$R = 0.9(0.05 + 0.9 * I)P$$

$$R = 0.9(0.05 + 0.9 * 0.59)45" = 23.53"$$

$$T = (R_s - 0.05 * R)\frac{A}{12}$$

$$T = (2.59"\text{-}0.05 * 23.53")\frac{21.52\ ac}{12} = 2.53\ acre - ft$$

The initial water quality volume based on the base criteria would be 49,882 cubic feet, or 1.15 acre-ft as calculated by the GI worksheet – also attached to this SWMP.

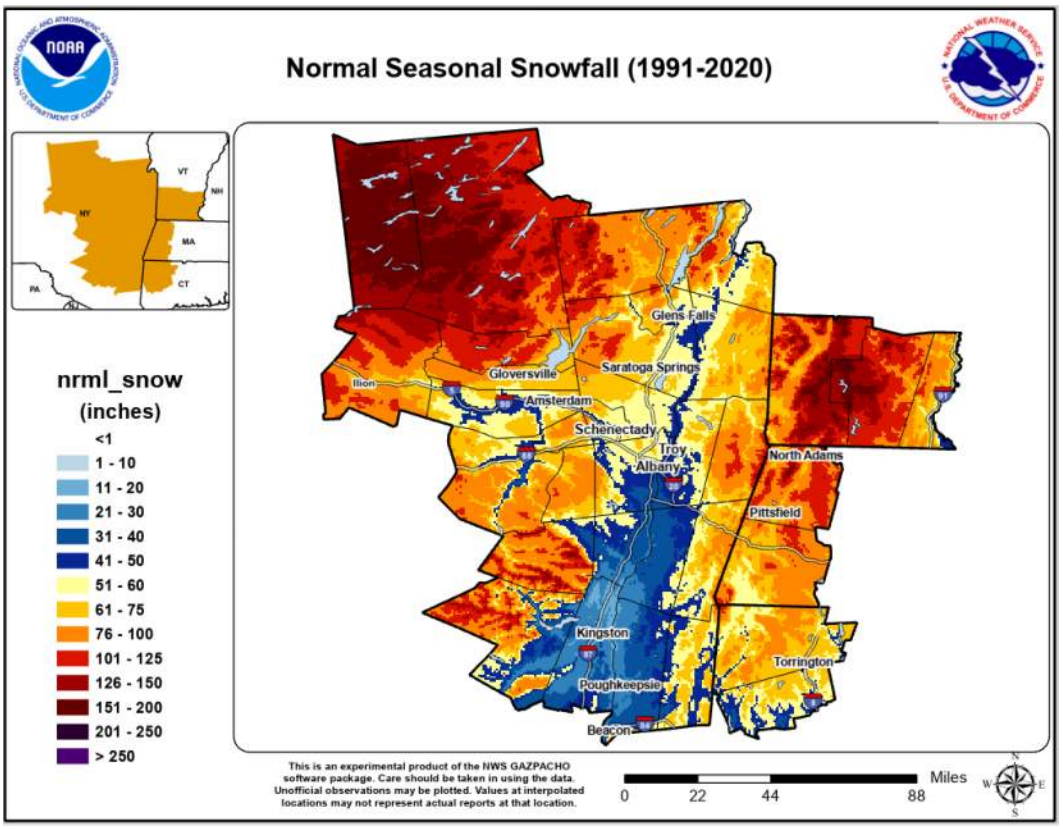
The cold weather adjusted WQv is 1.27 acre-ft as calculated below.

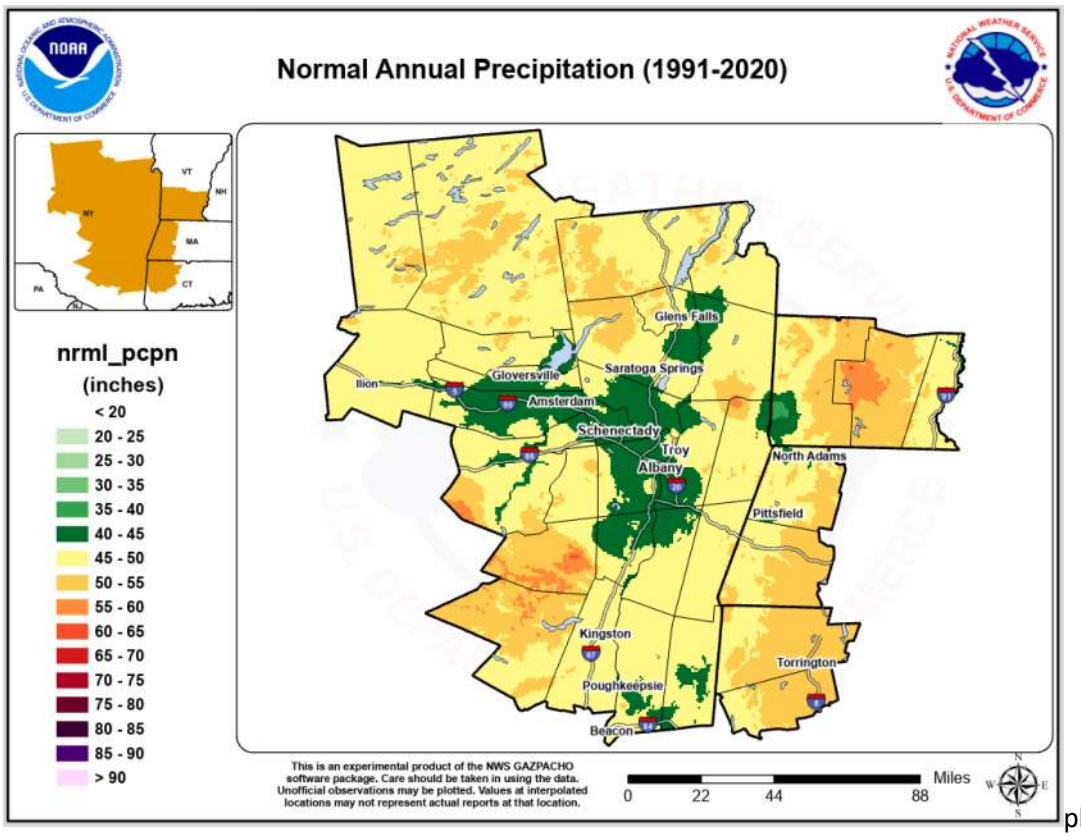
$$WQv = 0.5 * T$$

$$WQv = 0.5 * 2.53 = 1.27\ \text{acre} - \text{ft}$$

Since the cold weather adjusted WQv is greater than the base criteria WQv, the WQv used in design is 1.27 acre-ft, or 55,320 cubic feet.

WQv CALCULATIONS CONT.





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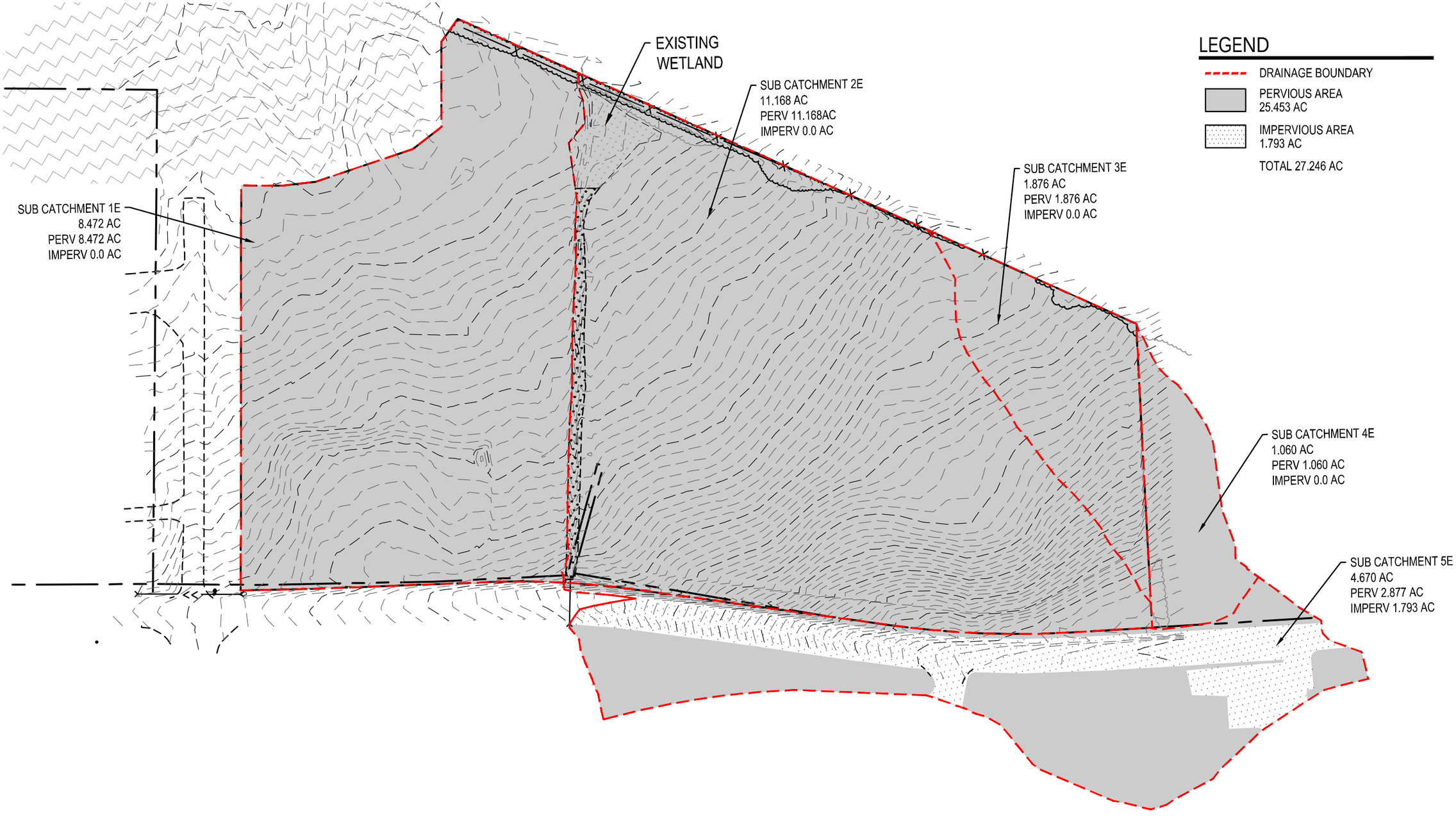
Runoff Reduction Volume and Treated volumes						
	Runoff Reduction Techiques/Standard SMPs		**Total Contributing Area**	**Total Contributing Impervious Area**	**WQv Reduced (RRv)**	**WQv Treated**
			(acres)	**(acres)**	**cf**	**cf**
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.26	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		1.04		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.00	0.00	0	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	0.00	0.00	0	0
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4				
	Bioretention & Infiltration Bioretention	F-5	2.93	2.57	4896	0
	Dry swale	O-1	4.45	1.11	1011	0
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2	9.64	7.82		49161.00
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Wet Swale (O-2)	O-2				
Totals by Area Reduction		→	0.26	1.04	3789	
Totals by Volume Reduction		→	0.00	0.00	0	
Totals by Standard SMP w/RRV		→	7.38	3.68	5907	0
Totals by Standard SMP		→	9.64	7.82		49161

Totals (Area + Volume + all SMPs)		→	17.28	12.54	9,697	49161.0
	Impervious Cover √	error				
	Total Area √	error				



1 EXISTING DRAINAGE MAP
1" = 150'

DOLLAR GENERAL FRESH
AMSTERDAM, NEW YORK
DGC22025

EXISTING DRAINAGE AREA MAP
10/13/2023

310 4TH SOUTH, SUITE 1006
MINNEAPOLIS, MN 55415
p 612.260.7980 | www.elanlab.com
f 612.260.7990

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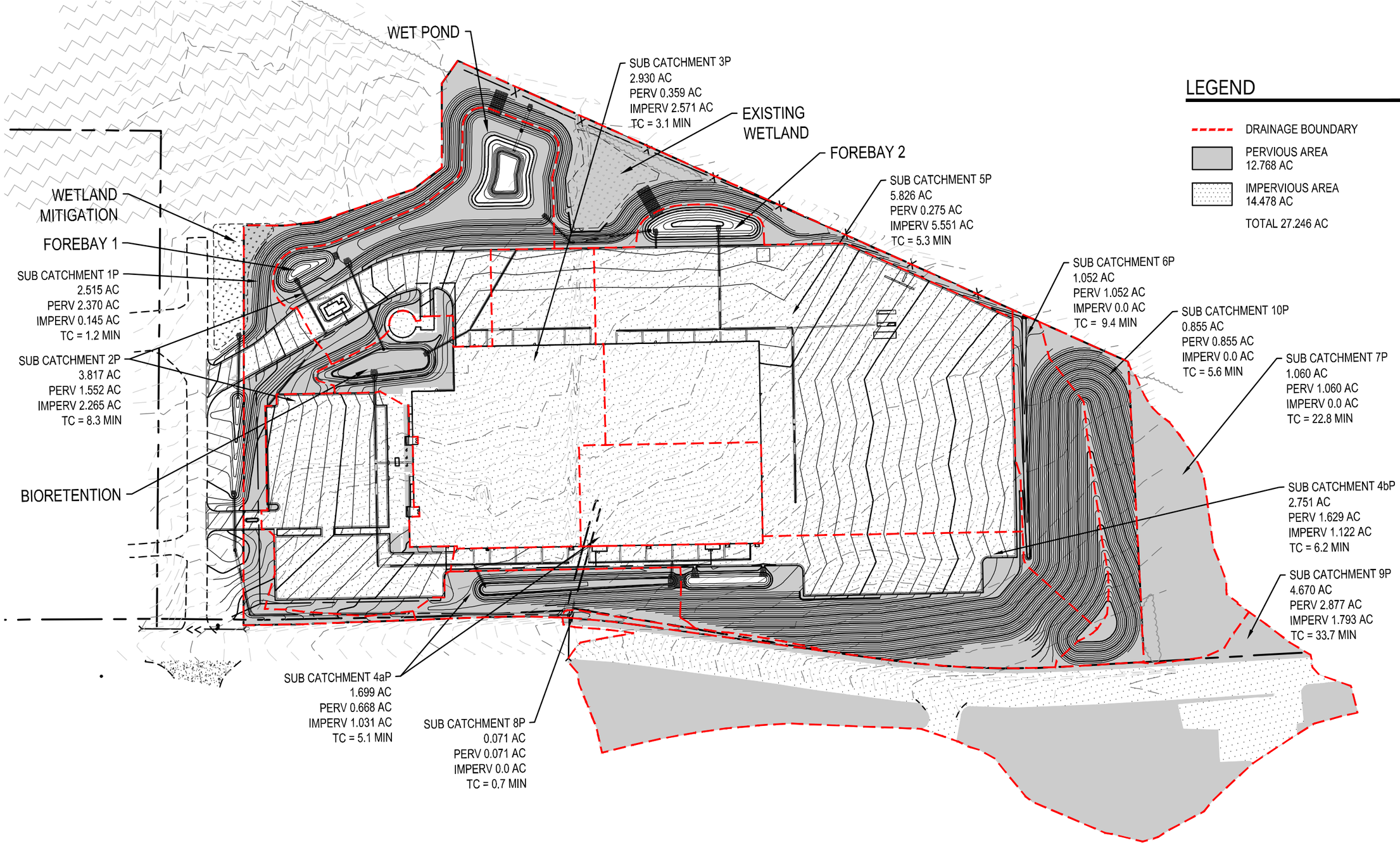

1 PROPOSED DRAINAGE MAP
1" = 150'

DOLLAR GENERAL FRESH
AMSTERDAM, NEW YORK
DGC22025

PROPOSED DRAINAGE AREA MAP
10/13/2023

310 4TH SOUTH, SUITE 1006
MINNEAPOLIS, MN 55415
p 612.260.7980 | www.elanlab.com
f 612.260.7990

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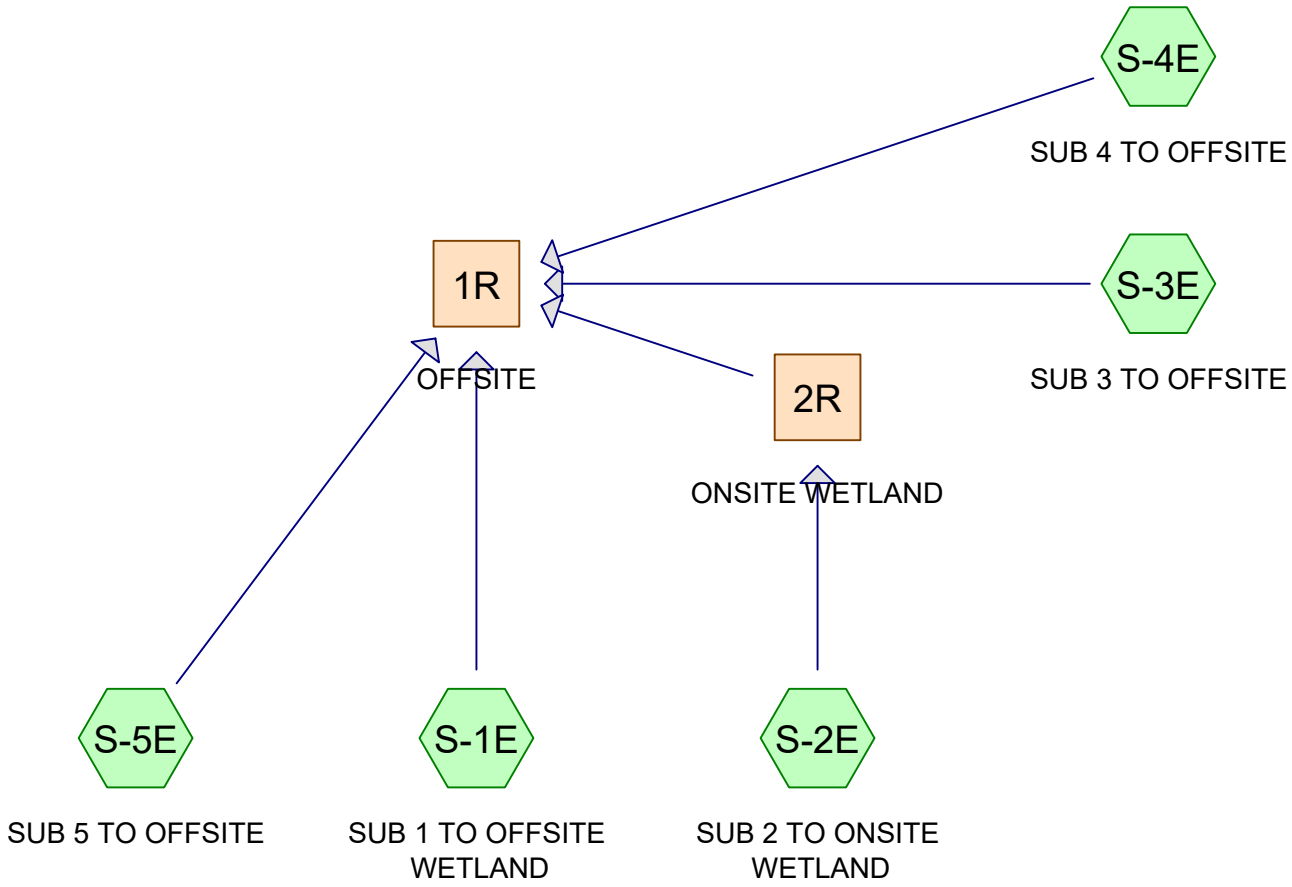
EXISTING DRAINAGE



Subcat Reach Pond Link

Routing Diagram for 20230915_DGC025_HydroCAD
Prepared by Elan Design Lab, Inc, Printed 10/10/2023

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1 yr (Cpv)	Type II 24-hr		Default	24.00	1	2.20	2
2	10 yr (Qp)	Type II 24-hr		Default	24.00	1	3.75	2
3	100 yr (Qf)	Type II 24-hr		Default	24.00	1	6.50	2
4	Water Quality (WQv)	Type II 24-hr		Default	24.00	1	1.10	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
25.453	80	>75% Grass cover, Good, HSG D (S-1E, S-2E, S-3E, S-4E, S-5E)
1.793	98	Paved roads w/curbs & sewers, HSG D (S-5E)
27.246	**81**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
27.246	HSG D	S-1E, S-2E, S-3E, S-4E, S-5E
0.000	Other	
27.246		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	25.453	0.000	25.453	>75% Grass cover, Good	S-1 E, S-2 E, S-3 E, S-4 E, S-5 E
0.000	0.000	0.000	1.793	0.000	1.793	Paved roads w/curbs & sewers	S-5 E
0.000	**0.000**	**0.000**	**27.246**	**0.000**	**27.246**	**TOTAL AREA**	

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentS-1E: SUB 1 TO OFFSITE Runoff Area=8.472 ac 0.00% Impervious Runoff Depth=0.69"
Flow Length=764' Tc=33.3 min CN=80 Runoff=4.34 cfs 0.486 af

SubcatchmentS-2E: SUB 2 TO ONSITE Runoff Area=11.168 ac 0.00% Impervious Runoff Depth=0.69"
Flow Length=1,272' Tc=31.3 min CN=80 Runoff=5.95 cfs 0.640 af

SubcatchmentS-3E: SUB 3 TO OFFSITE Runoff Area=1.876 ac 0.00% Impervious Runoff Depth=0.69"
Flow Length=631' Tc=26.4 min CN=80 Runoff=1.13 cfs 0.108 af

SubcatchmentS-4E: SUB 4 TO OFFSITE Runoff Area=1.060 ac 0.00% Impervious Runoff Depth=0.69"
Flow Length=289' Slope=0.0830 '/' Tc=22.8 min CN=80 Runoff=0.70 cfs 0.061 af

SubcatchmentS-5E: SUB 5 TO OFFSITE Runoff Area=4.670 ac 38.39% Impervious Runoff Depth=1.06"
Flow Length=1,032' Tc=33.7 min CN=87 Runoff=3.95 cfs 0.414 af

Reach 1R: OFFSITE Inflow=15.85 cfs 1.709 af
Outflow=15.85 cfs 1.709 af

Reach 2R: ONSITE WETLAND Inflow=5.95 cfs 0.640 af
Outflow=5.95 cfs 0.640 af

Total Runoff Area = 27.246 ac Runoff Volume = 1.709 af Average Runoff Depth = 0.75"
93.42% Pervious = 25.453 ac 6.58% Impervious = 1.793 ac

Summary for Subcatchment S-1E: SUB 1 TO OFFSITE WETLAND

Runoff = 4.34 cfs @ 12.31 hrs, Volume= 0.486 af, Depth= 0.69"
Routed to Reach 1R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr (Cpv) Rainfall=2.20"

Area (ac)	CN	Description
8.472	80	>75% Grass cover, Good, HSG D
8.472		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.3	300	0.0570	0.18		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
6.0	464	0.0340	1.29		**Shallow Concentrated Flow, OVERLAND** Short Grass Pasture Kv= 7.0 fps
33.3	764	Total			

Summary for Subcatchment S-2E: SUB 2 TO ONSITE WETLAND

Runoff = 5.95 cfs @ 12.28 hrs, Volume= 0.640 af, Depth= 0.69"
Routed to Reach 2R : ONSITE WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr (Cpv) Rainfall=2.20"

Area (ac)	CN	Description
11.168	80	>75% Grass cover, Good, HSG D
11.168		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	300	0.0900	0.22		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
7.9	734	0.0490	1.55		**Shallow Concentrated Flow, OVERLAND** Short Grass Pasture Kv= 7.0 fps
0.7	238	0.0250	5.92	55.29	**Parabolic Channel, DITCH** W=14.00' D=1.00' Area=9.3 sf Perim=14.2' n= 0.030 Short grass
31.3	1,272	Total			

Summary for Subcatchment S-3E: SUB 3 TO OFFSITE

Runoff = 1.13 cfs @ 12.22 hrs, Volume= 0.108 af, Depth= 0.69"
Routed to Reach 1R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr (Cpv) Rainfall=2.20"

Area (ac)	CN	Description
1.876	80	>75% Grass cover, Good, HSG D
1.876		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	300	0.0900	0.22		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
3.7	331	0.0450	1.48		**Shallow Concentrated Flow, OVERLAND** Short Grass Pasture Kv= 7.0 fps
26.4	631	Total			

Summary for Subcatchment S-4E: SUB 4 TO OFFSITE

Runoff = 0.70 cfs @ 12.18 hrs, Volume= 0.061 af, Depth= 0.69"
Routed to Reach 1R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr (Cpv) Rainfall=2.20"

Area (ac)	CN	Description
1.060	80	>75% Grass cover, Good, HSG D
1.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	289	0.0830	0.21		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"

Summary for Subcatchment S-5E: SUB 5 TO OFFSITE

Runoff = 3.95 cfs @ 12.29 hrs, Volume= 0.414 af, Depth= 1.06"
Routed to Reach 1R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr (Cpv) Rainfall=2.20"

Area (ac)	CN	Description
2.877	80	>75% Grass cover, Good, HSG D
1.793	98	Paved roads w/curbs & sewers, HSG D
4.670	87	Weighted Average
2.877		61.61% Pervious Area
1.793		38.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.5	216	0.0190	0.11		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
1.2	816	0.0510	10.94	142.17	**Parabolic Channel, DITCH** W=13.00' D=1.50' Area=13.0 sf Perim=13.4' n= 0.030 Short grass
33.7	1,032	Total			

Summary for Reach 1R: OFFSITE

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

Inflow Area = 27.246 ac, 6.58% Impervious, Inflow Depth = 0.75" for 1 yr (Cpv) event
Inflow = 15.85 cfs @ 12.28 hrs, Volume= 1.709 af
Outflow = 15.85 cfs @ 12.28 hrs, Volume= 1.709 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3

Summary for Reach 2R: ONSITE WETLAND

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

Inflow Area = 11.168 ac, 0.00% Impervious, Inflow Depth = 0.69" for 1 yr (Cpv) event
Inflow = 5.95 cfs @ 12.28 hrs, Volume= 0.640 af
Outflow = 5.95 cfs @ 12.28 hrs, Volume= 0.640 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 1R : OFFSITE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentS-1E: SUB 1 TO OFFSITE Runoff Area=8.472 ac 0.00% Impervious Runoff Depth=1.84"
Flow Length=764' Tc=33.3 min CN=80 Runoff=12.47 cfs 1.297 af

SubcatchmentS-2E: SUB 2 TO ONSITE Runoff Area=11.168 ac 0.00% Impervious Runoff Depth=1.84"
Flow Length=1,272' Tc=31.3 min CN=80 Runoff=17.13 cfs 1.710 af

SubcatchmentS-3E: SUB 3 TO OFFSITE Runoff Area=1.876 ac 0.00% Impervious Runoff Depth=1.84"
Flow Length=631' Tc=26.4 min CN=80 Runoff=3.21 cfs 0.287 af

SubcatchmentS-4E: SUB 4 TO OFFSITE Runoff Area=1.060 ac 0.00% Impervious Runoff Depth=1.84"
Flow Length=289' Slope=0.0830 '/' Tc=22.8 min CN=80 Runoff=1.99 cfs 0.162 af

SubcatchmentS-5E: SUB 5 TO OFFSITE Runoff Area=4.670 ac 38.39% Impervious Runoff Depth=2.41"
Flow Length=1,032' Tc=33.7 min CN=87 Runoff=9.02 cfs 0.937 af

Reach 1R: OFFSITE Inflow=43.29 cfs 4.393 af
Outflow=43.29 cfs 4.393 af

Reach 2R: ONSITE WETLAND Inflow=17.13 cfs 1.710 af
Outflow=17.13 cfs 1.710 af

Total Runoff Area = 27.246 ac Runoff Volume = 4.393 af Average Runoff Depth = 1.93"
93.42% Pervious = 25.453 ac 6.58% Impervious = 1.793 ac

Summary for Subcatchment S-1E: SUB 1 TO OFFSITE WETLAND

Runoff = 12.47 cfs @ 12.29 hrs, Volume= 1.297 af, Depth= 1.84"
Routed to Reach 1R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr (Qp) Rainfall=3.75"

Area (ac)	CN	Description
8.472	80	>75% Grass cover, Good, HSG D
8.472		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.3	300	0.0570	0.18		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
6.0	464	0.0340	1.29		**Shallow Concentrated Flow, OVERLAND** Short Grass Pasture Kv= 7.0 fps
33.3	764	Total			

Summary for Subcatchment S-2E: SUB 2 TO ONSITE WETLAND

Runoff = 17.13 cfs @ 12.27 hrs, Volume= 1.710 af, Depth= 1.84"
Routed to Reach 2R : ONSITE WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr (Qp) Rainfall=3.75"

Area (ac)	CN	Description
11.168	80	>75% Grass cover, Good, HSG D
11.168		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	300	0.0900	0.22		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
7.9	734	0.0490	1.55		**Shallow Concentrated Flow, OVERLAND** Short Grass Pasture Kv= 7.0 fps
0.7	238	0.0250	5.92	55.29	**Parabolic Channel, DITCH** W=14.00' D=1.00' Area=9.3 sf Perim=14.2' n= 0.030 Short grass
31.3	1,272	Total			

Summary for Subcatchment S-3E: SUB 3 TO OFFSITE

Runoff = 3.21 cfs @ 12.21 hrs, Volume= 0.287 af, Depth= 1.84"
Routed to Reach 1R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr (Qp) Rainfall=3.75"

Area (ac)	CN	Description
1.876	80	>75% Grass cover, Good, HSG D
1.876		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	300	0.0900	0.22		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
3.7	331	0.0450	1.48		**Shallow Concentrated Flow, OVERLAND** Short Grass Pasture Kv= 7.0 fps
26.4	631	Total			

Summary for Subcatchment S-4E: SUB 4 TO OFFSITE

Runoff = 1.99 cfs @ 12.16 hrs, Volume= 0.162 af, Depth= 1.84"
Routed to Reach 1R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr (Qp) Rainfall=3.75"

Area (ac)	CN	Description
1.060	80	>75% Grass cover, Good, HSG D
1.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	289	0.0830	0.21		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"

Summary for Subcatchment S-5E: SUB 5 TO OFFSITE

Runoff = 9.02 cfs @ 12.28 hrs, Volume= 0.937 af, Depth= 2.41"
Routed to Reach 1R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr (Qp) Rainfall=3.75"

Area (ac)	CN	Description
2.877	80	>75% Grass cover, Good, HSG D
1.793	98	Paved roads w/curbs & sewers, HSG D
4.670	87	Weighted Average
2.877		61.61% Pervious Area
1.793		38.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.5	216	0.0190	0.11		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
1.2	816	0.0510	10.94	142.17	**Parabolic Channel, DITCH** W=13.00' D=1.50' Area=13.0 sf Perim=13.4' n= 0.030 Short grass
33.7	1,032	Total			

Summary for Reach 1R: OFFSITE

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

Inflow Area = 27.246 ac, 6.58% Impervious, Inflow Depth = 1.93" for 10 yr (Qp) event
Inflow = 43.29 cfs @ 12.26 hrs, Volume= 4.393 af
Outflow = 43.29 cfs @ 12.26 hrs, Volume= 4.393 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3

Summary for Reach 2R: ONSITE WETLAND

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

Inflow Area = 11.168 ac, 0.00% Impervious, Inflow Depth = 1.84" for 10 yr (Qp) event
Inflow = 17.13 cfs @ 12.27 hrs, Volume= 1.710 af
Outflow = 17.13 cfs @ 12.27 hrs, Volume= 1.710 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 1R : OFFSITE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentS-1E: SUB 1 TO OFFSITE Runoff Area=8.472 ac 0.00% Impervious Runoff Depth=4.24"
Flow Length=764' Tc=33.3 min CN=80 Runoff=28.98 cfs 2.990 af

SubcatchmentS-2E: SUB 2 TO ONSITE Runoff Area=11.168 ac 0.00% Impervious Runoff Depth=4.24"
Flow Length=1,272' Tc=31.3 min CN=80 Runoff=39.75 cfs 3.942 af

SubcatchmentS-3E: SUB 3 TO OFFSITE Runoff Area=1.876 ac 0.00% Impervious Runoff Depth=4.24"
Flow Length=631' Tc=26.4 min CN=80 Runoff=7.44 cfs 0.662 af

SubcatchmentS-4E: SUB 4 TO OFFSITE Runoff Area=1.060 ac 0.00% Impervious Runoff Depth=4.24"
Flow Length=289' Slope=0.0830 '/' Tc=22.8 min CN=80 Runoff=4.59 cfs 0.374 af

SubcatchmentS-5E: SUB 5 TO OFFSITE Runoff Area=4.670 ac 38.39% Impervious Runoff Depth=5.00"
Flow Length=1,032' Tc=33.7 min CN=87 Runoff=18.37 cfs 1.945 af

Reach 1R: OFFSITE Inflow=97.92 cfs 9.913 af
Outflow=97.92 cfs 9.913 af

Reach 2R: ONSITE WETLAND Inflow=39.75 cfs 3.942 af
Outflow=39.75 cfs 3.942 af

Total Runoff Area = 27.246 ac Runoff Volume = 9.913 af Average Runoff Depth = 4.37"
93.42% Pervious = 25.453 ac 6.58% Impervious = 1.793 ac

Summary for Subcatchment S-1E: SUB 1 TO OFFSITE WETLAND

Runoff = 28.98 cfs @ 12.28 hrs, Volume= 2.990 af, Depth= 4.24"
Routed to Reach 1R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr (Qf) Rainfall=6.50"

Area (ac)	CN	Description
8.472	80	>75% Grass cover, Good, HSG D
8.472		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.3	300	0.0570	0.18		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
6.0	464	0.0340	1.29		**Shallow Concentrated Flow, OVERLAND** Short Grass Pasture Kv= 7.0 fps
33.3	764	Total			

Summary for Subcatchment S-2E: SUB 2 TO ONSITE WETLAND

Runoff = 39.75 cfs @ 12.25 hrs, Volume= 3.942 af, Depth= 4.24"
Routed to Reach 2R : ONSITE WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr (Qf) Rainfall=6.50"

Area (ac)	CN	Description
11.168	80	>75% Grass cover, Good, HSG D
11.168		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	300	0.0900	0.22		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
7.9	734	0.0490	1.55		**Shallow Concentrated Flow, OVERLAND** Short Grass Pasture Kv= 7.0 fps
0.7	238	0.0250	5.92	55.29	**Parabolic Channel, DITCH** W=14.00' D=1.00' Area=9.3 sf Perim=14.2' n= 0.030 Short grass
31.3	1,272	Total			

Summary for Subcatchment S-3E: SUB 3 TO OFFSITE

Runoff = 7.44 cfs @ 12.20 hrs, Volume= 0.662 af, Depth= 4.24"
Routed to Reach 1R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr (Qf) Rainfall=6.50"

Area (ac)	CN	Description
1.876	80	>75% Grass cover, Good, HSG D
1.876		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	300	0.0900	0.22		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
3.7	331	0.0450	1.48		**Shallow Concentrated Flow, OVERLAND** Short Grass Pasture Kv= 7.0 fps
26.4	631	Total			

Summary for Subcatchment S-4E: SUB 4 TO OFFSITE

Runoff = 4.59 cfs @ 12.16 hrs, Volume= 0.374 af, Depth= 4.24"
Routed to Reach 1R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr (Qf) Rainfall=6.50"

Area (ac)	CN	Description
1.060	80	>75% Grass cover, Good, HSG D
1.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	289	0.0830	0.21		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"

Summary for Subcatchment S-5E: SUB 5 TO OFFSITE

Runoff = 18.37 cfs @ 12.28 hrs, Volume= 1.945 af, Depth= 5.00"
Routed to Reach 1R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr (Qf) Rainfall=6.50"

Area (ac)	CN	Description
2.877	80	>75% Grass cover, Good, HSG D
1.793	98	Paved roads w/curbs & sewers, HSG D
4.670	87	Weighted Average
2.877		61.61% Pervious Area
1.793		38.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.5	216	0.0190	0.11		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
1.2	816	0.0510	10.94	142.17	**Parabolic Channel, DITCH** W=13.00' D=1.50' Area=13.0 sf Perim=13.4' n= 0.030 Short grass
33.7	1,032	Total			

Summary for Reach 1R: OFFSITE

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

Inflow Area = 27.246 ac, 6.58% Impervious, Inflow Depth = 4.37" for 100 yr (Qf) event
Inflow = 97.92 cfs @ 12.25 hrs, Volume= 9.913 af
Outflow = 97.92 cfs @ 12.25 hrs, Volume= 9.913 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3

Summary for Reach 2R: ONSITE WETLAND

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

Inflow Area = 11.168 ac, 0.00% Impervious, Inflow Depth = 4.24" for 100 yr (Qf) event
Inflow = 39.75 cfs @ 12.25 hrs, Volume= 3.942 af
Outflow = 39.75 cfs @ 12.25 hrs, Volume= 3.942 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 1R : OFFSITE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentS-1E: SUB 1 TO OFFSITE Runoff Area=8.472 ac 0.00% Impervious Runoff Depth=0.12"
Flow Length=764' Tc=33.3 min CN=80 Runoff=0.41 cfs 0.082 af

SubcatchmentS-2E: SUB 2 TO ONSITE Runoff Area=11.168 ac 0.00% Impervious Runoff Depth=0.12"
Flow Length=1,272' Tc=31.3 min CN=80 Runoff=0.56 cfs 0.108 af

SubcatchmentS-3E: SUB 3 TO OFFSITE Runoff Area=1.876 ac 0.00% Impervious Runoff Depth=0.12"
Flow Length=631' Tc=26.4 min CN=80 Runoff=0.11 cfs 0.018 af

SubcatchmentS-4E: SUB 4 TO OFFSITE Runoff Area=1.060 ac 0.00% Impervious Runoff Depth=0.12"
Flow Length=289' Slope=0.0830 '/' Tc=22.8 min CN=80 Runoff=0.07 cfs 0.010 af

SubcatchmentS-5E: SUB 5 TO OFFSITE Runoff Area=4.670 ac 38.39% Impervious Runoff Depth=0.28"
Flow Length=1,032' Tc=33.7 min CN=87 Runoff=0.90 cfs 0.109 af

Reach 1R: OFFSITE Inflow=2.01 cfs 0.327 af
Outflow=2.01 cfs 0.327 af

Reach 2R: ONSITE WETLAND Inflow=0.56 cfs 0.108 af
Outflow=0.56 cfs 0.108 af

Total Runoff Area = 27.246 ac Runoff Volume = 0.327 af Average Runoff Depth = 0.14"
93.42% Pervious = 25.453 ac 6.58% Impervious = 1.793 ac

Summary for Subcatchment S-1E: SUB 1 TO OFFSITE WETLAND

Runoff = 0.41 cfs @ 12.41 hrs, Volume= 0.082 af, Depth= 0.12"
Routed to Reach 1R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr Water Quality (WQv) Rainfall=1.10"

Area (ac)	CN	Description
8.472	80	>75% Grass cover, Good, HSG D
8.472		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.3	300	0.0570	0.18		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
6.0	464	0.0340	1.29		**Shallow Concentrated Flow, OVERLAND** Short Grass Pasture Kv= 7.0 fps
33.3	764	Total			

Summary for Subcatchment S-2E: SUB 2 TO ONSITE WETLAND

Runoff = 0.56 cfs @ 12.38 hrs, Volume= 0.108 af, Depth= 0.12"
Routed to Reach 2R : ONSITE WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr Water Quality (WQv) Rainfall=1.10"

Area (ac)	CN	Description
11.168	80	>75% Grass cover, Good, HSG D
11.168		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	300	0.0900	0.22		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
7.9	734	0.0490	1.55		**Shallow Concentrated Flow, OVERLAND** Short Grass Pasture Kv= 7.0 fps
0.7	238	0.0250	5.92	55.29	**Parabolic Channel, DITCH** W=14.00' D=1.00' Area=9.3 sf Perim=14.2' n= 0.030 Short grass
31.3	1,272	Total			

Summary for Subcatchment S-3E: SUB 3 TO OFFSITE

Runoff = 0.11 cfs @ 12.30 hrs, Volume= 0.018 af, Depth= 0.12"
Routed to Reach 1R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr Water Quality (WQv) Rainfall=1.10"

Area (ac)	CN	Description
1.876	80	>75% Grass cover, Good, HSG D
1.876		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	300	0.0900	0.22		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
3.7	331	0.0450	1.48		**Shallow Concentrated Flow, OVERLAND** Short Grass Pasture Kv= 7.0 fps
26.4	631	Total			

Summary for Subcatchment S-4E: SUB 4 TO OFFSITE

Runoff = 0.07 cfs @ 12.24 hrs, Volume= 0.010 af, Depth= 0.12"
Routed to Reach 1R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr Water Quality (WQv) Rainfall=1.10"

Area (ac)	CN	Description
1.060	80	>75% Grass cover, Good, HSG D
1.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	289	0.0830	0.21		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"

Summary for Subcatchment S-5E: SUB 5 TO OFFSITE

Runoff = 0.90 cfs @ 12.33 hrs, Volume= 0.109 af, Depth= 0.28"
Routed to Reach 1R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr Water Quality (WQv) Rainfall=1.10"

Area (ac)	CN	Description
2.877	80	>75% Grass cover, Good, HSG D
1.793	98	Paved roads w/curbs & sewers, HSG D
4.670	87	Weighted Average
2.877		61.61% Pervious Area
1.793		38.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.5	216	0.0190	0.11		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
1.2	816	0.0510	10.94	142.17	**Parabolic Channel, DITCH** W=13.00' D=1.50' Area=13.0 sf Perim=13.4' n= 0.030 Short grass
33.7	1,032	Total			

Summary for Reach 1R: OFFSITE

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

Inflow Area = 27.246 ac, 6.58% Impervious, Inflow Depth = 0.14" for Water Quality (WQv) event
Inflow = 2.01 cfs @ 12.35 hrs, Volume= 0.327 af
Outflow = 2.01 cfs @ 12.35 hrs, Volume= 0.327 af, Atten= 0%, Lag= 0.0 min

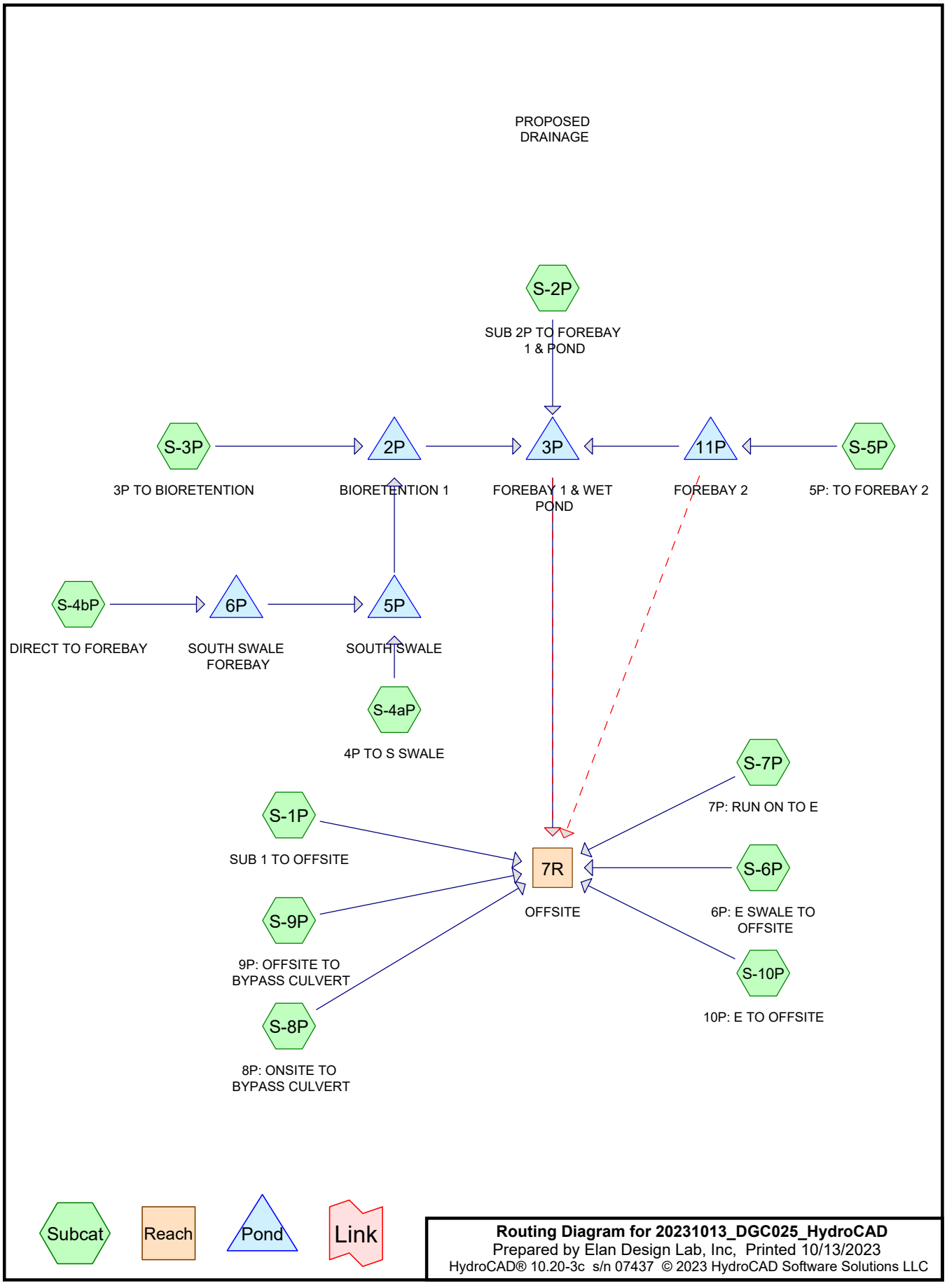
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3

Summary for Reach 2R: ONSITE WETLAND

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

Inflow Area = 11.168 ac, 0.00% Impervious, Inflow Depth = 0.12" for Water Quality (WQv) event
Inflow = 0.56 cfs @ 12.38 hrs, Volume= 0.108 af
Outflow = 0.56 cfs @ 12.38 hrs, Volume= 0.108 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 1R : OFFSITE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3



Routing Diagram for 20231013_DGC025_HydroCAD
Prepared by Elan Design Lab, Inc, Printed 10/13/2023

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1 yr (Cpv)	Type II 24-hr		Default	24.00	1	2.20	2
2	10 yr (Qp)	Type II 24-hr		Default	24.00	1	3.75	2
3	100 yr (Qf)	Type II 24-hr		Default	24.00	1	6.50	2
4	Water Quality (WQv)	Type II 24-hr		Default	24.00	1	1.10	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
12.768	80	>75% Grass cover, Good, HSG D (S-10P, S-1P, S-2P, S-3P, S-4aP, S-4bP, S-5P, S-6P, S-7P, S-8P, S-9P)
1.031	98	DISCONNECTED ROOF (S-4aP)
11.654	98	Paved parking, HSG D (S-1P, S-2P, S-3P, S-4bP, S-5P)
1.793	98	Paved roads w/curbs & sewers, HSG D (S-9P)
27.246	**90**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
26.215	HSG D	S-10P, S-1P, S-2P, S-3P, S-4aP, S-4bP, S-5P, S-6P, S-7P, S-8P, S-9P
1.031	Other	S-4aP
27.246		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	12.768	0.000	12.768	>75% Grass cover, Good	S-10P, S-1P, S-2P, S-3P, S-4aP, S-4bP, S-5P, S-6P, S-7P, S-8P, S-9P
0.000	0.000	0.000	0.000	1.031	1.031	DISCONNECTED ROOF	S-4aP
0.000	0.000	0.000	11.654	0.000	11.654	Paved parking	S-1P, S-2P, S-3P, S-4bP, S-5P
0.000	0.000	0.000	1.793	0.000	1.793	Paved roads w/curbs & sewers	S-9P
0.000	**0.000**	**0.000**	**26.215**	**1.031**	**27.246**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	S-2P	0.00	0.00	182.0	0.4500	0.011	0.0	24.0	0.0	
2	S-3P	0.00	0.00	20.0	0.0100	0.011	0.0	8.0	0.0	
3	S-3P	0.00	0.00	262.0	0.0050	0.011	0.0	18.0	0.0	
4	S-4aP	0.00	0.00	25.0	0.0100	0.010	0.0	8.0	0.0	
5	S-4aP	0.00	0.00	150.0	0.0025	0.011	0.0	18.0	0.0	
6	S-5P	0.00	0.00	567.0	0.0050	0.011	0.0	110.0	0.0	
7	2P	479.35	479.00	146.0	0.0024	0.010	0.0	24.0	0.0	
8	3P	471.00	471.78	39.0	-0.0200	0.011	0.0	24.0	0.0	
9	3P	474.30	474.00	37.0	0.0081	0.011	0.0	30.0	0.0	
10	5P	490.45	490.05	40.0	0.0100	0.011	0.0	24.0	0.0	
11	5P	490.05	487.85	150.0	0.0147	0.011	0.0	24.0	0.0	
12	5P	487.84	486.79	161.0	0.0065	0.011	0.0	24.0	0.0	
13	5P	486.39	486.00	139.0	0.0028	0.011	0.0	30.0	0.0	
14	11P	482.00	481.26	124.0	0.0060	0.010	0.0	30.0	0.0	
15	11P	476.20	476.00	42.0	0.0048	0.011	0.0	30.0	0.0	

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentS-10P: 10P: E TO OFFSITE Runoff Area=0.855 ac 0.00% Impervious Runoff Depth=0.69"
Flow Length=543' Tc=5.6 min CN=80 Runoff=1.02 cfs 0.049 af

SubcatchmentS-1P: SUB 1 TO OFFSITE Runoff Area=2.515 ac 5.77% Impervious Runoff Depth=0.73"
Flow Length=104' Slope=0.1540 '/' Tc=1.3 min CN=81 Runoff=3.62 cfs 0.154 af

SubcatchmentS-2P: SUB 2P TO FOREBAY Runoff Area=3.817 ac 59.34% Impervious Runoff Depth=1.34"
Flow Length=564' Tc=8.3 min CN=91 Runoff=8.17 cfs 0.426 af

SubcatchmentS-3P: 3P TO BIORETENTION Runoff Area=2.930 ac 87.75% Impervious Runoff Depth=1.77"
Flow Length=440' Tc=3.1 min CN=96 Runoff=9.08 cfs 0.432 af

SubcatchmentS-4aP: 4P TO S SWALE Runoff Area=1.699 ac 60.68% Impervious Runoff Depth=1.34"
Flow Length=623' Tc=5.1 min CN=91 Runoff=4.01 cfs 0.190 af

SubcatchmentS-4bP: DIRECT TO Runoff Area=2.751 ac 40.79% Impervious Runoff Depth=1.06"
Flow Length=689' Slope=0.0900 '/' Tc=6.2 min CN=87 Runoff=5.06 cfs 0.244 af

SubcatchmentS-5P: 5P: TO FOREBAY2 Runoff Area=5.826 ac 95.28% Impervious Runoff Depth=1.87"
Flow Length=905' Tc=3.3 min CN=97 Runoff=18.55 cfs 0.907 af

SubcatchmentS-6P: 6P: E SWALE TO Runoff Area=1.052 ac 0.00% Impervious Runoff Depth=0.69"
Flow Length=516' Tc=9.4 min CN=80 Runoff=1.09 cfs 0.060 af

SubcatchmentS-7P: 7P: RUN ON TO E Runoff Area=1.060 ac 0.00% Impervious Runoff Depth=0.69"
Flow Length=429' Tc=24.1 min CN=80 Runoff=0.68 cfs 0.061 af

SubcatchmentS-8P: 8P: ONSITE TO Runoff Area=0.071 ac 0.00% Impervious Runoff Depth=0.69"
Flow Length=397' Slope=0.0630 '/' Tc=0.7 min CN=80 Runoff=0.10 cfs 0.004 af

SubcatchmentS-9P: 9P: OFFSITE TO Runoff Area=4.670 ac 38.39% Impervious Runoff Depth=1.06"
Flow Length=1,032' Tc=33.7 min CN=87 Runoff=3.95 cfs 0.414 af

Reach 7R: OFFSITE Inflow=16.03 cfs 2.923 af
Outflow=16.03 cfs 2.923 af

Pond 2P: BIORETENTION1 Peak Elev=486.98' Storage=4,331 cf Inflow=14.44 cfs 0.866 af
Outflow=13.47 cfs 0.856 af

Pond 3P: FOREBAY1 & WET POND Peak Elev=477.62' Storage=65,336 cf Inflow=37.76 cfs 2.189 af
Primary=10.79 cfs 2.180 af Secondary=0.00 cfs 0.000 af Outflow=10.79 cfs 2.180 af

Pond 5P: SOUTH SWALE Peak Elev=491.69' Storage=1,194 cf Inflow=8.37 cfs 0.434 af
Outflow=7.07 cfs 0.434 af

Pond 6P: SOUTH SWALE FOREBAY Peak Elev=494.38' Storage=5,219 cf Inflow=5.06 cfs 0.244 af
Outflow=4.71 cfs 0.244 af

Pond 11P: FOREBAY 2 Peak Elev=489.48' Storage=15,435 cf Inflow=18.55 cfs 0.907 af
Primary=16.82 cfs 0.907 af Secondary=0.00 cfs 0.000 af Outflow=16.82 cfs 0.907 af

Total Runoff Area = 27.246 ac Runoff Volume = 2.941 af Average Runoff Depth = 1.30"
46.86% Pervious = 12.768 ac 53.14% Impervious = 14.478 ac

Summary for Subcatchment S-10P: 10P: E TO OFFSITE

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

Runoff = 1.02 cfs @ 11.98 hrs, Volume= 0.049 af, Depth= 0.69"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr (Cpv) Rainfall=2.20"

Area (ac)	CN	Description
0.855	80	>75% Grass cover, Good, HSG D
0.000	98	Paved parking, HSG D
0.855	80	Weighted Average
0.855		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	55	0.3260	0.26		**Sheet Flow, HILL TO SWALE** Grass: Dense n= 0.240 P2= 2.20"
2.1	488	0.0670	3.88		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	543	Total			

Summary for Subcatchment S-1P: SUB 1 TO OFFSITE

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

Runoff = 3.62 cfs @ 11.91 hrs, Volume= 0.154 af, Depth= 0.73"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr (Cpv) Rainfall=2.20"

Area (ac)	CN	Description
2.370	80	>75% Grass cover, Good, HSG D
0.145	98	Paved parking, HSG D
2.515	81	Weighted Average
2.370		94.23% Pervious Area
0.145		5.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	104	0.1540	1.35		**Lag/CN Method,**

Summary for Subcatchment S-2P: SUB 2P TO FOREBAY 1 & POND

Runoff = 8.17 cfs @ 12.00 hrs, Volume= 0.426 af, Depth= 1.34"
Routed to Pond 3P : FOREBAY 1 & WET POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr (Cpv) Rainfall=2.20"

Area (ac)	CN	Description
1.552	80	>75% Grass cover, Good, HSG D
2.265	98	Paved parking, HSG D
3.817	91	Weighted Average
1.552		40.66% Pervious Area
2.265		59.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	71	0.0560	0.20		**Sheet Flow, OVERLAND** Grass: Short n= 0.150 P2= 2.20"
2.2	311	0.0130	2.31		**Shallow Concentrated Flow, EMPLOYEE LOT** Paved Kv= 20.3 fps
0.1	182	0.4500	57.09	179.35	**Pipe Channel, PIPE TO FOREBAY 1** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
8.3	564	Total			

Summary for Subcatchment S-3P: 3P TO BIORETENTION

[49] Hint: Tc<2dt may require smaller dt
[47] Hint: Peak is 636% of capacity of segment #2
[47] Hint: Peak is 103% of capacity of segment #3

Runoff = 9.08 cfs @ 11.93 hrs, Volume= 0.432 af, Depth= 1.77"
Routed to Pond 2P : BIORETENTION 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr (Cpv) Rainfall=2.20"

Area (ac)	CN	Description
0.359	80	>75% Grass cover, Good, HSG D
2.571	98	Paved parking, HSG D
2.930	96	Weighted Average
0.359		12.25% Pervious Area
2.571		87.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	158	0.0200	1.25		**Sheet Flow, ROOF** Smooth surfaces n= 0.011 P2= 2.20"
0.1	20	0.0100	4.09	1.43	**Pipe Channel, ROOF DRAIN** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.011 Concrete pipe, straight & clean
0.9	262	0.0050	4.97	8.78	**Pipe Channel, RCP** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
3.1	440	Total			

Summary for Subcatchment S-4aP: 4P TO S SWALE

[49] Hint: Tc<2dt may require smaller dt
[47] Hint: Peak is 255% of capacity of segment #2

Runoff = 4.01 cfs @ 11.96 hrs, Volume= 0.190 af, Depth= 1.34"
Routed to Pond 5P : SOUTH SWALE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr (Cpv) Rainfall=2.20"

	Area (ac)	CN	Description
	0.668	80	>75% Grass cover, Good, HSG D
*	1.031	98	DISCONNECTED ROOF
	1.699	91	Weighted Average
	0.668		39.32% Pervious Area
	1.031		60.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	157	0.0200	1.25		**Sheet Flow, ROOF** Smooth surfaces n= 0.011 P2= 2.20"
0.1	25	0.0100	4.50	1.57	**Pipe Channel, Roof Drain** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
0.7	150	0.0025	3.51	6.21	**Pipe Channel, CMP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
2.2	291	0.0050	2.25	35.32	**Channel Flow, S SWALE** Area= 15.7 sf Perim= 30.5' r= 0.51' n= 0.030 Short grass
5.1	623	Total			

Summary for Subcatchment S-4bP: DIRECT TO FOREBAY

Runoff = 5.06 cfs @ 11.98 hrs, Volume= 0.244 af, Depth= 1.06"
Routed to Pond 6P : SOUTH SWALE FOREBAY

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr (Cpv) Rainfall=2.20"

Area (ac)	CN	Description
1.629	80	>75% Grass cover, Good, HSG D
1.122	98	Paved parking, HSG D
2.751	87	Weighted Average
1.629		59.21% Pervious Area
1.122		40.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	689	0.0900	1.85		**Lag/CN Method,**

Summary for Subcatchment S-5P: 5P: TO FOREBAY 2

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

Runoff = 18.55 cfs @ 11.93 hrs, Volume= 0.907 af, Depth= 1.87"
Routed to Pond 11P : FOREBAY 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr (Cpv) Rainfall=2.20"

Area (ac)	CN	Description
0.275	80	>75% Grass cover, Good, HSG D
5.551	98	Paved parking, HSG D
5.826	97	Weighted Average
0.275		4.72% Pervious Area
5.551		95.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.5	278	0.0390	1.83		**Sheet Flow, OVERLAND FLOW TRUCK PARKING** Smooth surfaces n= 0.011 P2= 2.20"
0.2	60	0.0390	4.01		**Shallow Concentrated Flow, TRUCK PARKING** Paved Kv= 20.3 fps
0.6	567	0.0050	16.60	1,095.78	**Pipe Channel, PIPE TO FOREBAY 2** 110.0" Round Area= 66.0 sf Perim= 28.8' r= 2.29' n= 0.011 Concrete pipe, straight & clean
3.3	905	Total			

Summary for Subcatchment S-6P: 6P: E SWALE TO OFFSITE

Runoff = 1.09 cfs @ 12.02 hrs, Volume= 0.060 af, Depth= 0.69"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr (Cpv) Rainfall=2.20"

Area (ac)	CN	Description
1.052	80	>75% Grass cover, Good, HSG D
0.000	98	Paved parking, HSG D
1.052	80	Weighted Average
1.052		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	141	0.3260	0.32		**Sheet Flow, HILL TO SWALE** Grass: Dense n= 0.240 P2= 2.20"
2.0	375	0.0130	3.07	25.14	**Channel Flow, SWALE** Area= 8.2 sf Perim= 20.5' r= 0.40' n= 0.030 Short grass
9.4	516	Total			

Summary for Subcatchment S-7P: 7P: RUN ON TO E

Runoff = 0.68 cfs @ 12.19 hrs, Volume= 0.061 af, Depth= 0.69"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr (Cpv) Rainfall=2.20"

Area (ac)	CN	Description
1.060	80	>75% Grass cover, Good, HSG D
1.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	289	0.0830	0.21		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
1.3	140	0.0640	1.77		**Shallow Concentrated Flow, EDGE OF PROPRTY DITCH** Short Grass Pasture Kv= 7.0 fps
24.1	429	Total			

Summary for Subcatchment S-8P: 8P: ONSITE TO BYPASS CULVERT

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

Runoff = 0.10 cfs @ 11.91 hrs, Volume= 0.004 af, Depth= 0.69"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr (Cpv) Rainfall=2.20"

Area (ac)	CN	Description
0.071	80	>75% Grass cover, Good, HSG D
0.000	98	Paved parking, HSG D
0.000	98	Roofs, HSG D
0.071	80	Weighted Average
0.071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	397	0.0630	9.24	49.29	**Parabolic Channel, DITCH** W=8.00' D=1.00' Area=5.3 sf Perim=8.3' n= 0.030 Short grass

Summary for Subcatchment S-9P: 9P: OFFSITE TO BYPASS CULVERT

Runoff = 3.95 cfs @ 12.29 hrs, Volume= 0.414 af, Depth= 1.06"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr (Cpv) Rainfall=2.20"

Area (ac)	CN	Description
2.877	80	>75% Grass cover, Good, HSG D
1.793	98	Paved roads w/curbs & sewers, HSG D
4.670	87	Weighted Average
2.877		61.61% Pervious Area
1.793		38.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.5	216	0.0190	0.11		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
1.2	816	0.0510	10.94	142.17	**Parabolic Channel, DITCH** W=13.00' D=1.50' Area=13.0 sf Perim=13.4' n= 0.030 Short grass
33.7	1,032	Total			

Summary for Reach 7R: OFFSITE

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

Inflow Area = 27.246 ac, 53.14% Impervious, Inflow Depth > 1.29" for 1 yr (Cpv) event
Inflow = 16.03 cfs @ 12.21 hrs, Volume= 2.923 af
Outflow = 16.03 cfs @ 12.21 hrs, Volume= 2.923 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3

Summary for Pond 2P: BIORETENTION 1

Inflow Area = 7.380 ac, 64.01% Impervious, Inflow Depth = 1.41" for 1 yr (Cpv) event
Inflow = 14.44 cfs @ 11.95 hrs, Volume= 0.866 af
Outflow = 13.47 cfs @ 11.98 hrs, Volume= 0.856 af, Atten= 7%, Lag= 2.0 min
Primary = 13.47 cfs @ 11.98 hrs, Volume= 0.856 af
Routed to Pond 3P : FOREBAY 1 & WET POND

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 486.98' @ 11.98 hrs Surf.Area= 4,954 sf Storage= 4,331 cf

Plug-Flow detention time= 87.2 min calculated for 0.856 af (99% of inflow)
Center-of-Mass det. time= 79.7 min (884.3 - 804.7)

Volume	Invert	Avail.Storage	Storage Description
#1	486.00'	20,603 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
486.00	3,930	0	0
487.00	4,980	4,455	4,455
488.00	6,130	5,555	10,010
489.00	7,370	6,750	16,760
489.50	8,000	3,843	20,603

Device	Routing	Invert	Outlet Devices
#1	Device 2	486.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	479.35'	**24.0" Round Culvert** L= 146.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 479.35' / 479.00' S= 0.0024 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#3	Device 2	486.00'	**0.200 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 450.00'

Primary OutFlow Max=13.17 cfs @ 11.98 hrs HW=486.97' TW=477.22' (Dynamic Tailwater)
└─**2=Culvert** (Passes 13.17 cfs of 38.37 cfs potential flow)
  ├─**1=Orifice/Grate** (Weir Controls 13.15 cfs @ 2.24 fps)
  └─**3=Exfiltration** (Controls 0.02 cfs)

Summary for Pond 3P: FOREBAY 1 & WET POND

Inflow Area = 17.023 ac, 73.67% Impervious, Inflow Depth > 1.54" for 1 yr (Cpv) event
Inflow = 37.76 cfs @ 11.97 hrs, Volume= 2.189 af
Outflow = 10.79 cfs @ 12.18 hrs, Volume= 2.180 af, Atten= 71%, Lag= 12.6 min
Primary = 10.79 cfs @ 12.18 hrs, Volume= 2.180 af
Routed to Reach 7R : OFFSITE
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 7R : OFFSITE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 475.50' Surf.Area= 9,510 sf Storage= 28,399 cf
Peak Elev= 477.62' @ 12.18 hrs Surf.Area= 25,083 sf Storage= 65,336 cf (36,936 cf above start)

Plug-Flow detention time= 292.9 min calculated for 1.528 af (70% of inflow)
Center-of-Mass det. time= 84.3 min (911.1 - 826.8)

Volume	Invert	Avail.Storage	Storage Description
#1	467.00'	161,578 cf	**WET POND (Prismatic)**Listed below (Recalc)
#2	473.00'	10,291 cf	**FOREBAY (Prismatic)**Listed below (Recalc)
		171,869 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
467.00	1,154	0	0
468.00	1,550	1,352	1,352
469.00	1,900	1,725	3,077
470.00	2,280	2,090	5,167
471.00	2,685	2,483	7,650
472.00	3,110	2,898	10,547
473.00	3,565	3,338	13,885
474.00	4,340	3,953	17,837
474.50	4,620	2,240	20,077
475.00	6,300	2,730	22,807
476.00	9,960	8,130	30,937
476.10	10,505	1,023	31,960
477.00	20,330	13,876	45,836
478.00	23,820	22,075	67,911
479.00	27,015	25,418	93,328
480.00	35,215	31,115	124,443
481.00	39,055	37,135	161,578

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
473.00	280	0	0
474.00	654	467	467
475.00	1,128	891	1,358
476.00	1,631	1,380	2,738
477.00	2,191	1,911	4,649
478.00	2,807	2,499	7,148
479.00	3,480	3,144	10,291

Device	Routing	Invert	Outlet Devices
#1	Device 4	478.50'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	471.78'	**24.0" Round Culvert** L= 39.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 471.00' / 471.78' S= -0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#3	Device 4	475.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)**

			Head (feet) 0.00 1.75 1.75 3.00
			Width (feet) 0.75 0.75 5.00 5.00
#4	Primary	474.30'	**30.0" Round Culvert**
			L= 37.0' RCP, end-section conforming to fill, Ke= 0.500
			Inlet / Outlet Invert= 474.30' / 474.00' S= 0.0081 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#5	Secondary	480.00'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=10.75 cfs @ 12.18 hrs HW=477.62' TW=0.00' (Dynamic Tailwater)
- **4=Culvert** (Passes 10.75 cfs of 31.80 cfs potential flow)
  - **1=Orifice/Grate** (Controls 0.00 cfs)
  - **3=Custom Weir/Orifice** (Weir Controls 10.75 cfs @ 3.39 fps)
    - **2=Culvert** (Passes 10.75 cfs of 22.04 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=475.50' TW=0.00' (Dynamic Tailwater)
- **5=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 5P: SOUTH SWALE

[44] Hint: Outlet device #1 is below defined storage
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=119)

Inflow Area = 4.450 ac, 48.38% Impervious, Inflow Depth = 1.17" for 1 yr (Cpv) event
Inflow = 8.37 cfs @ 11.98 hrs, Volume= 0.434 af
Outflow = 7.07 cfs @ 12.03 hrs, Volume= 0.434 af, Atten= 16%, Lag= 3.0 min
Primary = 7.07 cfs @ 12.03 hrs, Volume= 0.434 af
Routed to Pond 2P : BIORETENTION 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 491.69' @ 12.03 hrs Surf.Area= 2,569 sf Storage= 1,194 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.1 min (829.8 - 828.6)

Volume	Invert	Avail.Storage	Storage Description
#1	491.00'	20,935 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
491.00	885	0	0
492.00	3,320	2,103	2,103
493.00	5,265	4,293	6,395
494.00	7,200	6,233	12,628
495.00	9,415	8,308	20,935

Device	Routing	Invert	Outlet Devices
#1	Device 2	490.45'	**24.0" Round FES I1-5 TO STMH I1-4** L= 40.0' Ke= 0.500
			Inlet / Outlet Invert= 490.45' / 490.05' S= 0.0100 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Device 3	490.05'	**24.0" Round STMH I1-4 TO STMH I1-3** L= 150.0' Ke= 0.500
			Inlet / Outlet Invert= 490.05' / 487.85' S= 0.0147 '/' Cc= 0.900

			n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#3	Device 4	487.84'	**24.0" Round STMH I1-3 TO STMH I1-2** L= 161.0' Ke= 0.500 Inlet / Outlet Invert= 487.84' / 486.79' S= 0.0065 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#4	Primary	486.39'	**30.0" Round STMH I1-2 TO FES I1-1** L= 139.0' Ke= 0.500 Inlet / Outlet Invert= 486.39' / 486.00' S= 0.0028 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf

Primary OutFlow Max=6.93 cfs @ 12.03 hrs HW=491.68' TW=486.94' (Dynamic Tailwater)
└─**4=STMH I1-2 TO FES I1-1** (Passes 6.93 cfs of 45.12 cfs potential flow)
└─**3=STMH I1-3 TO STMH I1-2** (Passes 6.93 cfs of 24.99 cfs potential flow)
└─**2=STMH I1-4 TO STMH I1-3** (Passes 6.93 cfs of 11.87 cfs potential flow)
└─**1=FES I1-5 TO STMH I1-4** (Barrel Controls 6.93 cfs @ 4.91 fps)

Summary for Pond 6P: SOUTH SWALE FOREBAY

Inflow Area = 2.751 ac, 40.79% Impervious, Inflow Depth = 1.06" for 1 yr (Cpv) event
Inflow = 5.06 cfs @ 11.98 hrs, Volume= 0.244 af
Outflow = 4.71 cfs @ 12.00 hrs, Volume= 0.244 af, Atten= 7%, Lag= 1.7 min
Primary = 4.71 cfs @ 12.00 hrs, Volume= 0.244 af
Routed to Pond 5P : SOUTH SWALE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 494.10' Surf.Area= 2,961 sf Storage= 4,342 cf
Peak Elev= 494.38' @ 12.01 hrs Surf.Area= 3,219 sf Storage= 5,219 cf (877 cf above start)

Plug-Flow detention time= 214.5 min calculated for 0.144 af (59% of inflow)
Center-of-Mass det. time= 7.8 min (840.5 - 832.7)

Volume	Invert	Avail.Storage	Storage Description
#1	492.00'	7,375 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
492.00	1,210	0	0
493.00	2,010	1,610	1,610
494.00	2,870	2,440	4,050
495.00	3,780	3,325	7,375

Device	Routing	Invert	Outlet Devices
#1	Primary	494.10'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.90 3.00 Width (feet) 8.00 20.00 30.00

Primary OutFlow Max=4.65 cfs @ 12.00 hrs HW=494.38' TW=491.67' (Dynamic Tailwater)
└─**1=Custom Weir/Orifice** (Weir Controls 4.65 cfs @ 1.67 fps)

Summary for Pond 11P: FOREBAY 2

Inflow Area = 5.826 ac, 95.28% Impervious, Inflow Depth = 1.87" for 1 yr (Cpv) event
Inflow = 18.55 cfs @ 11.93 hrs, Volume= 0.907 af
Outflow = 16.82 cfs @ 11.96 hrs, Volume= 0.907 af, Atten= 9%, Lag= 1.5 min
Primary = 16.82 cfs @ 11.96 hrs, Volume= 0.907 af
Routed to Pond 3P : FOREBAY 1 & WET POND
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 7R : OFFSITE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 489.00' Surf.Area= 5,900 sf Storage= 12,455 cf
Peak Elev= 489.48' @ 11.96 hrs Surf.Area= 6,641 sf Storage= 15,435 cf (2,980 cf above start)

Plug-Flow detention time= 172.9 min calculated for 0.620 af (68% of inflow)
Center-of-Mass det. time= 7.1 min (777.4 - 770.3)

Volume	Invert	Avail.Storage	Storage Description
#1	485.00'	27,425 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
485.00	690	0	0
486.00	1,640	1,165	1,165
487.00	3,080	2,360	3,525
488.00	4,440	3,760	7,285
489.00	5,900	5,170	12,455
490.00	7,460	6,680	19,135
491.00	9,120	8,290	27,425

Device	Routing	Invert	Outlet Devices
#1	Device 2	489.00'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	482.00'	**30.0" Round Culvert** L= 124.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 482.00' / 481.26' S= 0.0060 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 4.91 sf
#3	Primary	476.20'	**30.0" Round Culvert** L= 42.0' Ke= 0.500 Inlet / Outlet Invert= 476.20' / 476.00' S= 0.0048 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#4	Secondary	490.50'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=16.48 cfs @ 11.96 hrs HW=489.47' TW=477.10' (Dynamic Tailwater)
↑—**3=Culvert** (Passes 16.48 cfs of 81.94 cfs potential flow)
↑—**2=Culvert** (Passes 16.48 cfs of 58.94 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 16.48 cfs @ 2.24 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=489.00' TW=0.00' (Dynamic Tailwater)
↑—**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentS-10P: 10P: E TO OFFSITE Runoff Area=0.855 ac 0.00% Impervious Runoff Depth=1.84"
Flow Length=543' Tc=5.6 min CN=80 Runoff=2.75 cfs 0.131 af

SubcatchmentS-1P: SUB 1 TO OFFSITE Runoff Area=2.515 ac 5.77% Impervious Runoff Depth=1.91"
Flow Length=104' Slope=0.1540 '/' Tc=1.3 min CN=81 Runoff=9.43 cfs 0.401 af

SubcatchmentS-2P: SUB 2P TO FOREBAY Runoff Area=3.817 ac 59.34% Impervious Runoff Depth=2.78"
Flow Length=564' Tc=8.3 min CN=91 Runoff=16.37 cfs 0.884 af

SubcatchmentS-3P: 3P TO BIORETENTION Runoff Area=2.930 ac 87.75% Impervious Runoff Depth=3.29"
Flow Length=440' Tc=3.1 min CN=96 Runoff=16.19 cfs 0.804 af

SubcatchmentS-4aP: 4P TO S SWALE Runoff Area=1.699 ac 60.68% Impervious Runoff Depth=2.78"
Flow Length=623' Tc=5.1 min CN=91 Runoff=8.01 cfs 0.393 af

SubcatchmentS-4bP: DIRECT TO Runoff Area=2.751 ac 40.79% Impervious Runoff Depth=2.41"
Flow Length=689' Slope=0.0900 '/' Tc=6.2 min CN=87 Runoff=11.07 cfs 0.552 af

SubcatchmentS-5P: 5P: TO FOREBAY2 Runoff Area=5.826 ac 95.28% Impervious Runoff Depth=3.40"
Flow Length=905' Tc=3.3 min CN=97 Runoff=32.54 cfs 1.652 af

SubcatchmentS-6P: 6P: E SWALE TO Runoff Area=1.052 ac 0.00% Impervious Runoff Depth=1.84"
Flow Length=516' Tc=9.4 min CN=80 Runoff=3.00 cfs 0.161 af

SubcatchmentS-7P: 7P: RUN ON TO E Runoff Area=1.060 ac 0.00% Impervious Runoff Depth=1.84"
Flow Length=429' Tc=24.1 min CN=80 Runoff=1.92 cfs 0.162 af

SubcatchmentS-8P: 8P: ONSITE TO Runoff Area=0.071 ac 0.00% Impervious Runoff Depth=1.84"
Flow Length=397' Slope=0.0630 '/' Tc=0.7 min CN=80 Runoff=0.26 cfs 0.011 af

SubcatchmentS-9P: 9P: OFFSITE TO Runoff Area=4.670 ac 38.39% Impervious Runoff Depth=2.41"
Flow Length=1,032' Tc=33.7 min CN=87 Runoff=9.02 cfs 0.937 af

Reach 7R: OFFSITE Inflow=40.25 cfs 6.070 af
Outflow=40.25 cfs 6.070 af

Pond 2P: BIORETENTION1 Peak Elev=487.23' Storage=5,655 cf Inflow=27.33 cfs 1.749 af
Outflow=25.88 cfs 1.739 af

Pond 3P: FOREBAY1 & WET POND Peak Elev=478.59' Storage=91,553 cf Inflow=71.02 cfs 4.275 af
Primary=28.07 cfs 4.266 af Secondary=0.00 cfs 0.000 af Outflow=28.07 cfs 4.266 af

Pond 5P: SOUTH SWALE Peak Elev=492.44' Storage=3,750 cf Inflow=18.22 cfs 0.946 af
Outflow=14.33 cfs 0.946 af

Pond 6P: SOUTH SWALE FOREBAY Peak Elev=494.56' Storage=5,808 cf Inflow=11.07 cfs 0.552 af
Outflow=10.77 cfs 0.552 af

Pond 11P: FOREBAY 2 Peak Elev=489.70' Storage=16,963 cf Inflow=32.54 cfs 1.652 af
Primary=30.04 cfs 1.652 af Secondary=0.00 cfs 0.000 af Outflow=30.04 cfs 1.652 af

Total Runoff Area = 27.246 ac Runoff Volume = 6.089 af Average Runoff Depth = 2.68"
46.86% Pervious = 12.768 ac 53.14% Impervious = 14.478 ac

Summary for Subcatchment S-10P: 10P: E TO OFFSITE

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

Runoff = 2.75 cfs @ 11.97 hrs, Volume= 0.131 af, Depth= 1.84"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr (Qp) Rainfall=3.75"

Area (ac)	CN	Description
0.855	80	>75% Grass cover, Good, HSG D
0.000	98	Paved parking, HSG D
0.855	80	Weighted Average
0.855		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	55	0.3260	0.26		**Sheet Flow, HILL TO SWALE** Grass: Dense n= 0.240 P2= 2.20"
2.1	488	0.0670	3.88		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	543	Total			

Summary for Subcatchment S-1P: SUB 1 TO OFFSITE

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

Runoff = 9.43 cfs @ 11.91 hrs, Volume= 0.401 af, Depth= 1.91"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr (Qp) Rainfall=3.75"

Area (ac)	CN	Description
2.370	80	>75% Grass cover, Good, HSG D
0.145	98	Paved parking, HSG D
2.515	81	Weighted Average
2.370		94.23% Pervious Area
0.145		5.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	104	0.1540	1.35		**Lag/CN Method,**

Summary for Subcatchment S-2P: SUB 2P TO FOREBAY 1 & POND

Runoff = 16.37 cfs @ 11.99 hrs, Volume= 0.884 af, Depth= 2.78"
Routed to Pond 3P : FOREBAY 1 & WET POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr (Qp) Rainfall=3.75"

Area (ac)	CN	Description
1.552	80	>75% Grass cover, Good, HSG D
2.265	98	Paved parking, HSG D
3.817	91	Weighted Average
1.552		40.66% Pervious Area
2.265		59.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	71	0.0560	0.20		**Sheet Flow, OVERLAND** Grass: Short n= 0.150 P2= 2.20"
2.2	311	0.0130	2.31		**Shallow Concentrated Flow, EMPLOYEE LOT** Paved Kv= 20.3 fps
0.1	182	0.4500	57.09	179.35	**Pipe Channel, PIPE TO FOREBAY 1** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
8.3	564	Total			

Summary for Subcatchment S-3P: 3P TO BIORETENTION

[49] Hint: Tc<2dt may require smaller dt
[47] Hint: Peak is 1134% of capacity of segment #2
[47] Hint: Peak is 184% of capacity of segment #3

Runoff = 16.19 cfs @ 11.93 hrs, Volume= 0.804 af, Depth= 3.29"
Routed to Pond 2P : BIORETENTION 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr (Qp) Rainfall=3.75"

Area (ac)	CN	Description
0.359	80	>75% Grass cover, Good, HSG D
2.571	98	Paved parking, HSG D
2.930	96	Weighted Average
0.359		12.25% Pervious Area
2.571		87.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	158	0.0200	1.25		**Sheet Flow, ROOF** Smooth surfaces n= 0.011 P2= 2.20"
0.1	20	0.0100	4.09	1.43	**Pipe Channel, ROOF DRAIN** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.011 Concrete pipe, straight & clean
0.9	262	0.0050	4.97	8.78	**Pipe Channel, RCP** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
3.1	440	Total			

Summary for Subcatchment S-4aP: 4P TO S SWALE

[49] Hint: Tc<2dt may require smaller dt
[47] Hint: Peak is 510% of capacity of segment #2
[47] Hint: Peak is 129% of capacity of segment #3

Runoff = 8.01 cfs @ 11.95 hrs, Volume= 0.393 af, Depth= 2.78"
Routed to Pond 5P : SOUTH SWALE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr (Qp) Rainfall=3.75"

	Area (ac)	CN	Description
	0.668	80	>75% Grass cover, Good, HSG D
*	1.031	98	DISCONNECTED ROOF
	1.699	91	Weighted Average
	0.668		39.32% Pervious Area
	1.031		60.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	157	0.0200	1.25		**Sheet Flow, ROOF** Smooth surfaces n= 0.011 P2= 2.20"
0.1	25	0.0100	4.50	1.57	**Pipe Channel, Roof Drain** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
0.7	150	0.0025	3.51	6.21	**Pipe Channel, CMP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
2.2	291	0.0050	2.25	35.32	**Channel Flow, S SWALE** Area= 15.7 sf Perim= 30.5' r= 0.51' n= 0.030 Short grass
5.1	623	Total			

Summary for Subcatchment S-4bP: DIRECT TO FOREBAY

Runoff = 11.07 cfs @ 11.97 hrs, Volume= 0.552 af, Depth= 2.41"
Routed to Pond 6P : SOUTH SWALE FOREBAY

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr (Qp) Rainfall=3.75"

Area (ac)	CN	Description
1.629	80	>75% Grass cover, Good, HSG D
1.122	98	Paved parking, HSG D
2.751	87	Weighted Average
1.629		59.21% Pervious Area
1.122		40.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	689	0.0900	1.85		**Lag/CN Method,**

Summary for Subcatchment S-5P: 5P: TO FOREBAY 2

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

Runoff = 32.54 cfs @ 11.93 hrs, Volume= 1.652 af, Depth= 3.40"
Routed to Pond 11P : FOREBAY 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr (Qp) Rainfall=3.75"

Area (ac)	CN	Description
0.275	80	>75% Grass cover, Good, HSG D
5.551	98	Paved parking, HSG D
5.826	97	Weighted Average
0.275		4.72% Pervious Area
5.551		95.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.5	278	0.0390	1.83		**Sheet Flow, OVERLAND FLOW TRUCK PARKING** Smooth surfaces n= 0.011 P2= 2.20"
0.2	60	0.0390	4.01		**Shallow Concentrated Flow, TRUCK PARKING** Paved Kv= 20.3 fps
0.6	567	0.0050	16.60	1,095.78	**Pipe Channel, PIPE TO FOREBAY 2** 110.0" Round Area= 66.0 sf Perim= 28.8' r= 2.29' n= 0.011 Concrete pipe, straight & clean
3.3	905	Total			

Summary for Subcatchment S-6P: 6P: E SWALE TO OFFSITE

Runoff = 3.00 cfs @ 12.01 hrs, Volume= 0.161 af, Depth= 1.84"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr (Qp) Rainfall=3.75"

Area (ac)	CN	Description
1.052	80	>75% Grass cover, Good, HSG D
0.000	98	Paved parking, HSG D
1.052	80	Weighted Average
1.052		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	141	0.3260	0.32		**Sheet Flow, HILL TO SWALE** Grass: Dense n= 0.240 P2= 2.20"
2.0	375	0.0130	3.07	25.14	**Channel Flow, SWALE** Area= 8.2 sf Perim= 20.5' r= 0.40' n= 0.030 Short grass
9.4	516	Total			

Summary for Subcatchment S-7P: 7P: RUN ON TO E

Runoff = 1.92 cfs @ 12.18 hrs, Volume= 0.162 af, Depth= 1.84"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr (Qp) Rainfall=3.75"

Area (ac)	CN	Description
1.060	80	>75% Grass cover, Good, HSG D
1.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	289	0.0830	0.21		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
1.3	140	0.0640	1.77		**Shallow Concentrated Flow, EDGE OF PROPRTY DITCH** Short Grass Pasture Kv= 7.0 fps
24.1	429	Total			

Summary for Subcatchment S-8P: 8P: ONSITE TO BYPASS CULVERT

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

Runoff = 0.26 cfs @ 11.90 hrs, Volume= 0.011 af, Depth= 1.84"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr (Qp) Rainfall=3.75"

Area (ac)	CN	Description
0.071	80	>75% Grass cover, Good, HSG D
0.000	98	Paved parking, HSG D
0.000	98	Roofs, HSG D
0.071	80	Weighted Average
0.071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	397	0.0630	9.24	49.29	**Parabolic Channel, DITCH** W=8.00' D=1.00' Area=5.3 sf Perim=8.3' n= 0.030 Short grass

Summary for Subcatchment S-9P: 9P: OFFSITE TO BYPASS CULVERT

Runoff = 9.02 cfs @ 12.28 hrs, Volume= 0.937 af, Depth= 2.41"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr (Qp) Rainfall=3.75"

Area (ac)	CN	Description
2.877	80	>75% Grass cover, Good, HSG D
1.793	98	Paved roads w/curbs & sewers, HSG D
4.670	87	Weighted Average
2.877		61.61% Pervious Area
1.793		38.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.5	216	0.0190	0.11		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
1.2	816	0.0510	10.94	142.17	**Parabolic Channel, DITCH** W=13.00' D=1.50' Area=13.0 sf Perim=13.4' n= 0.030 Short grass
33.7	1,032	Total			

Summary for Reach 7R: OFFSITE

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

Inflow Area = 27.246 ac, 53.14% Impervious, Inflow Depth > 2.67" for 10 yr (Qp) event
Inflow = 40.25 cfs @ 12.15 hrs, Volume= 6.070 af
Outflow = 40.25 cfs @ 12.15 hrs, Volume= 6.070 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3

Summary for Pond 2P: BIORETENTION 1

Inflow Area = 7.380 ac, 64.01% Impervious, Inflow Depth = 2.84" for 10 yr (Qp) event
Inflow = 27.33 cfs @ 11.95 hrs, Volume= 1.749 af
Outflow = 25.88 cfs @ 11.98 hrs, Volume= 1.739 af, Atten= 5%, Lag= 1.7 min
Primary = 25.88 cfs @ 11.98 hrs, Volume= 1.739 af
Routed to Pond 3P : FOREBAY 1 & WET POND

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 487.23' @ 11.98 hrs Surf.Area= 5,250 sf Storage= 5,655 cf

Plug-Flow detention time= 48.0 min calculated for 1.737 af (99% of inflow)
Center-of-Mass det. time= 45.5 min (832.7 - 787.3)

Volume	Invert	Avail.Storage	Storage Description
#1	486.00'	20,603 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
486.00	3,930	0	0
487.00	4,980	4,455	4,455
488.00	6,130	5,555	10,010
489.00	7,370	6,750	16,760
489.50	8,000	3,843	20,603

Device	Routing	Invert	Outlet Devices
#1	Device 2	486.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	479.35'	**24.0" Round Culvert** L= 146.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 479.35' / 479.00' S= 0.0024 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#3	Device 2	486.00'	**0.200 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 450.00'

Primary OutFlow Max=25.30 cfs @ 11.98 hrs HW=487.22' TW=478.14' (Dynamic Tailwater)
└─**2=Culvert** (Passes 25.30 cfs of 39.18 cfs potential flow)
  ├─**1=Orifice/Grate** (Weir Controls 25.28 cfs @ 2.78 fps)
  └─**3=Exfiltration** (Controls 0.02 cfs)

Summary for Pond 3P: FOREBAY 1 & WET POND

Inflow Area = 17.023 ac, 73.67% Impervious, Inflow Depth > 3.01" for 10 yr (Qp) event
Inflow = 71.02 cfs @ 11.97 hrs, Volume= 4.275 af
Outflow = 28.07 cfs @ 12.13 hrs, Volume= 4.266 af, Atten= 60%, Lag= 9.7 min
Primary = 28.07 cfs @ 12.13 hrs, Volume= 4.266 af
Routed to Reach 7R : OFFSITE
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 7R : OFFSITE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 475.50' Surf.Area= 9,510 sf Storage= 28,399 cf
Peak Elev= 478.59' @ 12.13 hrs Surf.Area= 28,924 sf Storage= 91,553 cf (63,154 cf above start)

Plug-Flow detention time= 189.7 min calculated for 3.614 af (85% of inflow)
Center-of-Mass det. time= 68.4 min (866.1 - 797.7)

Volume	Invert	Avail.Storage	Storage Description
#1	467.00'	161,578 cf	**WET POND (Prismatic)**Listed below (Recalc)
#2	473.00'	10,291 cf	**FOREBAY (Prismatic)**Listed below (Recalc)
		171,869 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
467.00	1,154	0	0
468.00	1,550	1,352	1,352
469.00	1,900	1,725	3,077
470.00	2,280	2,090	5,167
471.00	2,685	2,483	7,650
472.00	3,110	2,898	10,547
473.00	3,565	3,338	13,885
474.00	4,340	3,953	17,837
474.50	4,620	2,240	20,077
475.00	6,300	2,730	22,807
476.00	9,960	8,130	30,937
476.10	10,505	1,023	31,960
477.00	20,330	13,876	45,836
478.00	23,820	22,075	67,911
479.00	27,015	25,418	93,328
480.00	35,215	31,115	124,443
481.00	39,055	37,135	161,578

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
473.00	280	0	0
474.00	654	467	467
475.00	1,128	891	1,358
476.00	1,631	1,380	2,738
477.00	2,191	1,911	4,649
478.00	2,807	2,499	7,148
479.00	3,480	3,144	10,291

Device	Routing	Invert	Outlet Devices
#1	Device 4	478.50'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	471.78'	**24.0" Round Culvert** L= 39.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 471.00' / 471.78' S= -0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#3	Device 4	475.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)**

			Head (feet) 0.00 1.75 1.75 3.00
			Width (feet) 0.75 0.75 5.00 5.00
#4	Primary	474.30'	**30.0" Round Culvert**
			L= 37.0' RCP, end-section conforming to fill, Ke= 0.500
			Inlet / Outlet Invert= 474.30' / 474.00' S= 0.0081 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#5	Secondary	480.00'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=27.94 cfs @ 12.13 hrs HW=478.59' TW=0.00' (Dynamic Tailwater)
└─**4=Culvert** (Passes 27.94 cfs of 41.20 cfs potential flow)
  ├─**1=Orifice/Grate** (Weir Controls 1.36 cfs @ 0.97 fps)
  └─**3=Custom Weir/Orifice** (Passes 26.58 cfs of 34.46 cfs potential flow)
    └─**2=Culvert** (Inlet Controls 26.58 cfs @ 8.46 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=475.50' TW=0.00' (Dynamic Tailwater)
└─**5=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 5P: SOUTH SWALE

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 4.450 ac, 48.38% Impervious, Inflow Depth = 2.55" for 10 yr (Qp) event
Inflow = 18.22 cfs @ 11.98 hrs, Volume= 0.946 af
Outflow = 14.33 cfs @ 12.04 hrs, Volume= 0.946 af, Atten= 21%, Lag= 3.6 min
Primary = 14.33 cfs @ 12.04 hrs, Volume= 0.946 af
Routed to Pond 2P : BIORETENTION 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 492.44' @ 12.04 hrs Surf.Area= 4,175 sf Storage= 3,750 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.6 min (807.6 - 806.0)

Volume	Invert	Avail.Storage	Storage Description
#1	491.00'	20,935 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
491.00	885	0	0
492.00	3,320	2,103	2,103
493.00	5,265	4,293	6,395
494.00	7,200	6,233	12,628
495.00	9,415	8,308	20,935

Device	Routing	Invert	Outlet Devices
#1	Device 2	490.45'	**24.0" Round FES I1-5 TO STMH I1-4** L= 40.0' Ke= 0.500
			Inlet / Outlet Invert= 490.45' / 490.05' S= 0.0100 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Device 3	490.05'	**24.0" Round STMH I1-4 TO STMH I1-3** L= 150.0' Ke= 0.500
			Inlet / Outlet Invert= 490.05' / 487.85' S= 0.0147 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

#3	Device 4	487.84'	**24.0" Round STMH I1-3 TO STMH I1-2** L= 161.0' Ke= 0.500 Inlet / Outlet Invert= 487.84' / 486.79' S= 0.0065 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#4	Primary	486.39'	**30.0" Round STMH I1-2 TO FES I1-1** L= 139.0' Ke= 0.500 Inlet / Outlet Invert= 486.39' / 486.00' S= 0.0028 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf

Primary OutFlow Max=14.13 cfs @ 12.04 hrs HW=492.42' TW=487.16' (Dynamic Tailwater)
└─**4=STMH I1-2 TO FES I1-1** (Passes 14.13 cfs of 50.11 cfs potential flow)
  └─**3=STMH I1-3 TO STMH I1-2** (Passes 14.13 cfs of 28.02 cfs potential flow)
    └─**2=STMH I1-4 TO STMH I1-3** (Passes 14.13 cfs of 17.69 cfs potential flow)
      └─**1=FES I1-5 TO STMH I1-4** (Barrel Controls 14.13 cfs @ 5.68 fps)

Summary for Pond 6P: SOUTH SWALE FOREBAY

Inflow Area = 2.751 ac, 40.79% Impervious, Inflow Depth = 2.41" for 10 yr (Qp) event
Inflow = 11.07 cfs @ 11.97 hrs, Volume= 0.552 af
Outflow = 10.77 cfs @ 11.99 hrs, Volume= 0.552 af, Atten= 3%, Lag= 1.4 min
Primary = 10.77 cfs @ 11.99 hrs, Volume= 0.552 af
Routed to Pond 5P : SOUTH SWALE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 494.10' Surf.Area= 2,961 sf Storage= 4,342 cf
Peak Elev= 494.56' @ 11.99 hrs Surf.Area= 3,382 sf Storage= 5,808 cf (1,466 cf above start)

Plug-Flow detention time= 117.2 min calculated for 0.452 af (82% of inflow)
Center-of-Mass det. time= 6.0 min (815.4 - 809.4)

Volume	Invert	Avail.Storage	Storage Description
#1	492.00'	7,375 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
492.00	1,210	0	0
493.00	2,010	1,610	1,610
494.00	2,870	2,440	4,050
495.00	3,780	3,325	7,375

Device	Routing	Invert	Outlet Devices
#1	Primary	494.10'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.90 3.00 Width (feet) 8.00 20.00 30.00

Primary OutFlow Max=10.59 cfs @ 11.99 hrs HW=494.56' TW=492.36' (Dynamic Tailwater)
└─**1=Custom Weir/Orifice** (Weir Controls 10.59 cfs @ 2.09 fps)

Summary for Pond 11P: FOREBAY 2

Inflow Area = 5.826 ac, 95.28% Impervious, Inflow Depth = 3.40" for 10 yr (Qp) event
Inflow = 32.54 cfs @ 11.93 hrs, Volume= 1.652 af
Outflow = 30.04 cfs @ 11.95 hrs, Volume= 1.652 af, Atten= 8%, Lag= 1.3 min
Primary = 30.04 cfs @ 11.95 hrs, Volume= 1.652 af
Routed to Pond 3P : FOREBAY 1 & WET POND
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 7R : OFFSITE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 489.00' Surf.Area= 5,900 sf Storage= 12,455 cf
Peak Elev= 489.70' @ 11.96 hrs Surf.Area= 6,991 sf Storage= 16,963 cf (4,508 cf above start)

Plug-Flow detention time= 133.0 min calculated for 1.366 af (83% of inflow)
Center-of-Mass det. time= 6.0 min (761.9 - 755.9)

Volume	Invert	Avail.Storage	Storage Description
#1	485.00'	27,425 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
485.00	690	0	0
486.00	1,640	1,165	1,165
487.00	3,080	2,360	3,525
488.00	4,440	3,760	7,285
489.00	5,900	5,170	12,455
490.00	7,460	6,680	19,135
491.00	9,120	8,290	27,425

Device	Routing	Invert	Outlet Devices
#1	Device 2	489.00'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	482.00'	**30.0" Round Culvert** L= 124.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 482.00' / 481.26' S= 0.0060 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 4.91 sf
#3	Primary	476.20'	**30.0" Round Culvert** L= 42.0' Ke= 0.500 Inlet / Outlet Invert= 476.20' / 476.00' S= 0.0048 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#4	Secondary	490.50'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=29.65 cfs @ 11.95 hrs HW=489.69' TW=477.99' (Dynamic Tailwater)
↑—**3=Culvert** (Passes 29.65 cfs of 80.84 cfs potential flow)
↑—**2=Culvert** (Passes 29.65 cfs of 60.00 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 29.65 cfs @ 2.72 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=489.00' TW=0.00' (Dynamic Tailwater)
↑—**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentS-10P: 10P: E TO OFFSITE Runoff Area=0.855 ac 0.00% Impervious Runoff Depth=4.24"
Flow Length=543' Tc=5.6 min CN=80 Runoff=6.19 cfs 0.302 af

SubcatchmentS-1P: SUB 1 TO OFFSITE Runoff Area=2.515 ac 5.77% Impervious Runoff Depth=4.34"
Flow Length=104' Slope=0.1540 '/' Tc=1.3 min CN=81 Runoff=20.70 cfs 0.910 af

SubcatchmentS-2P: SUB 2P TO FOREBAY Runoff Area=3.817 ac 59.34% Impervious Runoff Depth=5.45"
Flow Length=564' Tc=8.3 min CN=91 Runoff=30.78 cfs 1.733 af

SubcatchmentS-3P: 3P TO BIORETENTION Runoff Area=2.930 ac 87.75% Impervious Runoff Depth=6.03"
Flow Length=440' Tc=3.1 min CN=96 Runoff=28.63 cfs 1.471 af

SubcatchmentS-4aP: 4P TO S SWALE Runoff Area=1.699 ac 60.68% Impervious Runoff Depth=5.45"
Flow Length=623' Tc=5.1 min CN=91 Runoff=15.04 cfs 0.771 af

SubcatchmentS-4bP: DIRECT TO Runoff Area=2.751 ac 40.79% Impervious Runoff Depth=5.00"
Flow Length=689' Slope=0.0900 '/' Tc=6.2 min CN=87 Runoff=22.09 cfs 1.146 af

SubcatchmentS-5P: 5P: TO FOREBAY2 Runoff Area=5.826 ac 95.28% Impervious Runoff Depth=6.14"
Flow Length=905' Tc=3.3 min CN=97 Runoff=57.07 cfs 2.982 af

SubcatchmentS-6P: 6P: E SWALE TO Runoff Area=1.052 ac 0.00% Impervious Runoff Depth=4.24"
Flow Length=516' Tc=9.4 min CN=80 Runoff=6.79 cfs 0.371 af

SubcatchmentS-7P: 7P: RUN ON TO E Runoff Area=1.060 ac 0.00% Impervious Runoff Depth=4.24"
Flow Length=429' Tc=24.1 min CN=80 Runoff=4.45 cfs 0.374 af

SubcatchmentS-8P: 8P: ONSITE TO Runoff Area=0.071 ac 0.00% Impervious Runoff Depth=4.24"
Flow Length=397' Slope=0.0630 '/' Tc=0.7 min CN=80 Runoff=0.59 cfs 0.025 af

SubcatchmentS-9P: 9P: OFFSITE TO Runoff Area=4.670 ac 38.39% Impervious Runoff Depth=5.00"
Flow Length=1,032' Tc=33.7 min CN=87 Runoff=18.37 cfs 1.945 af

Reach 7R: OFFSITE Inflow=83.10 cfs 12.011 af
Outflow=83.10 cfs 12.011 af

Pond 2P: BIORETENTION1 Peak Elev=487.72' Storage=8,311 cf Inflow=47.20 cfs 3.388 af
Outflow=40.70 cfs 3.378 af

Pond 3P: FOREBAY1 & WET POND Peak Elev=480.01' Storage=134,955 cf Inflow=122.73 cfs 8.093 af
Primary=49.89 cfs 8.084 af Secondary=0.00 cfs 0.000 af Outflow=49.89 cfs 8.084 af

Pond 5P: SOUTH SWALE Peak Elev=493.74' Storage=10,832 cf Inflow=35.76 cfs 1.917 af
Outflow=22.90 cfs 1.917 af

Pond 6P: SOUTH SWALE FOREBAY Peak Elev=494.79' Storage=6,595 cf Inflow=22.09 cfs 1.146 af
Outflow=21.79 cfs 1.146 af

Pond 11P: FOREBAY 2 Peak Elev=490.03' Storage=19,326 cf Inflow=57.07 cfs 2.982 af
Primary=53.34 cfs 2.982 af Secondary=0.00 cfs 0.000 af Outflow=53.34 cfs 2.982 af

Total Runoff Area = 27.246 ac Runoff Volume = 12.030 af Average Runoff Depth = 5.30"
46.86% Pervious = 12.768 ac 53.14% Impervious = 14.478 ac

Summary for Subcatchment S-10P: 10P: E TO OFFSITE

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

Runoff = 6.19 cfs @ 11.96 hrs, Volume= 0.302 af, Depth= 4.24"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr (Qf) Rainfall=6.50"

Area (ac)	CN	Description
0.855	80	>75% Grass cover, Good, HSG D
0.000	98	Paved parking, HSG D
0.855	80	Weighted Average
0.855		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	55	0.3260	0.26		**Sheet Flow, HILL TO SWALE** Grass: Dense n= 0.240 P2= 2.20"
2.1	488	0.0670	3.88		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	543	Total			

Summary for Subcatchment S-1P: SUB 1 TO OFFSITE

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

Runoff = 20.70 cfs @ 11.90 hrs, Volume= 0.910 af, Depth= 4.34"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr (Qf) Rainfall=6.50"

Area (ac)	CN	Description
2.370	80	>75% Grass cover, Good, HSG D
0.145	98	Paved parking, HSG D
2.515	81	Weighted Average
2.370		94.23% Pervious Area
0.145		5.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	104	0.1540	1.35		**Lag/CN Method,**

Summary for Subcatchment S-2P: SUB 2P TO FOREBAY 1 & POND

Runoff = 30.78 cfs @ 11.99 hrs, Volume= 1.733 af, Depth= 5.45"
Routed to Pond 3P : FOREBAY 1 & WET POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr (Qf) Rainfall=6.50"

Area (ac)	CN	Description
1.552	80	>75% Grass cover, Good, HSG D
2.265	98	Paved parking, HSG D
3.817	91	Weighted Average
1.552		40.66% Pervious Area
2.265		59.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	71	0.0560	0.20		**Sheet Flow, OVERLAND** Grass: Short n= 0.150 P2= 2.20"
2.2	311	0.0130	2.31		**Shallow Concentrated Flow, EMPLOYEE LOT** Paved Kv= 20.3 fps
0.1	182	0.4500	57.09	179.35	**Pipe Channel, PIPE TO FOREBAY 1** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
8.3	564	Total			

Summary for Subcatchment S-3P: 3P TO BIORETENTION

[49] Hint: Tc<2dt may require smaller dt
[47] Hint: Peak is 2005% of capacity of segment #2
[47] Hint: Peak is 326% of capacity of segment #3

Runoff = 28.63 cfs @ 11.93 hrs, Volume= 1.471 af, Depth= 6.03"
Routed to Pond 2P : BIORETENTION 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr (Qf) Rainfall=6.50"

Area (ac)	CN	Description
0.359	80	>75% Grass cover, Good, HSG D
2.571	98	Paved parking, HSG D
2.930	96	Weighted Average
0.359		12.25% Pervious Area
2.571		87.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	158	0.0200	1.25		**Sheet Flow, ROOF** Smooth surfaces n= 0.011 P2= 2.20"
0.1	20	0.0100	4.09	1.43	**Pipe Channel, ROOF DRAIN** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.011 Concrete pipe, straight & clean
0.9	262	0.0050	4.97	8.78	**Pipe Channel, RCP** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
3.1	440	Total			

Summary for Subcatchment S-4aP: 4P TO S SWALE

[49] Hint: Tc<2dt may require smaller dt
[47] Hint: Peak is 957% of capacity of segment #2
[47] Hint: Peak is 242% of capacity of segment #3

Runoff = 15.04 cfs @ 11.95 hrs, Volume= 0.771 af, Depth= 5.45"
Routed to Pond 5P : SOUTH SWALE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr (Qf) Rainfall=6.50"

	Area (ac)	CN	Description
	0.668	80	>75% Grass cover, Good, HSG D
*	1.031	98	DISCONNECTED ROOF
	1.699	91	Weighted Average
	0.668		39.32% Pervious Area
	1.031		60.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	157	0.0200	1.25		**Sheet Flow, ROOF** Smooth surfaces n= 0.011 P2= 2.20"
0.1	25	0.0100	4.50	1.57	**Pipe Channel, Roof Drain** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
0.7	150	0.0025	3.51	6.21	**Pipe Channel, CMP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
2.2	291	0.0050	2.25	35.32	**Channel Flow, S SWALE** Area= 15.7 sf Perim= 30.5' r= 0.51' n= 0.030 Short grass
5.1	623	Total			

Summary for Subcatchment S-4bP: DIRECT TO FOREBAY

Runoff = 22.09 cfs @ 11.97 hrs, Volume= 1.146 af, Depth= 5.00"
Routed to Pond 6P : SOUTH SWALE FOREBAY

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr (Qf) Rainfall=6.50"

Area (ac)	CN	Description
1.629	80	>75% Grass cover, Good, HSG D
1.122	98	Paved parking, HSG D
2.751	87	Weighted Average
1.629		59.21% Pervious Area
1.122		40.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	689	0.0900	1.85		**Lag/CN Method,**

Summary for Subcatchment S-5P: 5P: TO FOREBAY 2

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

Runoff = 57.07 cfs @ 11.93 hrs, Volume= 2.982 af, Depth= 6.14"
Routed to Pond 11P : FOREBAY 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr (Qf) Rainfall=6.50"

Area (ac)	CN	Description
0.275	80	>75% Grass cover, Good, HSG D
5.551	98	Paved parking, HSG D
5.826	97	Weighted Average
0.275		4.72% Pervious Area
5.551		95.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.5	278	0.0390	1.83		**Sheet Flow, OVERLAND FLOW TRUCK PARKING** Smooth surfaces n= 0.011 P2= 2.20"
0.2	60	0.0390	4.01		**Shallow Concentrated Flow, TRUCK PARKING** Paved Kv= 20.3 fps
0.6	567	0.0050	16.60	1,095.78	**Pipe Channel, PIPE TO FOREBAY 2** 110.0" Round Area= 66.0 sf Perim= 28.8' r= 2.29' n= 0.011 Concrete pipe, straight & clean
3.3	905	Total			

Summary for Subcatchment S-6P: 6P: E SWALE TO OFFSITE

Runoff = 6.79 cfs @ 12.01 hrs, Volume= 0.371 af, Depth= 4.24"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr (Qf) Rainfall=6.50"

Area (ac)	CN	Description
1.052	80	>75% Grass cover, Good, HSG D
0.000	98	Paved parking, HSG D
1.052	80	Weighted Average
1.052		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	141	0.3260	0.32		**Sheet Flow, HILL TO SWALE** Grass: Dense n= 0.240 P2= 2.20"
2.0	375	0.0130	3.07	25.14	**Channel Flow, SWALE** Area= 8.2 sf Perim= 20.5' r= 0.40' n= 0.030 Short grass
9.4	516	Total			

Summary for Subcatchment S-7P: 7P: RUN ON TO E

Runoff = 4.45 cfs @ 12.17 hrs, Volume= 0.374 af, Depth= 4.24"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr (Qf) Rainfall=6.50"

Area (ac)	CN	Description
1.060	80	>75% Grass cover, Good, HSG D
1.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	289	0.0830	0.21		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
1.3	140	0.0640	1.77		**Shallow Concentrated Flow, EDGE OF PROPRTY DITCH** Short Grass Pasture Kv= 7.0 fps
24.1	429	Total			

Summary for Subcatchment S-8P: 8P: ONSITE TO BYPASS CULVERT

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

Runoff = 0.59 cfs @ 11.90 hrs, Volume= 0.025 af, Depth= 4.24"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr (Qf) Rainfall=6.50"

Area (ac)	CN	Description
0.071	80	>75% Grass cover, Good, HSG D
0.000	98	Paved parking, HSG D
0.000	98	Roofs, HSG D
0.071	80	Weighted Average
0.071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	397	0.0630	9.24	49.29	**Parabolic Channel, DITCH** W=8.00' D=1.00' Area=5.3 sf Perim=8.3' n= 0.030 Short grass

Summary for Subcatchment S-9P: 9P: OFFSITE TO BYPASS CULVERT

Runoff = 18.37 cfs @ 12.28 hrs, Volume= 1.945 af, Depth= 5.00"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr (Qf) Rainfall=6.50"

Area (ac)	CN	Description
2.877	80	>75% Grass cover, Good, HSG D
1.793	98	Paved roads w/curbs & sewers, HSG D
4.670	87	Weighted Average
2.877		61.61% Pervious Area
1.793		38.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.5	216	0.0190	0.11		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
1.2	816	0.0510	10.94	142.17	**Parabolic Channel, DITCH** W=13.00' D=1.50' Area=13.0 sf Perim=13.4' n= 0.030 Short grass
33.7	1,032	Total			

Summary for Reach 7R: OFFSITE

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

Inflow Area = 27.246 ac, 53.14% Impervious, Inflow Depth > 5.29" for 100 yr (Qf) event
Inflow = 83.10 cfs @ 11.96 hrs, Volume= 12.011 af
Outflow = 83.10 cfs @ 11.96 hrs, Volume= 12.011 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3

Summary for Pond 2P: BIORETENTION 1

Inflow Area = 7.380 ac, 64.01% Impervious, Inflow Depth = 5.51" for 100 yr (Qf) event
Inflow = 47.20 cfs @ 11.94 hrs, Volume= 3.388 af
Outflow = 40.70 cfs @ 11.99 hrs, Volume= 3.378 af, Atten= 14%, Lag= 2.8 min
Primary = 40.70 cfs @ 11.99 hrs, Volume= 3.378 af
Routed to Pond 3P : FOREBAY 1 & WET POND

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 487.72' @ 11.99 hrs Surf.Area= 5,803 sf Storage= 8,311 cf

Plug-Flow detention time= 27.7 min calculated for 3.374 af (100% of inflow)
Center-of-Mass det. time= 27.1 min (798.8 - 771.8)

Volume	Invert	Avail.Storage	Storage Description
#1	486.00'	20,603 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
486.00	3,930	0	0
487.00	4,980	4,455	4,455
488.00	6,130	5,555	10,010
489.00	7,370	6,750	16,760
489.50	8,000	3,843	20,603

Device	Routing	Invert	Outlet Devices
#1	Device 2	486.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	479.35'	**24.0" Round Culvert** L= 146.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 479.35' / 479.00' S= 0.0024 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#3	Device 2	486.00'	**0.200 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 450.00'

Primary OutFlow Max=40.63 cfs @ 11.99 hrs HW=487.69' TW=479.47' (Dynamic Tailwater)
↑**2=Culvert** (Barrel Controls 40.63 cfs @ 12.93 fps)
↑**1=Orifice/Grate** (Passes < 53.53 cfs potential flow)
3=Exfiltration (Passes < 0.03 cfs potential flow)

Summary for Pond 3P: FOREBAY 1 & WET POND

Inflow Area = 17.023 ac, 73.67% Impervious, Inflow Depth > 5.70" for 100 yr (Qf) event
Inflow = 122.73 cfs @ 11.97 hrs, Volume= 8.093 af
Outflow = 49.89 cfs @ 12.13 hrs, Volume= 8.084 af, Atten= 59%, Lag= 9.7 min
Primary = 49.89 cfs @ 12.13 hrs, Volume= 8.084 af
Routed to Reach 7R : OFFSITE
Secondary = 0.00 cfs @ 12.15 hrs, Volume= 0.000 af
Routed to Reach 7R : OFFSITE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 475.50' Surf.Area= 9,510 sf Storage= 28,399 cf
Peak Elev= 480.01' @ 12.13 hrs Surf.Area= 38,719 sf Storage= 134,955 cf (106,555 cf above start)

Plug-Flow detention time= 137.3 min calculated for 7.432 af (92% of inflow)
Center-of-Mass det. time= 58.5 min (834.4 - 775.9)

Volume	Invert	Avail.Storage	Storage Description
#1	467.00'	161,578 cf	**WET POND (Prismatic)**Listed below (Recalc)
#2	473.00'	10,291 cf	**FOREBAY (Prismatic)**Listed below (Recalc)
		171,869 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
467.00	1,154	0	0
468.00	1,550	1,352	1,352
469.00	1,900	1,725	3,077
470.00	2,280	2,090	5,167
471.00	2,685	2,483	7,650
472.00	3,110	2,898	10,547
473.00	3,565	3,338	13,885
474.00	4,340	3,953	17,837
474.50	4,620	2,240	20,077
475.00	6,300	2,730	22,807
476.00	9,960	8,130	30,937
476.10	10,505	1,023	31,960
477.00	20,330	13,876	45,836
478.00	23,820	22,075	67,911
479.00	27,015	25,418	93,328
480.00	35,215	31,115	124,443
481.00	39,055	37,135	161,578

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
473.00	280	0	0
474.00	654	467	467
475.00	1,128	891	1,358
476.00	1,631	1,380	2,738
477.00	2,191	1,911	4,649
478.00	2,807	2,499	7,148
479.00	3,480	3,144	10,291

Device	Routing	Invert	Outlet Devices
#1	Device 4	478.50'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	471.78'	**24.0" Round Culvert** L= 39.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 471.00' / 471.78' S= -0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#3	Device 4	475.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)**

			Head (feet) 0.00 1.75 1.75 3.00
			Width (feet) 0.75 0.75 5.00 5.00
#4	Primary	474.30'	**30.0" Round Culvert**
			L= 37.0' RCP, end-section conforming to fill, Ke= 0.500
			Inlet / Outlet Invert= 474.30' / 474.00' S= 0.0081 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#5	Secondary	480.00'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=49.86 cfs @ 12.13 hrs HW=480.00' TW=0.00' (Dynamic Tailwater)
└─**4=Culvert** (Inlet Controls 49.86 cfs @ 10.16 fps)
  ├─**1=Orifice/Grate** (Passes < 94.32 cfs potential flow)
  └─**3=Custom Weir/Orifice** (Passes < 56.83 cfs potential flow)
    └─**2=Culvert** (Passes < 32.09 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 12.15 hrs HW=480.00' TW=0.00' (Dynamic Tailwater)
└─**5=Sharp-Crested Rectangular Weir** (Weir Controls 0.00 cfs @ 0.07 fps)

Summary for Pond 5P: SOUTH SWALE

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 4.450 ac, 48.38% Impervious, Inflow Depth = 5.17" for 100 yr (Qf) event
Inflow = 35.76 cfs @ 11.97 hrs, Volume= 1.917 af
Outflow = 22.90 cfs @ 12.06 hrs, Volume= 1.917 af, Atten= 36%, Lag= 5.0 min
Primary = 22.90 cfs @ 12.06 hrs, Volume= 1.917 af
Routed to Pond 2P : BIORETENTION 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 493.74' @ 12.05 hrs Surf.Area= 6,700 sf Storage= 10,832 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.7 min (788.6 - 785.9)

Volume	Invert	Avail.Storage	Storage Description
#1	491.00'	20,935 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
491.00	885	0	0
492.00	3,320	2,103	2,103
493.00	5,265	4,293	6,395
494.00	7,200	6,233	12,628
495.00	9,415	8,308	20,935

Device	Routing	Invert	Outlet Devices
#1	Device 2	490.45'	**24.0" Round FES I1-5 TO STMH I1-4** L= 40.0' Ke= 0.500
			Inlet / Outlet Invert= 490.45' / 490.05' S= 0.0100 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Device 3	490.05'	**24.0" Round STMH I1-4 TO STMH I1-3** L= 150.0' Ke= 0.500
			Inlet / Outlet Invert= 490.05' / 487.85' S= 0.0147 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

#3	Device 4	487.84'	**24.0" Round STMH I1-3 TO STMH I1-2** L= 161.0' Ke= 0.500 Inlet / Outlet Invert= 487.84' / 486.79' S= 0.0065 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#4	Primary	486.39'	**30.0" Round STMH I1-2 TO FES I1-1** L= 139.0' Ke= 0.500 Inlet / Outlet Invert= 486.39' / 486.00' S= 0.0028 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf

Primary OutFlow Max=22.83 cfs @ 12.06 hrs HW=493.73' TW=487.49' (Dynamic Tailwater)
└─**4=STMH I1-2 TO FES I1-1** (Passes 22.83 cfs of 57.89 cfs potential flow)
  └─**3=STMH I1-3 TO STMH I1-2** (Passes 22.83 cfs of 32.69 cfs potential flow)
    └─**2=STMH I1-4 TO STMH I1-3** (Passes 22.83 cfs of 24.76 cfs potential flow)
      └─**1=FES I1-5 TO STMH I1-4** (Inlet Controls 22.83 cfs @ 7.27 fps)

Summary for Pond 6P: SOUTH SWALE FOREBAY

Inflow Area = 2.751 ac, 40.79% Impervious, Inflow Depth = 5.00" for 100 yr (Qf) event
Inflow = 22.09 cfs @ 11.97 hrs, Volume= 1.146 af
Outflow = 21.79 cfs @ 11.99 hrs, Volume= 1.146 af, Atten= 1%, Lag= 1.2 min
Primary = 21.79 cfs @ 11.99 hrs, Volume= 1.146 af
Routed to Pond 5P : SOUTH SWALE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 494.10' Surf.Area= 2,961 sf Storage= 4,342 cf
Peak Elev= 494.79' @ 11.99 hrs Surf.Area= 3,587 sf Storage= 6,595 cf (2,253 cf above start)

Plug-Flow detention time= 75.6 min calculated for 1.046 af (91% of inflow)
Center-of-Mass det. time= 4.8 min (793.6 - 788.9)

Volume	Invert	Avail.Storage	Storage Description
#1	492.00'	7,375 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
492.00	1,210	0	0
493.00	2,010	1,610	1,610
494.00	2,870	2,440	4,050
495.00	3,780	3,325	7,375

Device	Routing	Invert	Outlet Devices
#1	Primary	494.10'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.90 3.00 Width (feet) 8.00 20.00 30.00

Primary OutFlow Max=21.14 cfs @ 11.99 hrs HW=494.78' TW=493.45' (Dynamic Tailwater)
└─**1=Custom Weir/Orifice** (Weir Controls 21.14 cfs @ 2.50 fps)

Summary for Pond 11P: FOREBAY 2

Inflow Area = 5.826 ac, 95.28% Impervious, Inflow Depth = 6.14" for 100 yr (Qf) event
Inflow = 57.07 cfs @ 11.93 hrs, Volume= 2.982 af
Outflow = 53.34 cfs @ 11.95 hrs, Volume= 2.982 af, Atten= 7%, Lag= 1.1 min
Primary = 53.34 cfs @ 11.95 hrs, Volume= 2.982 af
Routed to Pond 3P : FOREBAY 1 & WET POND
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 7R : OFFSITE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 489.00' Surf.Area= 5,900 sf Storage= 12,455 cf
Peak Elev= 490.03' @ 11.95 hrs Surf.Area= 7,502 sf Storage= 19,326 cf (6,871 cf above start)

Plug-Flow detention time= 97.2 min calculated for 2.697 af (90% of inflow)
Center-of-Mass det. time= 5.1 min (749.2 - 744.1)

Volume	Invert	Avail.Storage	Storage Description
#1	485.00'	27,425 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
485.00	690	0	0
486.00	1,640	1,165	1,165
487.00	3,080	2,360	3,525
488.00	4,440	3,760	7,285
489.00	5,900	5,170	12,455
490.00	7,460	6,680	19,135
491.00	9,120	8,290	27,425

Device	Routing	Invert	Outlet Devices
#1	Device 2	489.00'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	482.00'	**30.0" Round Culvert** L= 124.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 482.00' / 481.26' S= 0.0060 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 4.91 sf
#3	Primary	476.20'	**30.0" Round Culvert** L= 42.0' Ke= 0.500 Inlet / Outlet Invert= 476.20' / 476.00' S= 0.0048 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#4	Secondary	490.50'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=52.99 cfs @ 11.95 hrs HW=490.02' TW=479.14' (Dynamic Tailwater)
└─**3=Culvert** (Passes 52.99 cfs of 77.98 cfs potential flow)
└─**2=Culvert** (Passes 52.99 cfs of 61.50 cfs potential flow)
└─**1=Orifice/Grate** (Weir Controls 52.99 cfs @ 3.30 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=489.00' TW=0.00' (Dynamic Tailwater)
└─**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentS-10P: 10P: E TO OFFSITE Runoff Area=0.855 ac 0.00% Impervious Runoff Depth=0.12"
Flow Length=543' Tc=5.6 min CN=80 Runoff=0.12 cfs 0.008 af

SubcatchmentS-1P: SUB 1 TO OFFSITE Runoff Area=2.515 ac 5.77% Impervious Runoff Depth=0.13"
Flow Length=104' Slope=0.1540 '/' Tc=1.3 min CN=81 Runoff=0.53 cfs 0.028 af

SubcatchmentS-2P: SUB 2P TO FOREBAY Runoff Area=3.817 ac 59.34% Impervious Runoff Depth=0.43"
Flow Length=564' Tc=8.3 min CN=91 Runoff=2.65 cfs 0.137 af

SubcatchmentS-3P: 3P TO BIORETENTION Runoff Area=2.930 ac 87.75% Impervious Runoff Depth=0.72"
Flow Length=440' Tc=3.1 min CN=96 Runoff=3.93 cfs 0.176 af

SubcatchmentS-4aP: 4P TO S SWALE Runoff Area=1.699 ac 60.68% Impervious Runoff Depth=0.43"
Flow Length=623' Tc=5.1 min CN=91 Runoff=1.31 cfs 0.061 af

SubcatchmentS-4bP: DIRECT TO Runoff Area=2.751 ac 40.79% Impervious Runoff Depth=0.28"
Flow Length=689' Slope=0.0900 '/' Tc=6.2 min CN=87 Runoff=1.28 cfs 0.064 af

SubcatchmentS-5P: 5P: TO FOREBAY2 Runoff Area=5.826 ac 95.28% Impervious Runoff Depth=0.80"
Flow Length=905' Tc=3.3 min CN=97 Runoff=8.43 cfs 0.388 af

SubcatchmentS-6P: 6P: E SWALE TO Runoff Area=1.052 ac 0.00% Impervious Runoff Depth=0.12"
Flow Length=516' Tc=9.4 min CN=80 Runoff=0.11 cfs 0.010 af

SubcatchmentS-7P: 7P: RUN ON TO E Runoff Area=1.060 ac 0.00% Impervious Runoff Depth=0.12"
Flow Length=429' Tc=24.1 min CN=80 Runoff=0.06 cfs 0.010 af

SubcatchmentS-8P: 8P: ONSITE TO Runoff Area=0.071 ac 0.00% Impervious Runoff Depth=0.12"
Flow Length=397' Slope=0.0630 '/' Tc=0.7 min CN=80 Runoff=0.01 cfs 0.001 af

SubcatchmentS-9P: 9P: OFFSITE TO Runoff Area=4.670 ac 38.39% Impervious Runoff Depth=0.28"
Flow Length=1,032' Tc=33.7 min CN=87 Runoff=0.90 cfs 0.109 af

Reach 7R: OFFSITE Inflow=3.75 cfs 0.974 af
Outflow=3.75 cfs 0.974 af

Pond 2P: BIORETENTION1 Peak Elev=486.74' Storage=3,183 cf Inflow=5.68 cfs 0.301 af
Outflow=4.77 cfs 0.291 af

Pond 3P: FOREBAY1 & WET POND Peak Elev=476.55' Storage=41,510 cf Inflow=14.56 cfs 0.816 af
Primary=2.64 cfs 0.808 af Secondary=0.00 cfs 0.000 af Outflow=2.64 cfs 0.808 af

Pond 5P: SOUTH SWALE Peak Elev=491.04' Storage=33 cf Inflow=2.14 cfs 0.125 af
Outflow=1.98 cfs 0.125 af

Pond 6P: SOUTH SWALE FOREBAY Peak Elev=494.21' Storage=4,673 cf Inflow=1.28 cfs 0.064 af
Outflow=1.03 cfs 0.064 af

Pond 11P: FOREBAY 2 Peak Elev=489.27' Storage=14,128 cf Inflow=8.43 cfs 0.388 af
Primary=7.35 cfs 0.388 af Secondary=0.00 cfs 0.000 af Outflow=7.35 cfs 0.388 af

Total Runoff Area = 27.246 ac Runoff Volume = 0.993 af Average Runoff Depth = 0.44"
46.86% Pervious = 12.768 ac 53.14% Impervious = 14.478 ac

Summary for Subcatchment S-10P: 10P: E TO OFFSITE

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

Runoff = 0.12 cfs @ 12.00 hrs, Volume= 0.008 af, Depth= 0.12"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr Water Quality (WQv) Rainfall=1.10"

Area (ac)	CN	Description
0.855	80	>75% Grass cover, Good, HSG D
0.000	98	Paved parking, HSG D
0.855	80	Weighted Average
0.855		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	55	0.3260	0.26		**Sheet Flow, HILL TO SWALE** Grass: Dense n= 0.240 P2= 2.20"
2.1	488	0.0670	3.88		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	543	Total			

Summary for Subcatchment S-1P: SUB 1 TO OFFSITE

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

Runoff = 0.53 cfs @ 11.94 hrs, Volume= 0.028 af, Depth= 0.13"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr Water Quality (WQv) Rainfall=1.10"

Area (ac)	CN	Description
2.370	80	>75% Grass cover, Good, HSG D
0.145	98	Paved parking, HSG D
2.515	81	Weighted Average
2.370		94.23% Pervious Area
0.145		5.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	104	0.1540	1.35		**Lag/CN Method,**

Summary for Subcatchment S-2P: SUB 2P TO FOREBAY 1 & POND

Runoff = 2.65 cfs @ 12.00 hrs, Volume= 0.137 af, Depth= 0.43"
Routed to Pond 3P : FOREBAY 1 & WET POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr Water Quality (WQv) Rainfall=1.10"

Area (ac)	CN	Description
1.552	80	>75% Grass cover, Good, HSG D
2.265	98	Paved parking, HSG D
3.817	91	Weighted Average
1.552		40.66% Pervious Area
2.265		59.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	71	0.0560	0.20		**Sheet Flow, OVERLAND** Grass: Short n= 0.150 P2= 2.20"
2.2	311	0.0130	2.31		**Shallow Concentrated Flow, EMPLOYEE LOT** Paved Kv= 20.3 fps
0.1	182	0.4500	57.09	179.35	**Pipe Channel, PIPE TO FOREBAY 1** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
8.3	564	Total			

Summary for Subcatchment S-3P: 3P TO BIORETENTION

[49] Hint: Tc<2dt may require smaller dt
[47] Hint: Peak is 275% of capacity of segment #2

Runoff = 3.93 cfs @ 11.94 hrs, Volume= 0.176 af, Depth= 0.72"
Routed to Pond 2P : BIORETENTION 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr Water Quality (WQv) Rainfall=1.10"

Area (ac)	CN	Description
0.359	80	>75% Grass cover, Good, HSG D
2.571	98	Paved parking, HSG D
2.930	96	Weighted Average
0.359		12.25% Pervious Area
2.571		87.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	158	0.0200	1.25		**Sheet Flow, ROOF** Smooth surfaces n= 0.011 P2= 2.20"
0.1	20	0.0100	4.09	1.43	**Pipe Channel, ROOF DRAIN** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.011 Concrete pipe, straight & clean
0.9	262	0.0050	4.97	8.78	**Pipe Channel, RCP** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
3.1	440	Total			

Summary for Subcatchment S-4aP: 4P TO S SWALE

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

Runoff = 1.31 cfs @ 11.96 hrs, Volume= 0.061 af, Depth= 0.43"
Routed to Pond 5P : SOUTH SWALE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr Water Quality (WQv) Rainfall=1.10"

	Area (ac)	CN	Description
	0.668	80	>75% Grass cover, Good, HSG D
*	1.031	98	DISCONNECTED ROOF
	1.699	91	Weighted Average
	0.668		39.32% Pervious Area
	1.031		60.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	157	0.0200	1.25		**Sheet Flow, ROOF** Smooth surfaces n= 0.011 P2= 2.20"
0.1	25	0.0100	4.50	1.57	**Pipe Channel, Roof Drain** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
0.7	150	0.0025	3.51	6.21	**Pipe Channel, CMP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
2.2	291	0.0050	2.25	35.32	**Channel Flow, S SWALE** Area= 15.7 sf Perim= 30.5' r= 0.51' n= 0.030 Short grass
5.1	623	Total			

Summary for Subcatchment S-4bP: DIRECT TO FOREBAY

Runoff = 1.28 cfs @ 11.99 hrs, Volume= 0.064 af, Depth= 0.28"
Routed to Pond 6P : SOUTH SWALE FOREBAY

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr Water Quality (WQv) Rainfall=1.10"

Area (ac)	CN	Description
1.629	80	>75% Grass cover, Good, HSG D
1.122	98	Paved parking, HSG D
2.751	87	Weighted Average
1.629		59.21% Pervious Area
1.122		40.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	689	0.0900	1.85		**Lag/CN Method,**

Summary for Subcatchment S-5P: 5P: TO FOREBAY 2

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

Runoff = 8.43 cfs @ 11.94 hrs, Volume= 0.388 af, Depth= 0.80"
Routed to Pond 11P : FOREBAY 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr Water Quality (WQv) Rainfall=1.10"

Area (ac)	CN	Description
0.275	80	>75% Grass cover, Good, HSG D
5.551	98	Paved parking, HSG D
5.826	97	Weighted Average
0.275		4.72% Pervious Area
5.551		95.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.5	278	0.0390	1.83		**Sheet Flow, OVERLAND FLOW TRUCK PARKING** Smooth surfaces n= 0.011 P2= 2.20"
0.2	60	0.0390	4.01		**Shallow Concentrated Flow, TRUCK PARKING** Paved Kv= 20.3 fps
0.6	567	0.0050	16.60	1,095.78	**Pipe Channel, PIPE TO FOREBAY 2** 110.0" Round Area= 66.0 sf Perim= 28.8' r= 2.29' n= 0.011 Concrete pipe, straight & clean
3.3	905	Total			

Summary for Subcatchment S-6P: 6P: E SWALE TO OFFSITE

Runoff = 0.11 cfs @ 12.05 hrs, Volume= 0.010 af, Depth= 0.12"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr Water Quality (WQv) Rainfall=1.10"

Area (ac)	CN	Description
1.052	80	>75% Grass cover, Good, HSG D
0.000	98	Paved parking, HSG D
1.052	80	Weighted Average
1.052		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	141	0.3260	0.32		**Sheet Flow, HILL TO SWALE** Grass: Dense n= 0.240 P2= 2.20"
2.0	375	0.0130	3.07	25.14	**Channel Flow, SWALE** Area= 8.2 sf Perim= 20.5' r= 0.40' n= 0.030 Short grass
9.4	516	Total			

Summary for Subcatchment S-7P: 7P: RUN ON TO E

Runoff = 0.06 cfs @ 12.26 hrs, Volume= 0.010 af, Depth= 0.12"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr Water Quality (WQv) Rainfall=1.10"

Area (ac)	CN	Description
1.060	80	>75% Grass cover, Good, HSG D
1.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	289	0.0830	0.21		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
1.3	140	0.0640	1.77		**Shallow Concentrated Flow, EDGE OF PROPRTY DITCH** Short Grass Pasture Kv= 7.0 fps
24.1	429	Total			

Summary for Subcatchment S-8P: 8P: ONSITE TO BYPASS CULVERT

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

Runoff = 0.01 cfs @ 11.93 hrs, Volume= 0.001 af, Depth= 0.12"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr Water Quality (WQv) Rainfall=1.10"

Area (ac)	CN	Description
0.071	80	>75% Grass cover, Good, HSG D
0.000	98	Paved parking, HSG D
0.000	98	Roofs, HSG D
0.071	80	Weighted Average
0.071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	397	0.0630	9.24	49.29	**Parabolic Channel, DITCH** W=8.00' D=1.00' Area=5.3 sf Perim=8.3' n= 0.030 Short grass

Summary for Subcatchment S-9P: 9P: OFFSITE TO BYPASS CULVERT

Runoff = 0.90 cfs @ 12.33 hrs, Volume= 0.109 af, Depth= 0.28"
Routed to Reach 7R : OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr Water Quality (WQv) Rainfall=1.10"

Area (ac)	CN	Description
2.877	80	>75% Grass cover, Good, HSG D
1.793	98	Paved roads w/curbs & sewers, HSG D
4.670	87	Weighted Average
2.877		61.61% Pervious Area
1.793		38.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.5	216	0.0190	0.11		**Sheet Flow, OVERLAND** Grass: Dense n= 0.240 P2= 2.20"
1.2	816	0.0510	10.94	142.17	**Parabolic Channel, DITCH** W=13.00' D=1.50' Area=13.0 sf Perim=13.4' n= 0.030 Short grass
33.7	1,032	Total			

Summary for Reach 7R: OFFSITE

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

Inflow Area = 27.246 ac, 53.14% Impervious, Inflow Depth > 0.43" for Water Quality (WQv) event
Inflow = 3.75 cfs @ 12.31 hrs, Volume= 0.974 af
Outflow = 3.75 cfs @ 12.31 hrs, Volume= 0.974 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3

Summary for Pond 2P: BIORETENTION 1

Inflow Area = 7.380 ac, 64.01% Impervious, Inflow Depth = 0.49" for Water Quality (WQv) event
Inflow = 5.68 cfs @ 11.95 hrs, Volume= 0.301 af
Outflow = 4.77 cfs @ 12.00 hrs, Volume= 0.291 af, Atten= 16%, Lag= 3.1 min
Primary = 4.77 cfs @ 12.00 hrs, Volume= 0.291 af
Routed to Pond 3P : FOREBAY 1 & WET POND

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 486.74' @ 12.00 hrs Surf.Area= 4,704 sf Storage= 3,183 cf

Plug-Flow detention time= 225.1 min calculated for 0.291 af (97% of inflow)
Center-of-Mass det. time= 205.7 min (1,036.3 - 830.5)

Volume	Invert	Avail.Storage	Storage Description
#1	486.00'	20,603 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
486.00	3,930	0	0
487.00	4,980	4,455	4,455
488.00	6,130	5,555	10,010
489.00	7,370	6,750	16,760
489.50	8,000	3,843	20,603

Device	Routing	Invert	Outlet Devices
#1	Device 2	486.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	479.35'	**24.0" Round Culvert** L= 146.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 479.35' / 479.00' S= 0.0024 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#3	Device 2	486.00'	**0.200 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 450.00'

Primary OutFlow Max=4.74 cfs @ 12.00 hrs HW=486.74' TW=476.28' (Dynamic Tailwater)
↑└─**2=Culvert** (Passes 4.74 cfs of 37.62 cfs potential flow)
↑ ├─**1=Orifice/Grate** (Weir Controls 4.72 cfs @ 1.59 fps)
└─**3=Exfiltration** (Controls 0.02 cfs)

Summary for Pond 3P: FOREBAY 1 & WET POND

Inflow Area = 17.023 ac, 73.67% Impervious, Inflow Depth > 0.58" for Water Quality (WQv) event
Inflow = 14.56 cfs @ 11.99 hrs, Volume= 0.816 af
Outflow = 2.64 cfs @ 12.29 hrs, Volume= 0.808 af, Atten= 82%, Lag= 18.1 min
Primary = 2.64 cfs @ 12.29 hrs, Volume= 0.808 af
Routed to Reach 7R : OFFSITE
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 7R : OFFSITE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3

Starting Elev= 475.50' Surf.Area= 9,510 sf Storage= 28,399 cf
Peak Elev= 476.55' @ 12.29 hrs Surf.Area= 17,355 sf Storage= 41,510 cf (13,111 cf above start)

Plug-Flow detention time= 917.1 min calculated for 0.156 af (19% of inflow)
Center-of-Mass det. time= 97.8 min (991.4 - 893.7)

Volume	Invert	Avail.Storage	Storage Description
#1	467.00'	161,578 cf	**WET POND (Prismatic)**Listed below (Recalc)
#2	473.00'	10,291 cf	**FOREBAY (Prismatic)**Listed below (Recalc)
		171,869 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
467.00	1,154	0	0
468.00	1,550	1,352	1,352
469.00	1,900	1,725	3,077
470.00	2,280	2,090	5,167
471.00	2,685	2,483	7,650
472.00	3,110	2,898	10,547
473.00	3,565	3,338	13,885
474.00	4,340	3,953	17,837
474.50	4,620	2,240	20,077
475.00	6,300	2,730	22,807
476.00	9,960	8,130	30,937
476.10	10,505	1,023	31,960
477.00	20,330	13,876	45,836
478.00	23,820	22,075	67,911
479.00	27,015	25,418	93,328
480.00	35,215	31,115	124,443
481.00	39,055	37,135	161,578

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
473.00	280	0	0
474.00	654	467	467
475.00	1,128	891	1,358
476.00	1,631	1,380	2,738
477.00	2,191	1,911	4,649
478.00	2,807	2,499	7,148
479.00	3,480	3,144	10,291

Device	Routing	Invert	Outlet Devices
#1	Device 4	478.50'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	471.78'	**24.0" Round Culvert** L= 39.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 471.00' / 471.78' S= -0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#3	Device 4	475.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.75 1.75 3.00 Width (feet) 0.75 0.75 5.00 5.00

#4	Primary	474.30'	**30.0" Round Culvert** L= 37.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 474.30' / 474.00' S= 0.0081 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#5	Secondary	480.00'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.64 cfs @ 12.29 hrs HW=476.55' TW=0.00' (Dynamic Tailwater)
- **4=Culvert** (Passes 2.64 cfs of 20.15 cfs potential flow)
  - **1=Orifice/Grate** (Controls 0.00 cfs)
  - **3=Custom Weir/Orifice** (Weir Controls 2.64 cfs @ 3.36 fps)
    - **2=Culvert** (Passes 2.64 cfs of 15.50 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=475.50' TW=0.00' (Dynamic Tailwater)
- **5=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 5P: SOUTH SWALE

[44] Hint: Outlet device #1 is below defined storage
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=120)

Inflow Area = 4.450 ac, 48.38% Impervious, Inflow Depth = 0.34" for Water Quality (WQv) event
Inflow = 2.14 cfs @ 11.99 hrs, Volume= 0.125 af
Outflow = 1.98 cfs @ 12.01 hrs, Volume= 0.125 af, Atten= 8%, Lag= 1.4 min
Primary = 1.98 cfs @ 12.01 hrs, Volume= 0.125 af
Routed to Pond 2P : BIORETENTION 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 491.04' @ 12.01 hrs Surf.Area= 971 sf Storage= 33 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.4 min (867.1 - 866.7)

Volume	Invert	Avail.Storage	Storage Description
#1	491.00'	20,935 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
491.00	885	0	0
492.00	3,320	2,103	2,103
493.00	5,265	4,293	6,395
494.00	7,200	6,233	12,628
495.00	9,415	8,308	20,935

Device	Routing	Invert	Outlet Devices
#1	Device 2	490.45'	**24.0" Round FES I1-5 TO STMH I1-4** L= 40.0' Ke= 0.500 Inlet / Outlet Invert= 490.45' / 490.05' S= 0.0100 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Device 3	490.05'	**24.0" Round STMH I1-4 TO STMH I1-3** L= 150.0' Ke= 0.500 Inlet / Outlet Invert= 490.05' / 487.85' S= 0.0147 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#3	Device 4	487.84'	**24.0" Round STMH I1-3 TO STMH I1-2** L= 161.0' Ke= 0.500

			Inlet / Outlet Invert= 487.84' / 486.79' S= 0.0065 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#4	Primary	486.39'	**30.0" Round STMH I1-2 TO FES I1-1** L= 139.0' Ke= 0.500
			Inlet / Outlet Invert= 486.39' / 486.00' S= 0.0028 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf

Primary OutFlow Max=1.96 cfs @ 12.01 hrs HW=491.03' TW=486.73' (Dynamic Tailwater)
↑—**4=STMH I1-2 TO FES I1-1** (Passes 1.96 cfs of 40.29 cfs potential flow)
↑—**3=STMH I1-3 TO STMH I1-2** (Passes 1.96 cfs of 22.03 cfs potential flow)
↑—**2=STMH I1-4 TO STMH I1-3** (Passes 1.96 cfs of 5.18 cfs potential flow)
↑—**1=FES I1-5 TO STMH I1-4** (Barrel Controls 1.96 cfs @ 3.87 fps)

Summary for Pond 6P: SOUTH SWALE FOREBAY

Inflow Area = 2.751 ac, 40.79% Impervious, Inflow Depth = 0.28" for Water Quality (WQv) event
Inflow = 1.28 cfs @ 11.99 hrs, Volume= 0.064 af
Outflow = 1.03 cfs @ 12.04 hrs, Volume= 0.064 af, Atten= 20%, Lag= 3.1 min
Primary = 1.03 cfs @ 12.04 hrs, Volume= 0.064 af
Routed to Pond 5P : SOUTH SWALE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 494.10' Surf.Area= 2,961 sf Storage= 4,342 cf
Peak Elev= 494.21' @ 12.04 hrs Surf.Area= 3,061 sf Storage= 4,673 cf (332 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 12.4 min (886.3 - 873.9)

Volume	Invert	Avail.Storage	Storage Description
#1	492.00'	7,375 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
492.00	1,210	0	0
493.00	2,010	1,610	1,610
494.00	2,870	2,440	4,050
495.00	3,780	3,325	7,375

Device	Routing	Invert	Outlet Devices
#1	Primary	494.10'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)**
			Head (feet) 0.00 0.90 3.00
			Width (feet) 8.00 20.00 30.00

Primary OutFlow Max=1.00 cfs @ 12.04 hrs HW=494.21' TW=491.03' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Weir Controls 1.00 cfs @ 1.06 fps)

Summary for Pond 11P: FOREBAY 2

Inflow Area = 5.826 ac, 95.28% Impervious, Inflow Depth = 0.80" for Water Quality (WQv) event
Inflow = 8.43 cfs @ 11.94 hrs, Volume= 0.388 af
Outflow = 7.35 cfs @ 11.97 hrs, Volume= 0.388 af, Atten= 13%, Lag= 1.9 min
Primary = 7.35 cfs @ 11.97 hrs, Volume= 0.388 af
Routed to Pond 3P : FOREBAY 1 & WET POND
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 7R : OFFSITE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 489.00' Surf.Area= 5,900 sf Storage= 12,455 cf
Peak Elev= 489.27' @ 11.97 hrs Surf.Area= 6,327 sf Storage= 14,128 cf (1,673 cf above start)

Plug-Flow detention time= 415.1 min calculated for 0.102 af (26% of inflow)
Center-of-Mass det. time= 9.1 min (802.5 - 793.3)

Volume	Invert	Avail.Storage	Storage Description
#1	485.00'	27,425 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
485.00	690	0	0
486.00	1,640	1,165	1,165
487.00	3,080	2,360	3,525
488.00	4,440	3,760	7,285
489.00	5,900	5,170	12,455
490.00	7,460	6,680	19,135
491.00	9,120	8,290	27,425

Device	Routing	Invert	Outlet Devices
#1	Device 2	489.00'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	482.00'	**30.0" Round Culvert** L= 124.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 482.00' / 481.26' S= 0.0060 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 4.91 sf
#3	Primary	476.20'	**30.0" Round Culvert** L= 42.0' Ke= 0.500 Inlet / Outlet Invert= 476.20' / 476.00' S= 0.0048 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#4	Secondary	490.50'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=7.14 cfs @ 11.97 hrs HW=489.27' TW=476.18' (Dynamic Tailwater)
↑—**3=Culvert** (Passes 7.14 cfs of 81.25 cfs potential flow)
↑—**2=Culvert** (Passes 7.14 cfs of 57.98 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 7.14 cfs @ 1.69 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=489.00' TW=0.00' (Dynamic Tailwater)
↑—**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 2P: BIORETENTION 1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
486.00	3,930	0
486.05	3,983	198
486.10	4,035	398
486.15	4,087	601
486.20	4,140	807
486.25	4,193	1,015
486.30	4,245	1,226
486.35	4,298	1,440
486.40	4,350	1,656
486.45	4,402	1,875
486.50	4,455	2,096
486.55	4,508	2,320
486.60	4,560	2,547
486.65	4,612	2,776
486.70	4,665	3,008
486.75	4,718	3,243
486.80	4,770	3,480
486.85	4,823	3,720
486.90	4,875	3,962
486.95	4,927	4,207
487.00	4,980	4,455
487.05	5,038	4,705
487.10	5,095	4,959
487.15	5,152	5,215
487.20	5,210	5,474
487.25	5,268	5,736
487.30	5,325	6,001
487.35	5,383	6,268
487.40	5,440	6,539
487.45	5,497	6,812
487.50	5,555	7,089
487.55	5,613	7,368
487.60	5,670	7,650
487.65	5,727	7,935
487.70	5,785	8,223
487.75	5,843	8,513
487.80	5,900	8,807
487.85	5,958	9,103
487.90	6,015	9,403
487.95	6,072	9,705
488.00	6,130	10,010
488.05	6,192	10,318
488.10	6,254	10,629
488.15	6,316	10,943
488.20	6,378	11,261
488.25	6,440	11,581
488.30	6,502	11,905
488.35	6,564	12,231
488.40	6,626	12,561
488.45	6,688	12,894
488.50	6,750	13,230
488.55	6,812	13,569
488.60	6,874	13,911
488.65	6,936	14,256
488.70	6,998	14,605
488.75	7,060	14,956
488.80	7,122	15,311
488.85	7,184	15,668
488.90	7,246	16,029
488.95	7,308	16,393
489.00	7,370	16,760
489.05	7,433	17,130
489.10	7,496	17,503
489.15	7,559	17,880
489.20	7,622	18,259
489.25	7,685	18,642
489.30	7,748	19,028
489.35	7,811	19,417
489.40	7,874	19,809
489.45	7,937	20,204
489.50	**8,000**	**20,603**

Stage-Area-Storage for Pond 6P: SOUTH SWALE FOREBAY

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
492.00	1,210	0
492.05	1,250	62
492.10	1,290	125
492.15	1,330	190
492.20	1,370	258
492.25	1,410	328
492.30	1,450	399
492.35	1,490	473
492.40	1,530	548
492.45	1,570	625
492.50	1,610	705
492.55	1,650	787
492.60	1,690	870
492.65	1,730	955
492.70	1,770	1,043
492.75	1,810	1,133
492.80	1,850	1,224
492.85	1,890	1,318
492.90	1,930	1,413
492.95	1,970	1,510
493.00	2,010	1,610
493.05	2,053	1,712
493.10	2,096	1,815
493.15	2,139	1,921
493.20	2,182	2,029
493.25	2,225	2,139
493.30	2,268	2,252
493.35	2,311	2,366
493.40	2,354	2,483
493.45	2,397	2,602
493.50	2,440	2,723
493.55	2,483	2,846
493.60	2,526	2,971
493.65	2,569	3,098
493.70	2,612	3,228
493.75	2,655	3,359
493.80	2,698	3,493
493.85	2,741	3,629
493.90	2,784	3,767
493.95	2,827	3,908
494.00	2,870	4,050
494.05	2,916	4,195
494.10	2,961	4,342
494.15	3,006	4,491
494.20	3,052	4,642
494.25	3,098	4,796
494.30	3,143	4,952
494.35	3,189	5,110
494.40	3,234	5,271
494.45	3,279	5,434
494.50	3,325	5,599
494.55	3,371	5,766
494.60	3,416	5,936
494.65	3,461	6,108
494.70	3,507	6,282
494.75	3,553	6,458
494.80	3,598	6,637
494.85	3,644	6,818
494.90	3,689	7,002
494.95	3,734	7,187
495.00	**3,780**	**7,375**

Stage-Area-Storage for Pond 5P: SOUTH SWALE

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
491.00	885	0
491.05	1,007	47
491.10	1,129	101
491.15	1,250	160
491.20	1,372	226
491.25	1,494	297
491.30	1,616	375
491.35	1,737	459
491.40	1,859	549
491.45	1,981	645
491.50	2,103	747
491.55	2,224	855
491.60	2,346	969
491.65	2,468	1,090
491.70	2,589	1,216
491.75	2,711	1,349
491.80	2,833	1,487
491.85	2,955	1,632
491.90	3,076	1,783
491.95	3,198	1,940
492.00	3,320	2,103
492.05	3,417	2,271
492.10	3,515	2,444
492.15	3,612	2,622
492.20	3,709	2,805
492.25	3,806	2,993
492.30	3,904	3,186
492.35	4,001	3,384
492.40	4,098	3,586
492.45	4,195	3,793
492.50	4,293	4,006
492.55	4,390	4,223
492.60	4,487	4,445
492.65	4,584	4,671
492.70	4,681	4,903
492.75	4,779	5,140
492.80	4,876	5,381
492.85	4,973	5,627
492.90	5,070	5,878
492.95	5,168	6,134
493.00	5,265	6,395
493.05	5,362	6,661
493.10	5,459	6,931
493.15	5,555	7,207
493.20	5,652	7,487
493.25	5,749	7,772
493.30	5,846	8,062
493.35	5,942	8,356
493.40	6,039	8,656
493.45	6,136	8,960
493.50	6,233	9,269
493.55	6,329	9,583
493.60	6,426	9,902
493.65	6,523	10,226
493.70	6,619	10,555
493.75	6,716	10,888
493.80	6,813	11,226
493.85	6,910	11,569
493.90	7,006	11,917
493.95	7,103	12,270
494.00	7,200	12,628
494.05	7,311	12,990
494.10	7,422	13,359
494.15	7,532	13,732
494.20	7,643	14,112
494.25	7,754	14,497
494.30	7,865	14,887
494.35	7,975	15,283
494.40	8,086	15,685
494.45	8,197	16,092
494.50	8,308	16,504
494.55	8,418	16,923
494.60	8,529	17,346
494.65	8,640	17,775
494.70	8,750	18,210
494.75	8,861	18,650
494.80	8,972	19,096
494.85	9,083	19,548
494.90	9,193	20,005
494.95	9,304	20,467
495.00	**9,415**	**20,935**

Stage-Area-Storage for Pond 7P: WET POND VOLUME

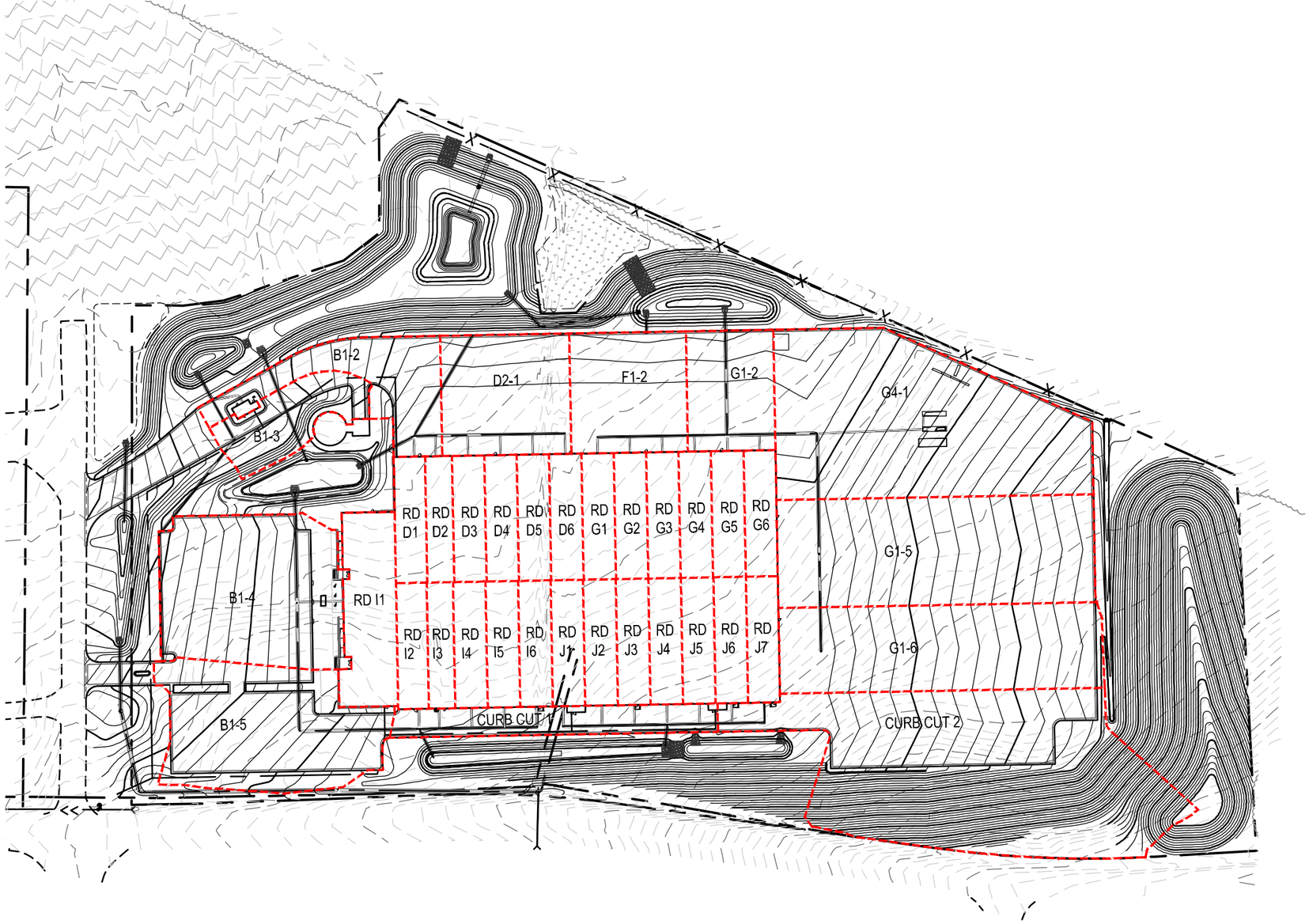
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
467.00	1,154	0
467.20	1,233	239
467.40	1,312	493
467.60	1,392	764
467.80	1,471	1,050
468.00	1,550	1,352
468.20	1,620	1,669
468.40	1,690	2,000
468.60	1,760	2,345
468.80	1,830	2,704
469.00	1,900	3,077
469.20	1,976	3,465
469.40	2,052	3,867
469.60	2,128	4,285
469.80	2,204	4,719
470.00	2,280	5,167
470.20	2,361	5,631
470.40	2,442	6,111
470.60	2,523	6,608
470.80	2,604	7,121
471.00	2,685	7,650
471.20	2,770	8,195
471.40	2,855	8,757
471.60	2,940	9,337
471.80	3,025	9,934
472.00	3,110	10,547
472.20	3,201	11,178
472.40	3,292	11,827
472.60	3,383	12,495
472.80	3,474	13,181
473.00	3,565	13,885
473.20	3,720	14,613
473.40	3,875	15,372
473.60	4,030	16,163
473.80	4,185	16,985
474.00	4,340	17,837
474.20	4,452	18,716
474.40	4,564	19,618
474.60	4,956	20,556
474.80	5,628	21,614
475.00	6,300	22,807
475.20	7,032	24,140
475.40	7,764	25,620
475.60	8,496	27,246
475.80	9,228	29,018
476.00	9,960	30,937
476.20	11,597	33,065
476.40	13,780	35,603
476.60	15,963	38,577
476.80	18,147	41,988
477.00	20,330	45,836
477.20	21,028	49,972
477.40	21,726	54,247
477.60	22,424	58,662
477.80	23,122	63,217
478.00	23,820	67,911
478.20	24,459	72,739
478.40	25,098	77,695
478.60	25,737	82,778
478.80	26,376	87,989
479.00	27,015	93,328
479.20	28,655	98,895
479.40	30,295	104,790
479.60	31,935	111,014
479.80	33,575	117,565
480.00	35,215	124,443
480.20	35,983	131,563
480.40	36,751	138,837
480.60	37,519	146,264
480.80	38,287	153,844
481.00	**39,055**	**161,578**

Stage-Area-Storage for Pond 11P: FOREBAY 2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
485.00	690	0
485.10	785	74
485.20	880	157
485.30	975	250
485.40	1,070	352
485.50	1,165	464
485.60	1,260	585
485.70	1,355	716
485.80	1,450	856
485.90	1,545	1,006
486.00	1,640	1,165
486.10	1,784	1,336
486.20	1,928	1,522
486.30	2,072	1,722
486.40	2,216	1,936
486.50	2,360	2,165
486.60	2,504	2,408
486.70	2,648	2,666
486.80	2,792	2,938
486.90	2,936	3,224
487.00	3,080	3,525
487.10	3,216	3,840
487.20	3,352	4,168
487.30	3,488	4,510
487.40	3,624	4,866
487.50	3,760	5,235
487.60	3,896	5,618
487.70	4,032	6,014
487.80	4,168	6,424
487.90	4,304	6,848
488.00	4,440	7,285
488.10	4,586	7,736
488.20	4,732	8,202
488.30	4,878	8,683
488.40	5,024	9,178
488.50	5,170	9,688
488.60	5,316	10,212
488.70	5,462	10,751
488.80	5,608	11,304
488.90	5,754	11,872
489.00	5,900	12,455
489.10	6,056	13,053
489.20	6,212	13,666
489.30	6,368	14,295
489.40	6,524	14,940
489.50	6,680	15,600
489.60	6,836	16,276
489.70	6,992	16,967
489.80	7,148	17,674
489.90	7,304	18,397
490.00	7,460	19,135
490.10	7,626	19,889
490.20	7,792	20,660
490.30	7,958	21,448
490.40	8,124	22,252
490.50	8,290	23,073
490.60	8,456	23,910
490.70	8,622	24,764
490.80	8,788	25,634
490.90	8,954	26,521
491.00	**9,120**	**27,425**

Stage-Area-Storage for Pond 8P: FOREBAY 1 VOLUME

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
473.00	280	0
473.10	317	30
473.20	355	63
473.30	392	101
473.40	430	142
473.50	467	187
473.60	504	235
473.70	542	288
473.80	579	344
473.90	617	403
474.00	654	467
474.10	701	535
474.20	749	607
474.30	796	685
474.40	844	767
474.50	891	853
474.60	938	945
474.70	986	1,041
474.80	1,033	1,142
474.90	1,081	1,248
475.00	1,128	1,358
475.10	1,178	1,473
475.20	1,229	1,594
475.30	1,279	1,719
475.40	1,329	1,849
475.50	1,380	1,985
475.60	1,430	2,125
475.70	1,480	2,271
475.80	1,530	2,421
475.90	1,581	2,577
476.00	1,631	2,738
476.10	1,687	2,903
476.20	1,743	3,075
476.30	1,799	3,252
476.40	1,855	3,435
476.50	1,911	3,623
476.60	1,967	3,817
476.70	2,023	4,016
476.80	2,079	4,222
476.90	2,135	4,432
477.00	2,191	4,649
477.10	2,253	4,871
477.20	2,314	5,099
477.30	2,376	5,334
477.40	2,437	5,574
477.50	2,499	5,821
477.60	2,561	6,074
477.70	2,622	6,333
477.80	2,684	6,598
477.90	2,745	6,870
478.00	2,807	7,148
478.10	2,874	7,432
478.20	2,942	7,722
478.30	3,009	8,020
478.40	3,076	8,324
478.50	3,144	8,635
478.60	3,211	8,953
478.70	3,278	9,277
478.80	3,345	9,608
478.90	3,413	9,946
479.00	**3,480**	**10,291**
479.10	3,480	10,291
479.20	3,480	10,291
479.30	3,480	10,291
479.40	3,480	10,291
479.50	3,480	10,291
479.60	3,480	10,291
479.70	3,480	10,291
479.80	3,480	10,291
479.90	3,480	10,291
480.00	3,480	10,291



LEGEND

DRAINAGE BOUNDARY

INLET SUMMARY

INLET	DRAINAGE AREA (AC)	C: RATIONAL COEF.
B1-2	0.456	0.92
B1-3	0.305	0.62
B1-4	0.962	0.93
B1-5	0.906	0.83
D2-1	0.559	0.95
F1-2	0.504	0.95
G1-2	0.345	0.95
G1-5	1.232	0.95
G1-6	1.000	0.94
G4-1	1.611	0.95
CURB CUT 1	0.332	0.70
CURB CUT 2	1.998	0.56
CURB CUT 3	0.108	0.62

ROOF DRAIN SUMMARY

INLET	AREA (AC)	INLET	AREA (AC)	INLET	AREA (AC)	INLET	AREA (AC)
RD D1	0.142	RD G1	0.147	RD I1	0.373	RD J1	0.147
RD D2	0.122	RD G2	0.147	RD I2	0.139	RD J2	0.149
RD D3	0.147	RD G3	0.147	RD I3	0.119	RD J3	0.148
RD D4	0.147	RD G4	0.147	RD I4	0.148	RD J4	0.148
RD D5	0.147	RD G5	0.149	RD I5	0.148	RD J5	0.148
RD D6	0.147	RD G6	0.145	RD I6	0.148	RD J6	0.147
						RD J7	0.145

*C: RATIONAL COEF.= 0.95 FOR ALL ROOF

150 300
SCALE IN FEET

1 INLET DRAINAGE MAP
1" = 150'

DOLLAR GENERAL FRESH
AMSTERDAM, NEW YORK
DGC22025

PROPOSED DRAINAGE AREA MAP
10/13/2023

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MINNEAPOLIS, MN 55415
p 612.260.7980 | www.elanlab.com
f 612.260.7990

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310 4th Ave.
Suite 1006
Minneapolis, MN 55415
(612) 260-7980
www.elanlab.com

Project: DGC025

Storm Sewer Design Calculations

Storm Sewer Design Calculations

Project No.: DGC22025 Storm Frequency: 25 years
Location: Amsterdam, NY
Date: 10/10/23 Calculations By: EJJ

Printed: 10/10/23 11:37 AM

Segment		A	C		Tc - Time of Conc.			I	Q - Rate		Pipe								Upstream Structure						Downstream Structure					
From	To	CB Ac.	CB Indiv.	Pipe Avg.	CB Min.	Pipe Min.	Total Min.	CB In/Hr	CB CFS	Pipe CFS	Len. Ft.	Dia. In.	Grade %	Mat'l.	Man's. n	Vel. Ft/S	Cap. CFS	Excess Cap.	STRUCT	RIM ELEV	INVERT	BUILD	Cover	Structure	Rim Elev	Inlet	Build	Cover	Notes
LINE A																													
SEE HIGHWAY 5S DRAINAGE CALCULATIONS																													
CHANNEL																													
LINE B																													
STMH B1-5	STMH B1-4	0.910	0.83		5.0	0.4	5.4	7.68	5.80	5.80	160	18	1.40	RCP	0.013	7.0	12.4	6.6	STMH B1-5	486.15	481.15	5.00	3.50	STMH B1-4	484.40	478.90	5.50	4.00	
STMH B1-4	STMH B1-3	0.960	0.93		5.4	0.3	5.7	7.68	6.86	12.66	151	18	1.50	RCP	0.013	7.3	12.9	0.2	STMH B1-4	484.40	478.90	5.50	4.00	STMH B1-3	482.15	476.63	5.52	4.02	
STMH B1-3	STMH B1-2	0.300	0.62		5.7	0.1	5.8	7.46	1.39	14.04	57	18	1.80	RCP	0.013	8.0	14.1	0.0	STMH B1-3	482.15	476.63	5.52	4.02	STMH B1-2	482.15	475.61	6.54	5.04	
STMH B1-2	FES B1-1	0.460	0.92		5.8	0.1	6.0	7.46	3.16	17.20	36	24	0.58	RCP	0.013	5.5	17.2	0.0	STMH B1-2	482.15	475.21	6.94	4.94	FES B1-1	N/A	475.00	N/A		
LINE C																													
SEE HYDROCAD CALCULATIONS																													
LINE D																													
RD D6	STMH D1-3	0.150	0.95		5.0	0.1	5.1	7.68	1.09	1.09	25	8	2.00	RCP	0.013	4.9	1.7	0.6	RD D6		488.20			STMH D1-3	493.70	487.70	6.00	5.34	ROOF DRAIN AREA D6
STMH D1-3	STMH D1-2	0.560	0.95		5.1	1.1	6.1	7.68	4.09	5.18	189	18	0.25	RCP	0.013	3.0	5.3	0.1	STMH D1-3	493.70	487.04	6.66	5.16	STMH D1-2	493.38	486.57	6.81	5.31	ROOF DRAIN AREAS D2 TO D5
STMH D1-2	FES D1-1	0.000	0.95		6.1	0.4	6.5	7.23	0.00	10.29	76	24	0.22	RCP	0.013	3.4	10.6	0.3	STMH D1-2	493.38	486.17	7.21	5.21	FES D1-1		486.00			
CBMH D2-1	STMH D1-2	0.560	0.95		5.0	0.8	5.8	7.68	4.09	4.09	145	18	0.25	RCP	0.013	3.0	5.3	1.2	CBMH D2-1	490.38	486.93	3.45	1.95	STMH D1-2	493.38	486.57	6.81	5.31	
RD D1	STMH D1-2	0.140	0.95		5.0	0.1	5.1	7.68	1.02	1.02	25	8	2.00	RCP	0.013	4.9	1.7	0.7	RD D1		488.20			STMH D1-2	493.38	487.70	5.68	5.01	
LINE E																													
SEE HYDROCAD CALCULATIONS																													
LINE F																													
CBMH F1-2	FES F1-1	0.500	0.95		5.0	0.1	5.1	7.68	3.65	3.65	24	18	0.25	RCP	0.013	3.0	5.3	1.6	CBMH F1-2	490.50	487.06	3.44	1.94	FES F1-1		487.00			
LINE G																													
CBMH G1-6	CBMH G1-5	1.000	0.94		5.0	0.5	5.5	7.68	7.22	7.22	122	18	0.48	RCP	0.013	4.1	7.3	0.1	CBMH G1-6	495.30	489.99	5.31	3.81	CBMH G1-5	495.19	489.40	5.79	4.29	
CBMH G1-5	STMH G1-4	1.230	0.95		5.5	0.5	6.0	7.68	8.97	16.19	150	24	0.52	RCP	0.013	5.2	16.3	0.1	CBMH G1-5	495.19	489.00	6.19	4.19	STMH G1-4	493.52	488.22	5.30	3.30	
STMH G1-4	STMH G1-3	0.140	0.95		6.0	0.3	6.3	7.46	0.99	17.33	113	24	0.60	RCP	0.013	5.6	17.5	0.2	STMH G1-4	493.52	488.22	5.30	3.30	STMH G1-3	493.73	487.54	6.19	4.19	ROOF DRAIN AREA G6
STMH G1-3	CBMH G1-2	0.000	0.95		6.3	0.3	6.6	7.23	0.00	22.73	130	24	1.02	RCP	0.013	7.3	22.8	0.1	STMH G1-3	493.73	487.54	6.19	4.19	CBMH G1-2	490.50	486.22	4.28	2.28	No 8/10th
CBMH G1-2	FES G1-1	0.345	0.95		6.6	0.1	6.7	7.01	2.30	36.78	27	30	0.81	RCP	0.013	7.5	36.8	0.0	CBMH G1-2	490.50	486.22	4.28	1.78	FES G1-1		486.00			
FUEL ISLAND	STMH G1-4	0.020	0.95		5.0	0.3	5.3	7.68	0.15	0.15	133	6	3.00	PVC	0.010	6.4	1.3	1.1	FUEL ISLAND	498.73	493.41	5.32	4.82	STMH G1-4	493.52	489.42	4.10	3.60	
RD G5	STMH G1-3	0.150	0.95		5.0	0.0	5.0	7.68	1.09	1.09	19	8	2.00	PVC	0.010	6.4	2.2	1.1	RD G5		489.75			STMH G1-3	493.73	489.37	4.36	3.69	1.82' DROP
RD G1	STMH G2-1	0.150	0.95		5.0	0.0	5.0	7.68	1.09	1.09	19	8	2.00	PVC	0.010	6.4	2.2	1.1	RD G1		489.75			STMH G2-1	493.73	489.37	4.36	3.70	ROOF DRAIN AREA G1; 8/10 - 0.06'
STMH G2-1	STMH G1-3	0.440	0.95		5.0	0.6	5.7	7.68	3.21	4.30	163	18	0.50	RCP	0.013	4.2	7.4	3.1	STMH G2-1	493.73	488.76	4.97	3.47	STMH G1-3	493.73	487.94	5.79	4.29	ROOF DRAIN AREAS G2 TO G4
CBMH G4-1	CBMH G1-2	1.611	0.95		5.0	0.3	5.3	7.68	11.75	11.75	101	18	1.22	RCP	0.013	6.6	11.6	(0.2)	CBMH G4-1	491.00	487.45	3.55	2.05	CBMH G1-2	490.50	486.22	4.28	2.78	No 8/10th
LINE H																													
SEE HIGHWAY 5S DRAINAGE CALCULATIONS																													
SOUTH SWALE																													
LINE I																													
FES I1-5	STMH I1-4	FROM HYDROCAD 25 YR (Qf)							11.15	14.21	40	24	0.40	RCP	0.013	4.5	14.2	0.0	FES I1-5		490.22			STMH I1-4	497.16	490.06	7.10	5.10	
STMH I1-4	STMH I1-3	0.000	0.00		5.0	0.3	5.3	7.68	0.00	18.30	150	24	1.47	RCP	0.013	8.7	27.5	9.2	STMH I1-4	497.16	490.06	7.10	4.85	STMH I1-3	493.83	487.85	5.98	3.98	
STMH I1-3	STMH I1-2	0.000	0.00		5.3	0.5	5.7	7.68	0.00	18.30	161	24	0.66	RCP	0.013	5.9	18.4	0.1	STMH I1-3	493.83	487.85	5.98	3.73	STMH I1-2	493.30	486.79	6.51	4.51	
STMH I1-2	FES I1-1	0.000	0.00		5.7	0.5	6.3	7.46	0.00	21.00	139	30	0.28	RCP	0.013	4.4	21.7	0.7	STMH I1-2	493.30	486.39	6.91	4.12	FES I1-1		486.00			
RD I6	STMH I2-1	0.150	0.95		5.0	0.1	5.1	7.68	1.09	1.09	24	8	2.00	PVC	0.010	6.4	2.2	1.1	RD I6	495.03	491.75	3.28	2.48	STMH I2-1		491.27			ROOF AREA I6
STMH I2-1	STMH I1-4	0.420	0.95		5.1	0.9	6.0	7.68	3.06	3.06	147	18	0.20	RCP	0.013	2.7	4.7	1.6	STMH I2-1	496.03	490.76	5.27	3.56	STMH I1-4	497.16	490.46	6.70	5.20	ROOF AREAS I3 TO I5
RD I2	STMH I1-4	0.140	0.95		5.0	0.1	5.1	7.68	1.02	1.02	24	8	1.00	PVC	0.010	4.5	1.6	0.5	RD I2		491.75			STMH I1-4	497.16	491.51	5.65	4.98	ROOF AREA I2; 1.46' DROP

310 4th Ave.
Suite 1006
Minneapolis, MN 55415
(612) 260-7980
www.elanlab.com

Project: DGC025

Storm Sewer Design Calculations

Storm Sewer Design Calculations

Project No.: DGC22025 Storm Frequency: 25 years
Location: Amsterdam, NY
Date: 10/10/23 Calculations By: EJJ

Printed:
10/10/23
11:37 AM

Segment		A	C		Tc - Time of Conc.			I	Q - Rate		Pipe								Upstream Structure						Downstream Structure					
From	To	CB Ac.	CB Indiv.	Pipe Avg.	CB Min.	Pipe Min.	Total Min.	CB In/Hr	CB CFS	Pipe CFS	Len. Ft.	Dia. In.	Grade %	Mat'l.	Man's. n	Vel. Ft/S	Cap. CFS	Excess Cap.	STRUCT	RIM ELEV	INVERT	BUILD	Cover	Structure	Rim Elev	Inlet	Build	Cover	Notes
RD I1	STMH I1-2	0.370	0.95		5.0	0.1	5.1	7.68	2.70	2.70	58	10	2.20	PVC	0.010	7.7	4.2	1.5	RD I1		489.00			STMH I1-2	493.30	487.72	5.58	4.74	ROOF AREA I1
LINE J																													
RD J1	STMH J1-3	0.150	0.95		5.0	0.1	5.1	7.68	1.09	1.09	25	8	2.00	PVC	0.010	6.4	2.2	1.1	RD J1		493.25			STMH J1-3	495.81	492.75	3.06	2.39	ROOF AREA J1; 8/10 - 0.32
STMH J1-3	STMH J1-2	0.300	0.95		5.1	0.5	5.6	7.68	2.19	7.53	130	18	0.52	RCP	0.013	4.3	7.6	0.0	STMH J1-3	495.81	492.40	3.41	1.70	STMH J1-2	495.33	491.73	3.60	2.10	ROOF AREA J2 & J3; NO 8/10TH
STMH J1-2	FES J1-1	0.000	0.00		5.6	0.1	5.7	7.46	0.00	11.78	28	24	0.28	RCP	0.013	3.8	12.0	0.2	STMH J1-2	495.33	491.73	3.60	1.35	FES J1-1		491.65			24" RCAP EQUIVALENT PIPE
RD J7	STMH J2-1	0.140	0.95		5.0	0.1	5.1	7.68	1.02	1.02	24	8	2.00	PVC	0.010	6.4	2.2	1.2	RD J7		492.90			STMH J2-1	495.30	492.42	2.88	2.21	ROOF AREA J7
STMH J2-1	STMH J1-2	0.300	0.95		5.1	0.7	5.7	7.68	2.19	3.21	122	18	0.25	RCP	0.013	3.0	5.3	2.0	STMH J2-1	495.30	492.03	3.27	1.56	STMH J1-2	495.33	491.73	3.60	2.10	ROOF AREA J5 & J6; NO 8./10TH
RD J4	STMH J1-2	0.150	0.90		5.0	0.0	5.0	7.68	1.04	1.04	24	8	3.55	PVC	0.010	8.5	3.0	1.9	RD J4		493.25			STMH J1-2	495.33	492.40	2.93	2.27	ROOF AREA J4
LINE K																													
SEE HYDROCAD CALCULATIONS																													

LEGEND

PERVIOUS AREA
4.079 AC

IMPERVIOUS AREA
1.856 AC

TOTAL 5.935 AC

CULVERT A

TOTAL AREA TO CULVERT A
TOTAL 5.935 AC
PERV 4.079 AC
IMPERV 1.856 AC

FES H1-1

AREA A1-2
TOTAL 0.517 AC
PERV 0.402 AC
IMPERV 0.115 AC

COLD STORAGE WAREHOUSE
167,500 SF
FFE = 498.00
DOCK = 493.83

EXISTING WETLAND

CB H1-2

MH H1-3

MH H1-3

CB H1-4

EXISTING 18" CULVERT

EX FES H1-5

AREA H1-2
TOTAL 0.672 AC
PERV 0.476 AC
IMPERV 0.196 AC

AREA H1-4
TOTAL 1.047 AC
PERV 0.649 AC
IMPERV 0.398 AC

AREA H1-5
TOTAL 3.699 AC
PERV 2.552 AC
IMPERV 1.147 AC

120 240
SCALE IN FEET

1 ROUTE 5S DRAINAGE MAP
1" = 120'

DOLLAR GENERAL FRESH
AMSTERDAM, NEW YORK
DGC22025

ROUTE 5S CULVERT
DRAINAGE MAP
10/13/2023

310 4TH SOUTH, SUITE 1006
MINNEAPOLIS, MN 55415
p 612.260.7980 | www.elanlab.com
f 612.260.7990

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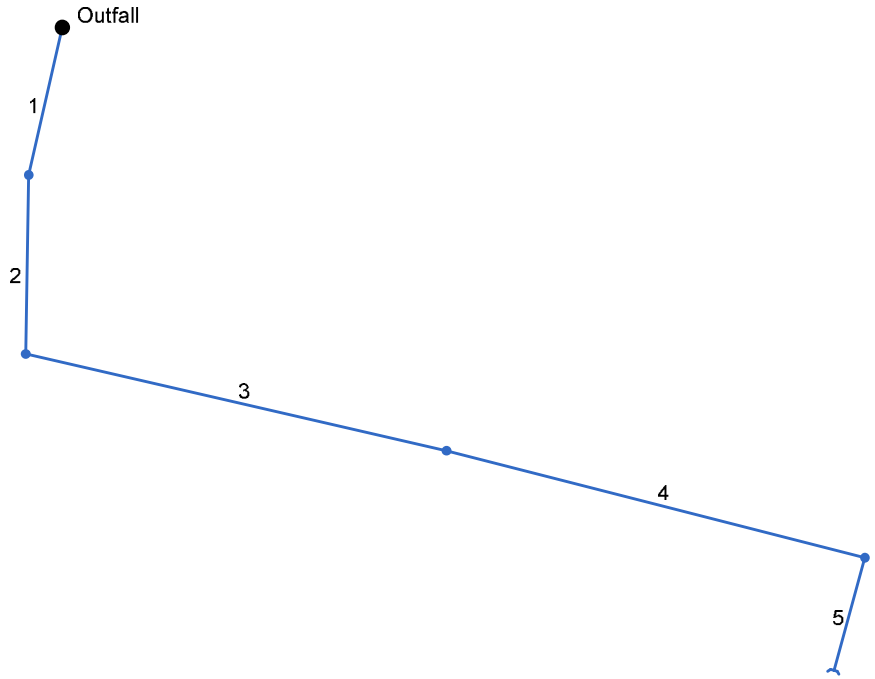
Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: 20231013_NYDOT Culvert Bypass Design.stm	Number of lines: 5	Date: 10/13/2023

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	88.000	0.67	5.42	0.49	0.33	2.72	5.0	7.5	8.3	22.54	22.72	5.18	30	0.31	478.00	478.27	480.08	480.33	480.88	483.00	H11-H12
2	1	104.000	0.00	4.75	0.00	0.00	2.39	0.0	7.1	8.4	20.11	22.39	4.37	30	0.30	478.27	478.58	480.54	480.75	483.00	491.34	H12-H13
3	2	250.000	0.00	4.75	0.00	0.00	2.39	0.0	6.1	8.7	20.82	22.46	5.19	30	0.30	485.41	486.16	487.31	488.06	491.34	497.14	H13-H14
4	3	250.000	1.05	4.75	0.52	0.54	2.39	5.0	5.1	9.0	21.55	22.46	5.21	30	0.30	492.16	492.91	494.12	494.88	497.14	502.65	H14-H15
5	4	68.000	3.70	3.70	0.50	1.85	1.85	5.0	5.0	9.0	16.73	20.23	11.20	18	3.16	498.95	501.10	499.99	502.54	502.65	0.00	EX CULVERT

Project File: 20231013_NYDOT Culvert Bypass Design.stm

Number of lines: 5

Run Date: 10/13/2023

NOTES:Intensity = 114.82 / (Inlet time + 17.20) ^ 0.82; Return period =Yrs. 50 ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

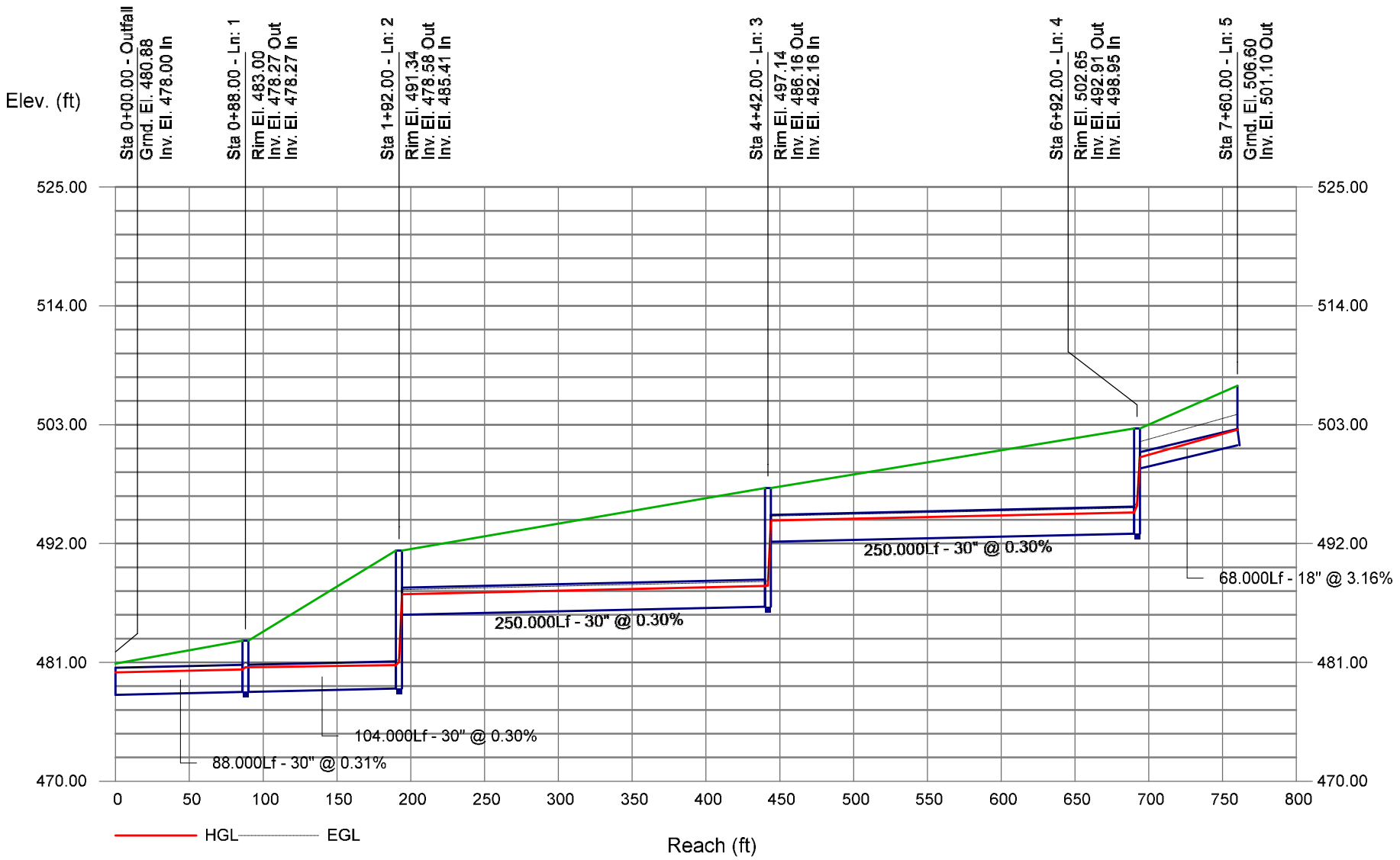
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
(1)	(in) (2)	(cfs) (3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(ft) (12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(K) (23)	(ft) (24)
1	30	22.54	478.00	480.08	2.08	4.36	5.16	0.41	480.49	0.294	88.000	478.27	480.33	2.06	4.34	5.20	0.42	480.75	0.298	0.296	0.261	0.50	0.21
2	30	20.11	478.27	480.54	2.27	4.69	4.29	0.29	480.83	0.210	104.000	478.58	480.75	2.17	4.52	4.45	0.31	481.05	0.220	0.215	0.224	0.98	0.30
3	30	20.82	485.41	487.31	1.90*	4.01	5.20	0.42	487.73	0.300	250.000	486.16	488.06	1.90	4.01	5.19	0.42	488.48	0.299	0.299	0.749	0.15	0.06
4	30	21.55	492.16	494.12	1.96*	4.14	5.21	0.42	494.55	0.300	250.000	492.91	494.88	1.97	4.14	5.21	0.42	495.30	0.299	0.300	0.749	1.50	0.63
5	18	16.73	498.95	499.99	1.04*	1.31	12.79	1.44	501.43	0.000	68.000	501.10	502.54	1.44**	1.74	9.61	1.44	503.97	0.000	0.000	n/a	1.00	n/a

Project File: 20231013_NYDOT Culvert Bypass Design.stm | Number of lines: 5 | Run Date: 10/13/2023

Notes: * depth assumed; ** Critical depth. ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: 20231013_NYDOT Culvert Bypass Design.stm



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Oct 2 2023

CULVERT A HYDRUALICS

Invert Elev Dn (ft)	=	472.25
Pipe Length (ft)	=	98.00
Slope (%)	=	0.28
Invert Elev Up (ft)	=	472.52
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

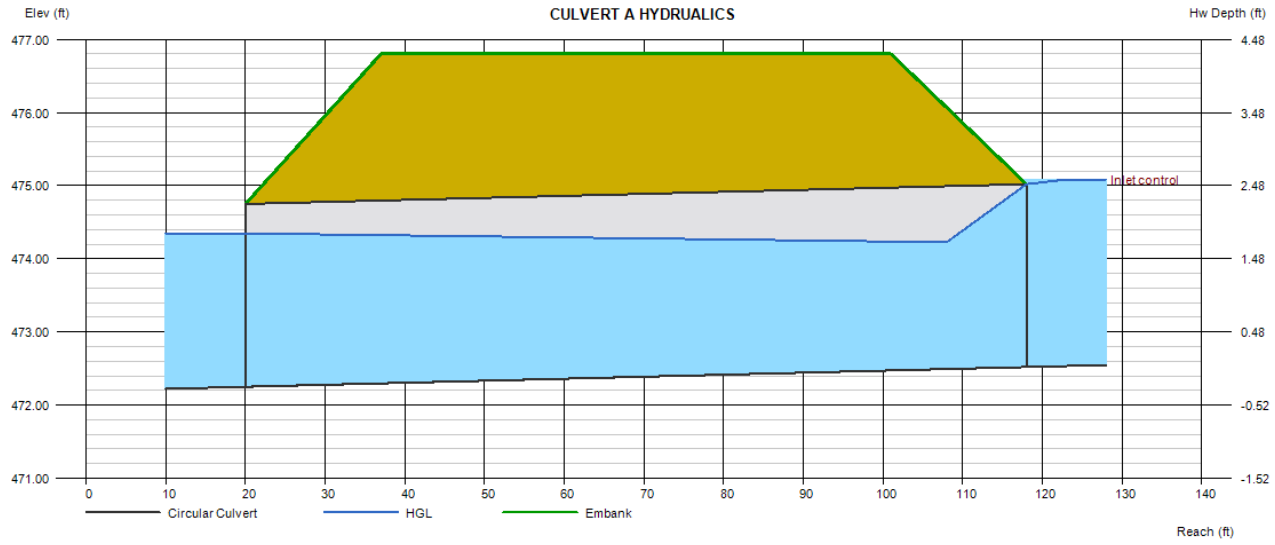
Top Elevation (ft)	=	476.80
Top Width (ft)	=	64.00
Crest Width (ft)	=	15.00

Calculations

Qmin (cfs)	=	24.75
Qmax (cfs)	=	24.75
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	24.75
Qpipe (cfs)	=	24.75
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	5.63
Veloc Up (ft/s)	=	6.99
HGL Dn (ft)	=	474.35
HGL Up (ft)	=	474.21
Hw Elev (ft)	=	475.08
Hw/D (ft)	=	1.03
Flow Regime	=	Inlet Control



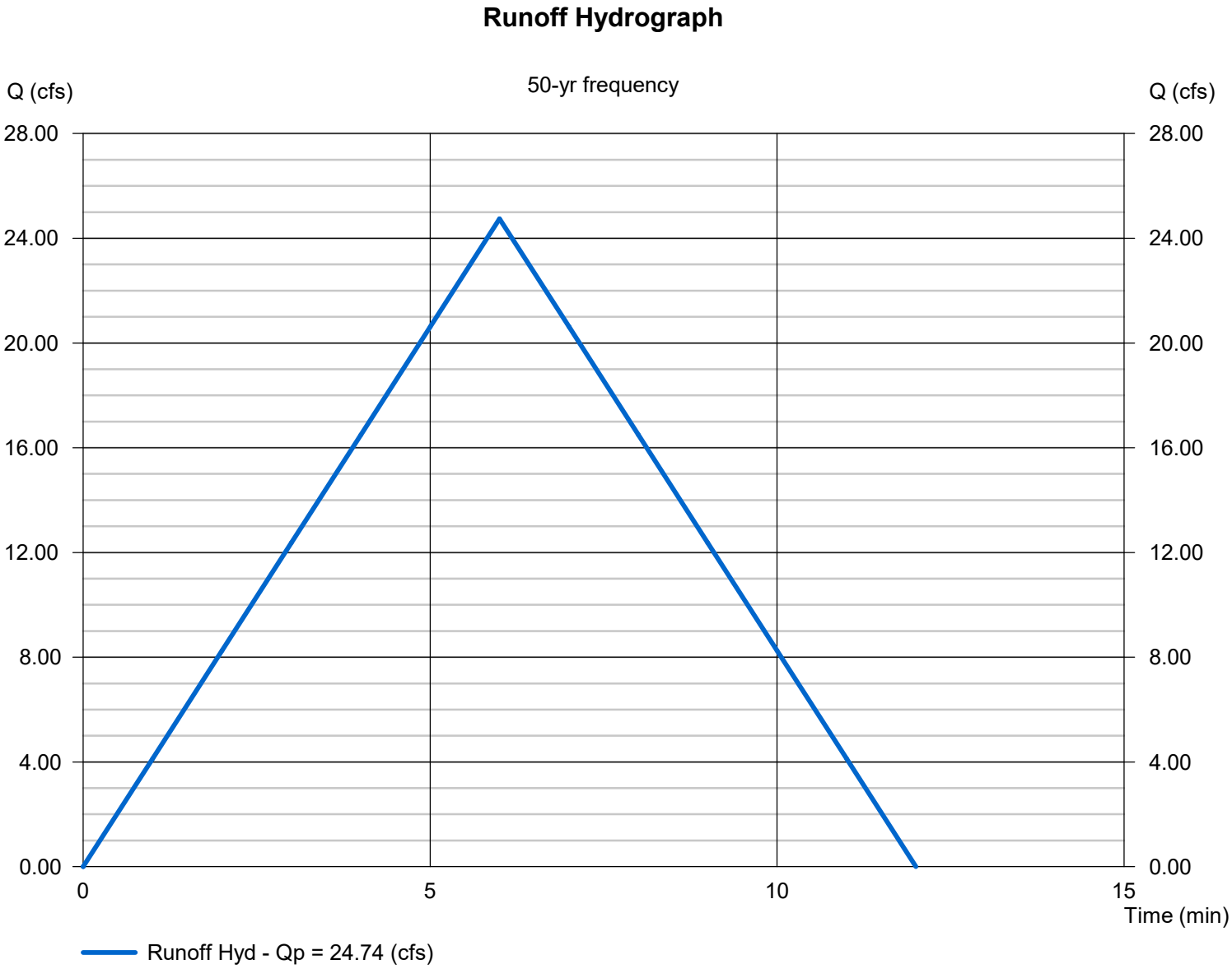
Hydrology Report

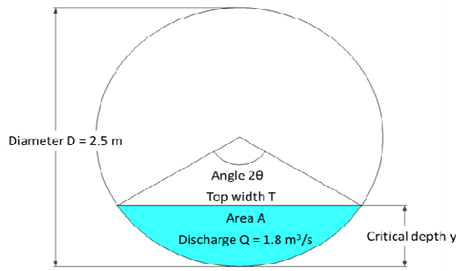
Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Oct 2 2023

CULVERT A HYDROLOGY

Hydrograph type	=	Rational	Peak discharge (cfs)	=	24.74
Storm frequency (yrs)	=	50	Time interval (min)	=	1
Drainage area (ac)	=	5.930	Runoff coeff. (C)	=	0.52
Rainfall Inten (in/hr)	=	8.025	Tc by User (min)	=	6
IDF Curve	=	SampleExpress.IDF	Rec limb factor	=	1.00

Hydrograph Volume = 8,908 (cuft); 0.205 (acft)





Critical flow condition

$$\frac{Q^2}{g} = \frac{A^3}{T}$$

$$\frac{Q^2}{g} = \frac{\left[\frac{D^2}{8}(2\theta - sin2\theta)\right]^3}{D\ sin\theta}$$

$$\frac{Q}{\sqrt{g}\,D^{2.5}} = \frac{0.044194(2\theta - sin2\theta)^{3/2}}{(sin\theta)^{1/2}}$$

Diameter D (m)	0.762
Discharge Q (m^3/s)	0.7
$\frac{Q}{\sqrt{g}\,D^{2.5}}$	0.4409
$\frac{0.044194(2\theta - sin2\theta)^{3/2}}{(sin\theta)^{1/2}}$	0.4409
Angle θ (radians)	1.9337
Angle θ (radians)	1.9337
Critical depth y (m)	0.5163
Critical depth y (ft)	**1.69**

$$\frac{Q}{\sqrt{g}\,D^{2.5}} = \frac{0.044194(2\theta - sin2\theta)^{3/2}}{(sin\theta)^{1/2}}$$

Use solver to obtain angle θ

$$\theta = cos^{-1}(1 - \frac{2y}{D})$$

Use solver to obtain critical depth y

Angle 2θ (radians)	3.867
Angle 2θ (degrees)	221.50
Area A (m^2)	0.329
Top width T (m)	0.712
Froude number F	1.00

$$2\theta(deg) = \frac{180 \times 2\theta(rad)}{\pi}$$

$$A = \frac{D^2}{8}(2\theta - sin2\theta)$$

$$T = D\ sin\theta$$

$$F = \frac{Q}{\sqrt{g\left(\frac{A^3}{T}\right)}}$$

Angle θ (degrees)	110.75

DATE: 10-06-2023 PROJECT: DOLLAR GENERAL COLD STORAGE BUILDING RE: ROUTE 55 CULVERT BYPASS

FROUDE NUMBER CHECK

$$F_R = \frac{V}{\sqrt{gD}}$$

$$0.9 \geq F_R \geq 1.1$$

PIPE H11 - H12

$V = 5.28$ ft/s (FROM HYDROFLOW REPORT)

$D = 2.08$ ft (FROM HYDROFLOW REPORT)

$$F_R = \frac{5.28}{\sqrt{32.2 \cdot 2.08}} = \frac{5.28}{8.18}$$

$\boxed{F_R = 0.64 < 0.90 \quad OK}$

PIPE H12 - H13

$V = 4.44$ ft/s

$D = 2.30$ ft

$$F_R = \frac{4.44}{8.61}$$

$\boxed{F_R = 0.52 < 0.9 \quad OK}$

PIPE H13 - H14

$V = 5.24$ ft/s

$D = 1.95$ ft

$\boxed{F_R = 0.66 < 0.9 \quad OK}$

PIPE H14 - H15

$V = 5.22$ ft/s

$D = 2.01$ ft

$\boxed{F_R = 0.65 < 0.9 \quad OK}$

CULVERT A

$V = 5.63$ ft/s

$D = 2.10$ ft

$\boxed{F_R = 0.68 < 0.9 \quad OK}$

NOAA Atlas 14, Volume 10, Version 2
Location name: Florida, Town of, New York, USA*
Latitude: 42.9346°, Longitude: -74.268°
Elevation: 445.11 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**3.50** (2.83-4.27)	**4.21** (3.41-5.15)	**5.38** (4.33-6.59)	**6.35** (5.08-7.80)	**7.68** (5.90-9.72)	**8.71** (6.54-11.2)	**9.73** (7.04-12.8)	**11.0** (7.49-14.6)	**12.7** (8.24-17.2)	**13.9** (8.81-19.2)
10-min	**2.48** (2.01-3.02)	**2.99** (2.42-3.65)	**3.81** (3.07-4.66)	**4.50** (3.60-5.52)	**5.44** (4.19-6.88)	**6.17** (4.63-7.91)	**6.89** (4.99-9.07)	**7.79** (5.30-10.4)	**8.96** (5.84-12.2)	**9.85** (6.24-13.6)
15-min	**1.94** (1.58-2.37)	**2.34** (1.90-2.86)	**2.99** (2.41-3.66)	**3.53** (2.82-4.33)	**4.27** (3.28-5.40)	**4.84** (3.63-6.20)	**5.41** (3.92-7.11)	**6.11** (4.16-8.12)	**7.03** (4.58-9.57)	**7.73** (4.89-10.7)
30-min	**1.26** (1.02-1.54)	**1.52** (1.23-1.86)	**1.94** (1.56-2.38)	**2.29** (1.83-2.81)	**2.77** (2.13-3.51)	**3.14** (2.36-4.03)	**3.51** (2.54-4.62)	**3.97** (2.70-5.28)	**4.57** (2.98-6.22)	**5.03** (3.18-6.94)
60-min	**0.776** (0.629-0.947)	**0.935** (0.756-1.14)	**1.19** (0.962-1.46)	**1.41** (1.13-1.73)	**1.71** (1.31-2.16)	**1.93** (1.45-2.48)	**2.16** (1.57-2.84)	**2.44** (1.66-3.25)	**2.81** (1.83-3.83)	**3.09** (1.96-4.27)
2-hr	**0.497** (0.406-0.602)	**0.588** (0.479-0.713)	**0.736** (0.598-0.894)	**0.859** (0.692-1.05)	**1.03** (0.798-1.29)	**1.16** (0.877-1.48)	**1.29** (0.942-1.69)	**1.46** (0.998-1.92)	**1.67** (1.10-2.26)	**1.84** (1.17-2.52)
3-hr	**0.381** (0.312-0.460)	**0.447** (0.365-0.539)	**0.554** (0.451-0.671)	**0.643** (0.520-0.781)	**0.766** (0.596-0.958)	**0.860** (0.654-1.09)	**0.954** (0.700-1.25)	**1.08** (0.741-1.42)	**1.24** (0.813-1.67)	**1.36** (0.868-1.85)
6-hr	**0.241** (0.199-0.289)	**0.280** (0.230-0.336)	**0.343** (0.282-0.413)	**0.396** (0.323-0.478)	**0.469** (0.368-0.583)	**0.525** (0.402-0.662)	**0.580** (0.429-0.753)	**0.654** (0.453-0.855)	**0.751** (0.497-1.00)	**0.824** (0.530-1.12)
12-hr	**0.148** (0.123-0.176)	**0.171** (0.142-0.204)	**0.210** (0.174-0.251)	**0.242** (0.199-0.290)	**0.286** (0.226-0.353)	**0.320** (0.246-0.401)	**0.353** (0.263-0.455)	**0.398** (0.277-0.517)	**0.456** (0.304-0.607)	**0.501** (0.324-0.675)
24-hr	**0.089** (0.075-0.105)	**0.103** (0.086-0.122)	**0.126** (0.105-0.150)	**0.145** (0.120-0.173)	**0.172** (0.137-0.211)	**0.192** (0.149-0.239)	**0.212** (0.159-0.271)	**0.238** (0.167-0.307)	**0.272** (0.182-0.359)	**0.297** (0.194-0.398)
2-day	**0.052** (0.044-0.061)	**0.060** (0.050-0.070)	**0.073** (0.061-0.086)	**0.084** (0.070-0.099)	**0.099** (0.079-0.121)	**0.111** (0.086-0.137)	**0.122** (0.092-0.154)	**0.136** (0.096-0.174)	**0.154** (0.104-0.202)	**0.168** (0.110-0.223)
3-day	**0.038** (0.032-0.044)	**0.044** (0.037-0.051)	**0.053** (0.045-0.062)	**0.061** (0.051-0.072)	**0.071** (0.057-0.086)	**0.080** (0.062-0.098)	**0.088** (0.066-0.110)	**0.097** (0.069-0.124)	**0.110** (0.075-0.144)	**0.120** (0.079-0.158)
4-day	**0.031** (0.026-0.036)	**0.035** (0.030-0.041)	**0.042** (0.036-0.050)	**0.048** (0.041-0.057)	**0.057** (0.046-0.068)	**0.063** (0.050-0.077)	**0.069** (0.052-0.087)	**0.077** (0.055-0.098)	**0.087** (0.059-0.113)	**0.094** (0.062-0.124)
7-day	**0.021** (0.018-0.024)	**0.024** (0.020-0.027)	**0.028** (0.024-0.033)	**0.032** (0.027-0.037)	**0.037** (0.030-0.044)	**0.041** (0.032-0.049)	**0.045** (0.034-0.056)	**0.049** (0.035-0.062)	**0.055** (0.038-0.072)	**0.060** (0.040-0.079)
10-day	**0.017** (0.014-0.019)	**0.019** (0.016-0.022)	**0.022** (0.019-0.026)	**0.025** (0.021-0.029)	**0.029** (0.023-0.034)	**0.032** (0.025-0.038)	**0.034** (0.026-0.043)	**0.038** (0.027-0.048)	**0.042** (0.029-0.054)	**0.046** (0.030-0.060)
20-day	**0.012** (0.010-0.014)	**0.013** (0.011-0.015)	**0.015** (0.013-0.017)	**0.017** (0.014-0.019)	**0.019** (0.015-0.022)	**0.021** (0.016-0.025)	**0.022** (0.017-0.027)	**0.024** (0.017-0.030)	**0.026** (0.018-0.034)	**0.028** (0.019-0.036)
30-day	**0.010** (0.009-0.012)	**0.011** (0.009-0.013)	**0.012** (0.011-0.014)	**0.013** (0.012-0.016)	**0.015** (0.012-0.018)	**0.016** (0.013-0.019)	**0.018** (0.013-0.021)	**0.019** (0.014-0.023)	**0.020** (0.014-0.026)	**0.021** (0.014-0.028)
45-day	**0.008** (0.007-0.010)	**0.009** (0.008-0.010)	**0.010** (0.009-0.012)	**0.011** (0.009-0.013)	**0.012** (0.010-0.014)	**0.013** (0.010-0.015)	**0.014** (0.011-0.017)	**0.015** (0.011-0.018)	**0.016** (0.011-0.020)	**0.017** (0.011-0.021)
60-day	**0.007** (0.007-0.008)	**0.008** (0.007-0.009)	**0.009** (0.008-0.010)	**0.009** (0.008-0.011)	**0.010** (0.009-0.012)	**0.011** (0.009-0.013)	**0.012** (0.009-0.014)	**0.012** (0.009-0.015)	**0.013** (0.009-0.017)	**0.014** (0.009-0.018)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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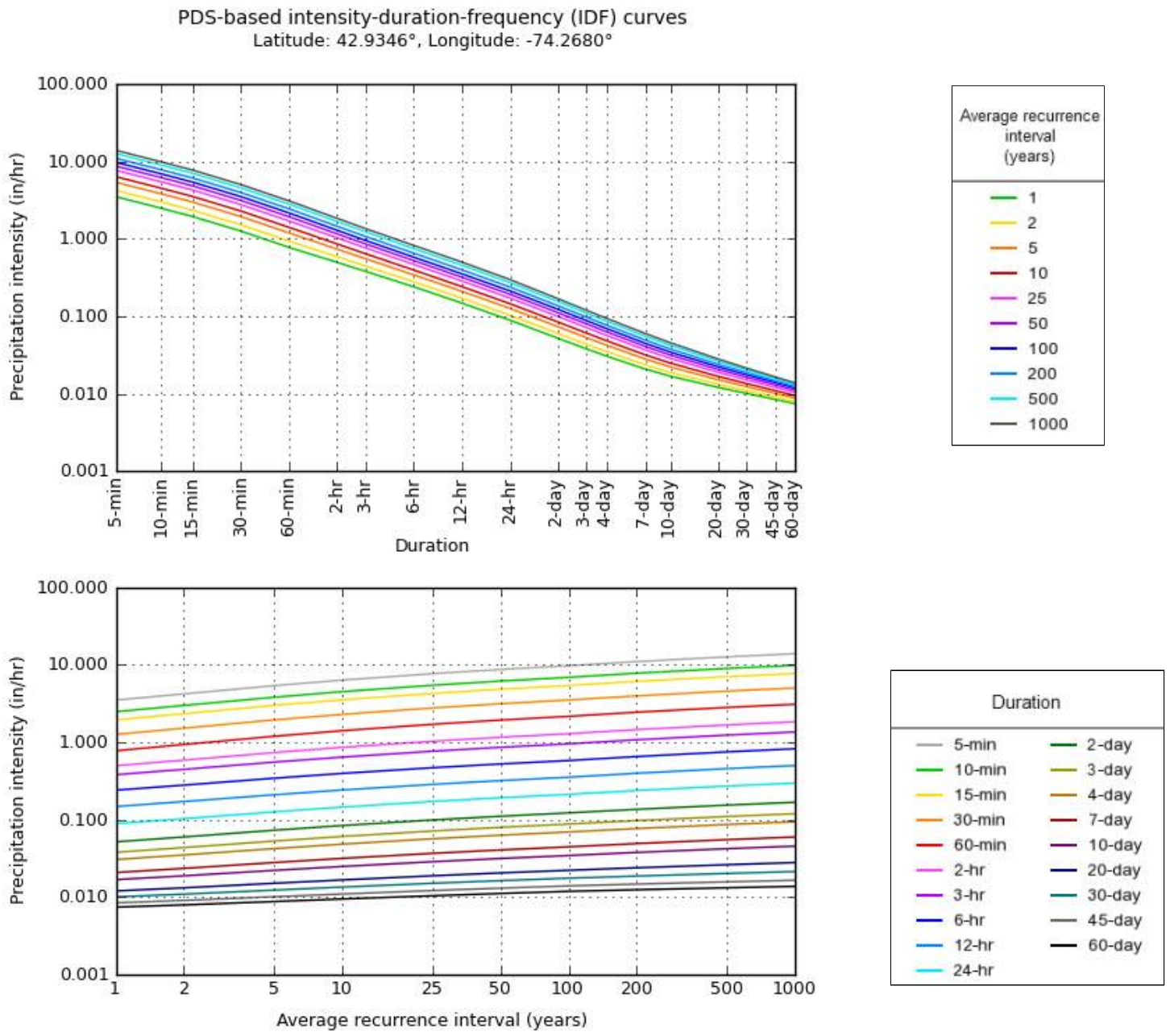
PF graphical



NOAA Atlas 14, Volume 10, Version 2

Created (GMT): Tue Apr 3 19:56:44 2018

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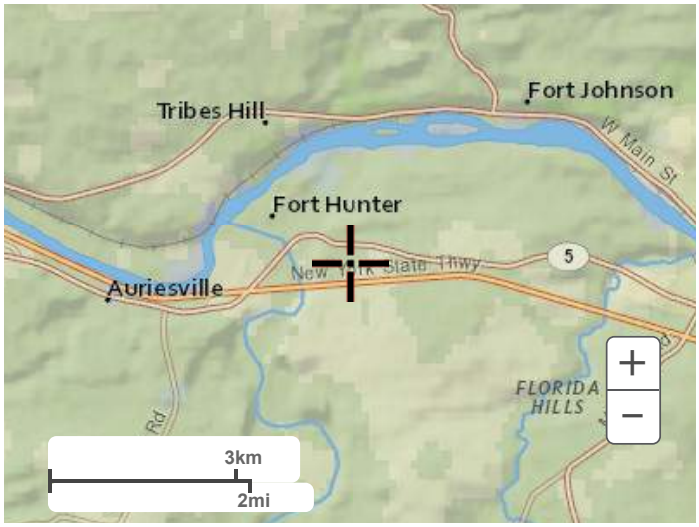
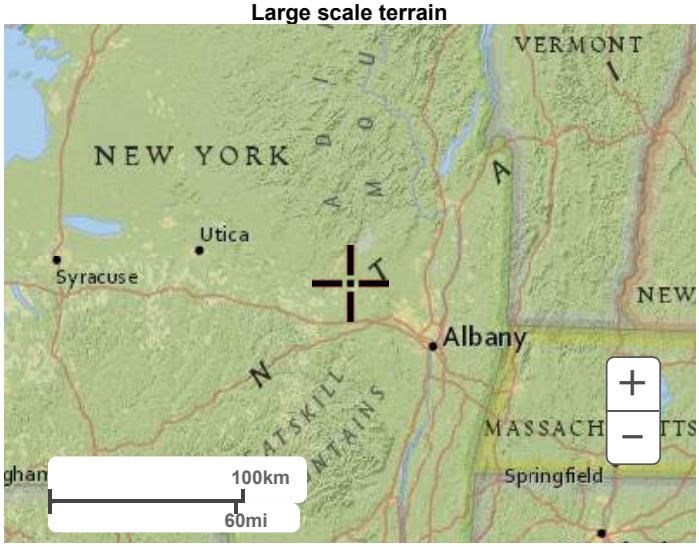
Maps & aerials

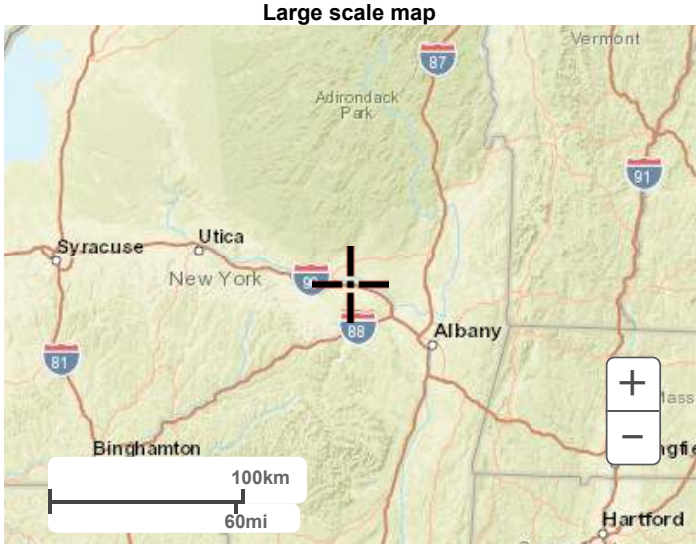
Small scale terrain



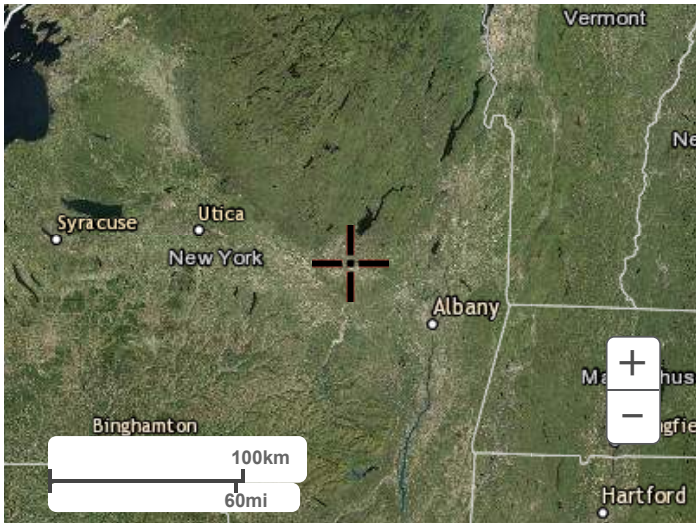
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

THE AREA OF POTENTIAL EFFECT ("APE") BOUNDARY LINE SHOWN HEREIN IS INTENDED TO REPRESENT THE LIMITS OF THE PROPOSED DISTURBANCE FOR THE PROJECT. ANY WORK OR DEVELOPMENT, OCCURRING OUTSIDE THE "APE" BOUNDARY, WILL REQUIRE WRITTEN AUTHORIZATION/APPROVAL FROM THE NYS OFFICE OF PARKS, RECREATION AND HISTORIC PRESERVATION BEFORE BEING UNDERTAKEN. "X" INDICATES A LOCATION IN WHICH AN ARTIFACT WAS RECOVERED DURING THE PHASE I CULTURAL RESOURCE INVESTIGATION PERFORMED IN SEPTEMBER 2009.

SITE P-5 AS DEFINED BY PHASE I CULTURAL RESOURCE INVESTIGATION PERFORMED IN SEPTEMBER 2009.

POTENTIAL SUB DIVISION (SHADED IN ORANGE) =21.47 ACRES

WETLAND A DELINEATED JANUARY 2022.
AREA=.51 ACRES

APE BOUNDS

3
A=
4± S.F.
ACRES

EXPANSION 6,000 SF

WAREHOUSE 14,000 SF

NYS ROUTE 5

GRAPHIC SCALE
75.0 0 37.5 75.0 150.0

NO.	DATE	REVISION	BY
00	03/08/22	ORIGINAL ISSUE	MAL

PRIME AE®
KB Group of NY, Inc. dba PRIME AE Group of NY

Albany Office
100 Great Oaks Blvd | Suite 114 | Albany, New York 12203
Ph: 518 382 1774 www.primeeng.com

PROJ. ENGR.: MAL | DRAWN BY: MAL | CHECKED BY: DPC

TOWN OF FLORIDA
MONTGOMERY COUNTY, NY

FLORIDA BUSINESS PARK NORTHSIDE

SHEET TITLE:

LOT 3 SUBDIVISION
UPDATED WETLANDS 2022

SCALE: AS SHOWN

FILE NO.: 48-1701

DATE: MARCH 2022

SHEET NO.: A1

KB Group of NY, Inc. dba PRIME AE Group of NY
Albany Office
100 Great Oaks Boulevard | Suite 114 | Albany, New York 12203
P: 518.382.1774

Introduction

As requested by the Montgomery County Industrial Development Agency (MCIDA), Prime AE Group completed wetland delineations at the Florida Business Park, along the north side of Route 5S next to 2018 NY-5S in The Town of Florida, Amsterdam, Montgomery County, New York. The assessed area is an agricultural field approximately twenty-three acres with a linier wetland area dividing the field in half. The wetland drains south to north from Route 5S to a large, forested area along the back of the fields. In a previous delineation there were two isolated wetlands delineated as Wetland KK and Wetland L. Both areas had corn stalk remains and no longer exhibit hydrophytic vegetation, hydrologic connections, or strong hydric soil features.

There are no NYS mapped wetlands or NWI mapped wetlands within the subject property using New York State (NYS) Environmental Resource Mapper. There are also no Significant Natural Communities or Rare Plants and Animals mapped within the subject property. Based on FEMA's Flood Map Service Center, the project site is mapped as an area of Minimal Flood Hazard, Zone X and is outside of the 100 and 500-year flood plains.

Resource Area Descriptions

The site was assessed in January 2022 to determine if there are any resource areas protected under the NYS Department of Environmental Conservation Freshwater Wetlands Regulations Article 24 or under the Army Corp of Engineers jurisdiction. Delineations were conducted following the methodology set forth in the New York State Freshwater Wetlands Delineation Manual, 1995, using the 1987 Army Corps of Engineers methodology. The wetland delineated is classified as a Palustrine Wetland, which includes all nontidal wetlands dominated by trees, shrubs, persistent emergent, emergent mosses, or lichens… according to Classification of Wetlands and Deepwater Habitats of the United States, 1979. The wetland is specifically a Palustrine Emergent (PEM), Wetland with a Scrub Shrub (PSS) component.

The wetland is approximately 22,224.0 square feet or 0.510 acres within the subject property and is flagged beginning along the woods at the north edge of the field then south along the drain towards Route 5S and back to the woods on the northside of the field, with blue consecutively numbered flags W-A1 through W-A32. Field Data forms were completed listing vegetation, hydrology, and soils data for the wetland and adjacent upland plot and are attached with this report. Weather conditions were overcast and 25 degrees at the time of the delineation. The ground was frozen in the upland areas with a dusting to two inches of snow. The topography of the field is level to gentle sloping and drains from the south and

east. The wetland follows a field drain draining north to a large, wooded area north of the corn field.

Wetlands Delineations

Wetland A is an emergent wetland (PEM) with a scrub shrub (PSS) component. Ground cover vegetation is dominated by Switch Grass (*Panicum virgatum*) and Purple loosestrife (*Lythrum salicaria*). Sensitive Fern (*Onoclea sensibilis*) Tussock sedge (*Carex stricta*) and Broad leaf cattail (*Typha latifolia*) are common. The shrub layer is dominated by Silky Dogwood (*Cornus amomum*) Red maple (*Acer rubrum*) Box elder (*Acer negundo*), saplings. The canopy is open with a few Red maples, and Box elders.

Hydrology is primarily from groundwater as well as surface runoff and precipitation. The Hydrologic indicators observed include drift deposits and water-stained leaves. Water is mostly reabsorbed into the soil within the wetland or drains north to the wooded area.

Using NRCS Web Soil Survey, most of the field is mapped as Darian silt loam 3-8% slopes. The soil is classified as somewhat poorly drained and very deep. Darian soils are formed from gray shale fragments on Wisconsinan glacial till plains, drumlins, and moraines. Part of wetland and the east field is mapped as Lansing silt loam, which is classified as well drained also formed from Wisconsinan glacial till from shale, limestone, fine grained sandstone, and silt stone. At the far east end of the subject property the field is mapped as Darian silt loam, 8 – 15% slopes and Lancing silt loam, 8-15% slopes.

The soil profile has an Ao horizon from 0-4 inches of mineral muck fine sandy loam with organic with a matrix color of 2.5Y 3/1. From 4 to 11 inches the A horizon is silt loam w some clay with a matrix color of 2.5YR 3/1. The B horizon from 11 to 18 inches is silt and clay with a matrix color of 2.5Y3/3 with faint redoximorphic concentrations of 7.5 YR 4/4 at 20% through the horizon. The soil was saturated at the surface with water at 14“at the time of the delineation.

The adjacent upland is mostly open corn fields. The upland margins along the edge of the woods are dominated by Switch Grass, Orchard grass (*Dactylis glomerata*), Canada goldenrod (*Solidago canadensis*) and Rough-stemmed goldenrod (*Solidago rugosa*) with Panic Grass (*Dichanthelium acuminatum*) and Multiflora rose (*Rosa multiflora)* common. Red oak (*Quercus rubra*) saplings are the dominant shrub vegetation. The canopy adjacent to the field is dominated by White pine (*Pinus strobus*) and Red oak.

The upland soil profile has an Ap horizon from 0 to 9 inches is silt loam with a matrix color of 10YR4/2. This overlays an AB horizon from 9 -21 inches of silt loam with fine sand and a matrix color of 10YR4/3 mixed with 10YR 5/4. The upland soil bore was done between rows in shallow standing water under ice. Dry upland soils were frozen too deep to get a soil profile.

In conclusion most of the assessed field is upland. The wetland across the center of the field is very similar to the previous delineation. Two isolated wetlands from the previous delineation no longer exhibit dominant wetland vegetation, hydrology, or hydric soil.

Florida Business Park, Amsterdam, NY January 2022

View northwest across the west half of the field.

View west along Route 5S of both fields.

View east across the south field from south end of Wetland A next to Route 5S.

View south along paved access road at the west end of the subject property.

Florida Business Park, Amsterdam, NY January 2022

View north from Route 5S of Wetland A at wetland flags W- A15 and W-A16

Hydric north near Wetland flag W-A20

View south towards Route 5S near wetland flag W-A3

View east near wetland flags W-A3 and W-A4

Florida Business Park, Amsterdam, NY January 2022

View northwest of the adjacent upland along the north edge of the fields

View northwest of area of previous Isolated Wetland KK.

View east of area of previous Isolated Wetland KK in the west field

View east of area of previous Isolated Wetland L in the east field.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Florida Business Park City/County: Amsterdam / Montgomery Sampling Date: 6 Jan 2022

Applicant/Owner: Florida Business Park State: NY Sampling Point: Wet A

Investigator(s): Jeff Smith Section, Township, Range:

Landform (hillslope, terrace, etc.): gradual slope to level Local relief (concave, convex, none): none

Slope (%): 0-3% Lat: 42.938 Long: 74.259 Datum: NAD 88

Soil Map Unit Name: Darian Silt loam, Lansing Silt Loam NWI classification: PEM/PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area within a Wetland?** Yes X No ___
Hydric Soil Present?	Yes X	No ___	If yes, optional Wetland Site ID:
Wetland Hydrology Present?	Yes X	No ___	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 6

Water Table Present? Yes X No ___ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): Surface

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland A

Tree Stratum (Plot size: 30 Ft Radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	10	Yes	FAC
2. Acer negundo	10	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 Ft Radius)			
1. Cornus amomum	10	Yes	FACW
2. Acer negundo	10	Yes	FAC
3. Acer rubrum	10	Yes	FAC
4. Salix sp	5	No	
5.			
6.			
7.			
	= Total Cover		
Herb Stratum (Plot size: 5 Ft Radius)			
1. Panicum virgatum	20	Yes	FAC
2. Lythrum salicaria	20	Yes	FACW
3. Carex stricta	10	No	OBL
4. Onoclea sensibilis	10	No	FACW
5. Typha latifolia	5	No	OBL
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: Wetland A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-11	2.5Y4/1	100						Mineral muck
11-18	2.5Y3/3	80	7.5YR 4/4	20	C	M		Silt loam w clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- X Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Florida Business Park City/County: Amsterdam / Montgomery Sampling Date: 6 Jan 2022

Applicant/Owner: Florida Business Park State: NY Sampling Point: Wet A

Investigator(s): Jeff Smith Section, Township, Range:

Landform (hillslope, terrace, etc.): gradual slope to level Local relief (concave, convex, none): none

Slope (%): 0-3% Lat: 42.938 Long: 74.259 Datum: NAD 88

Soil Map Unit Name: Darian Silt loam, Lansing Silt Loam NWI classification: PEM/PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area within a Wetland?** Yes X No ___
Hydric Soil Present?	Yes X	No ___	If yes, optional Wetland Site ID:
Wetland Hydrology Present?	Yes X	No ___	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 6

Water Table Present? Yes X No ___ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): Surface

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: Wetland A

Tree Stratum (Plot size: 30 Ft Radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	10	Yes	FAC
2. Acer negundo	10	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

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1. Cornus amomum	10	Yes	FACW
2. Acer negundo	10	Yes	FAC
3. Acer rubrum	10	Yes	FAC
4. Salix sp	5	No	
5.			
6.			
7.			
	= Total Cover		

Herb Stratum (Plot size: 5 Ft Radius)			
1. Panicum virgatum	20	Yes	FAC
2. Lythrum salicaria	20	Yes	FACW
3. Carex stricta	10	No	OBL
4. Onoclea sensibilis	10	No	FACW
5. Typha latifolia	5	No	OBL
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

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Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

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Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: Wetland A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-11	2.5Y4/1	100						Mineral muck
11-18	2.5Y3/3	80	7.5YR 4/4	20	C	M		Silt loam w clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

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- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- X Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
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- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

Dollar General Wetland Mitigation Plan
Florida Business Park, Montgomery County NY

This replication plan has been developed to mitigate the area of wetland displaced by the proposed Dollar General Facility located on Route 5S in Montgomery County New York. The plan was developed following the New York State Inland Wetland Replication Guidelines. The restoration plan proposes to convert 10,878 square feet of upland agricultural field to a bordering vegetated wetland. This meets the 1:1 replacement ratio as required under the New York Freshwater Wetlands Act (Article 24). The wetland to be replaced is a linear wetland feature across the center of an agricultural field and primarily conveys seasonal flow and storm water flow from State Highway 5S. The linear portion of the wetland is a narrow scrub shrub wetland along a drain beginning at a culvert outlet under Route 5S and drains to a scrub shrub wetland located along the northerly property line. The northerly portion of the wetland will not be impacted. The entire wetland including the linear drain is approximately one-half acre and is not mapped as a regulated wetland by the state of New York or on National Wetland mapping.

The wetland mitigation site is located at the northwest corner of the proposed facility next to an existing paved access road and the proposed main entrance to the facility. A portion of the drainage that fed the original wetland will be redirected around the new facility and to the mitigated wetland site. The remainder of the original wetland will be fed by run off, precipitation and seasonal high ground water.

The purpose and goal for the mitigation site is to compensate and replace the lost area of the existing wetland with an in-kind replacement of the existing wetland area. The mitigated site should provide similar hydrologic functions and habitat values to the lost area. The mitigation site will be graded to four different hydrologic regimes. The deepest area will be ponded with one to one and a half feet of water under normal conditions. A second tier would be frequently flooded with up to 6 inches of water with perimeter tier that would be periodically inundated. A third tier of the wetland would be graded so it is infrequently flooded or inundated then graded to the outer edge were it is not likely to be inundated under normal conditions. By developing different hydrologic levels, the wetland can support a broad range of plants and provide suitable habitat for wildlife.

The soils in this area are mapped as Darien silt loam, and Lansing Silt loam. Darien soils are very deep somewhat poorly drained formed on till plains, drumlins and glacial moraines derived from shale and siltstone. Lancing soils are very deep well drained soils formed till plains drumlin fields and dissected plateaus derived from shale, limestone and fine-grained sandstone and siltstone.

Soil profiles were taken on July 19, 2023 and are described below. Soils were consistent with the mapped soils shown on the USDA NRCS Soil maps. At the time of the survey the fields were fallow with cut corn stalks and weeds. Weather conditions were normal with no precipitation on the day of the site visit. Soil colors are from Munsell Soil Color Charts Revised 2009, Produced 2019. The charts used were new in March 2020. The suffix p indicates a plowed layer. There was no standing water or water accumulating in the soil bore. Also, the soil profiles were not saturated at any depth except Soil bore 2, that was saturated at the surface only.

MITIGATION SITE SOIL PROFILES

Soil bore One: Elevation 469.7 Feet

Horizon	Horizon Thickness	Matrix Color	Redox Color	Texture
Ap	0 - 8	10YR3/3		Silt loam
B	8-23	10YR4/4	10YR5/6 (10%) Concentrations	Silt loam
BC	23-27	10YR5/3	10YR4/1 Reductions	Silt, Clay

Soil bore Two: Elevation 469.2 Feet

Horizon	Horizon Thickness	Matrix Color	Redox Color	Texture
Ap	0 - 9	10YR3/3		Silt loam
B	9-19	10YR3/4		Silt
BC	19-27	10YR3/1		Silt w Clay

Soil bore Three: Elevation 470.6 Feet

Horizon	Horizon Thickness	Matrix Color	Redox Color	Texture
Ap	0 - 9	10YR3/3		Silt loam
B	9-22	10YR4/4		Silt
BC	22-26	10YR5/4	10YR5/2 and, 10YR6/2 Reductions	Silt w Clay

Soil bore Four: Elevation 471.5 Feet

Horizon	Horizon Thickness	Matrix Color	Redox Color	Texture
Ap	0 - 9	10YR3/4		Silt loam
B	9-22	10YR4/4		Silt
B2	22-24	10YR5/3	10YR6/2 Reductions	Silt w Clay

Prior to any mitigation work, erosion control will be installed along the perimeter of the mitigation site. Work will take place during dry, no flow conditions if possible. The replication site will be constructed concurrent with the site work in the existing wetland to minimize any stockpiling of hydric soil to be translocated.

Wetland Replication and Planting Plan

The mitigation site will be excavated to reach groundwater or evidence of seasonal high ground water. Based on soil bores with a hand auger this is from 20 to 27-inches from the surface to a reduced matrix with low chroma soil colors, evidence of long-term saturated soil conditions within the proposed replication area.

Excavated wetland soils from the original wetland will be removed and stockpiled to be translocated to the mitigation site. The stockpiled wetland soils should be kept moist. If additional organic soil is required, the A and B horizons from the mitigation site should be used rather than soil from off site. The upland soil should be amended with equal amounts of well composted leaf litter.

A layer of silt loam (B horizon) will be placed in the excavated area to help ensure successful root growth. The soil will be compacted to a friable consistency. Hydric soils will then be translocated from the crossing location spread at a depth of 10 to 12 inches over a B horizon of. If additional wetland soil is required, the topsoil from the mitigation site can be amended in equal parts with weed free composted leaf material and added to the translocated soil. The excavated upland soil will be stockpiled in an area separate from the wetlands and mitigation site, to be utilized elsewhere on the project. Erosion control will also be placed around the perimeter and the soil and will be covered while stockpiled.

New England Wetland Seed Mix or a similar wetland mix should be spread at a rate of one pound per 2500 square feet. In addition to a wetland seed mix, wetland vegetation will likely grow from the seedbank in the translocated wetland soil. In addition to herbaceous vegetation, container plants of 18” to 24” tall shrub sized plants will be planted 8 to 10 feet apart along the margins and on isolated hummocks within the mitigated area to add vertical structure and improve the habitat value of the wetland. The planting stock will be native species from local growers. A vegetated buffer will be left to grow adjacent to the wetlands to reduce nutrient runoff, improve habitat value, connectivity, and add to the aesthetics of the site. The following is a list of suitable native plant species that are likely to grow successfully and provide both food and cover habitat for aquatic and terrestrial wildlife.

The following is a list of suggested herbaceous emergent and ground cover vegetation, shrub and tree plantings for the mitigation area.

Common Name	Scientific Name	Indicator
Riverbank Wild Rye	*Elymus riparius FACW*	*FACW*
Fox Sedge	*Carex vulpinoidea OBL*	*OBL*
Lurid Sedge	*Carex lurida OBL*	*OBL*
Tussock Sedge	*Carex stricta OBL*	*OBL*
Sensitive Fern	*Onoclea sensibilis FACW*	*FACW*

Wetland Replication and Planting Plan

Common Name	Scientific Name	Indicator
Buttonbush	*Cephalanthus occidentalis*	*OBL*
Silky Dogwood	*Cornus amomum*	*FACW*
Red Osier Dogwood	*Cornus sericea*	*FACW*
Speckled Alder	*Alnus incana (rugosa)*	*FACW*
Sweet Pepperbush	*Clethera alnifolia*	*FAC*
Meadowsweet	*Spiraea latifolia*	*FAC*
Hardhack, Steeplebush	*Spiraea tomentosa*	*FACW*
Common Spicebush	*Lindera benzoin*	*FACW*
Inkberry	*Ilex glabra*	*FACW*
Red Maple	*Acer rubrum*	*FAC*
Highbush Blueberry	*Vaccininium corymbosum*	*FACW*

A qualified wetland scientist will inspect construction of the crossing site and mitigation work to ensure compliance with the mitigation plan. The wetland mitigation site will also be monitored for two growing seasons to insure at least 75% survival of plantings. Any invasive plants will be removed by hand. In the event there is not adequate survival additional plantings will be added. Erosion and sediment control will remain in place until the site is stabilized and will be removed from the site when no longer necessary. A report including photographs will be submitted each growing season to confirm the progress and success of the replication.

Doller General Site Rt 5S Amsterdam NY
Mitigation Site Photographs, July 2023

View south of the mitigation site adjacent to access road.

View east of the proposed mitigation site at the end of the access road

Doller General Site Rt 5S Amsterdam NY
Mitigation Site Photographs, July 2023

View south Soil Bore 1

View west of the mitigation site looking towards the access road

Doller General Site Rt 5S Amsterdam NY
Mitigation Site Photographs, July 2023

Soil Bore 1

Soil Bore 2

Doller General Site Rt 5S Amsterdam NY
Mitigation Site Photographs, July 2023

Soil Bore 3

Soil Bore 4

DOLLAR GENERAL
FRESH DISTRIBUTION CENTER

Amsterdam, New York

OPERATIONS AND MAINTENANCE PLAN

DGC22025

OCTOBER 13, 2023

Élan DESIGN LAB
Élan Design Lab, Inc.
Flour Exchange Building
310 4th Ave S
Suite 1006
Mpls, MN 55415

Stormwater Operations and Maintenance Plan

This O&M Plan has been prepared for the ongoing maintenance of the stormwater SMPs and associated structures at the Dollar General Fresh Distribution center at 20XX NY Hwy 55 in Amsterdam, NY. A BMP and storm sewer location map is included for identification of areas to be inspected and maintained. An inspection checklist is also to be completed annually or after major storms, select portions of the checklist should be inspected monthly and are indicated as such. These sections include the wet pond permanent pool, litter and debris, vegetation, and dewatering.

Each of the Stormwater Management Practices are to be marked on-site with a sign identifying the type of practice and the SPDES Construction Permit Number.

Entity Responsible for Post-Construction Maintenance

The Wet Pond, Forebays, Bioretention, Dry Swales, Constructed Wetland, and Storm Sewer are to be maintained by:

Dollar General Corporation
100 Mission Ridge
Goodlettsville, TN 37072

Owner's Representative Contact:
Kacey Levine
klevine@dollargeneral.com
(404) 309-9846

A copy of the maintenance agreement is included in this document.

Maintenance Requirements

The bulleted lists below summarize the maintenance requirements of each SMP and Stormwater Feature onsite. A complete inspection checklist is attached to this manual.

Dry Swale:

- Fertilize and lime as needed to maintain dense vegetation.
- Mow as required during the growing season to maintain grass heights at 4 inches to 6 inches.
- Remove any sediment or debris buildup by hand if possible in the bottom of the channel when the depth reaches 2 inches.
- Inspect for pools of standing water. Regrade to restore design grade and revegetate.

- Repair rills in channel bottom with compacted topsoil, anchored with mesh or filter fabric. Seed and mulch.
- Use of heavy equipment for mowing and removing plants/debris should be avoided to minimize soil compaction. Disturbed areas should be stabilized with seed and mulch, or revetment, as necessary.

Wet Pond:

- Sediment removal in the forebay(s) shall occur every five to six years or after 50% of total forebay capacity has been lost.
- All required safety elements must be inspected and maintained on an annual basis, unless prior inspections indicate more frequent maintenance is required.

Bioretention:

- Silt/sediment shall be removed from the filter bed when the accumulation exceeds one inch. When the filtering capacity of the filter diminishes substantially (i.e., when water ponds on the surface of the filter bed for more than 48 hours), the top few inches of discolored material shall be removed and shall be replaced with fresh material. The removed sediments shall be disposed in an acceptable manner (i.e., landfill).

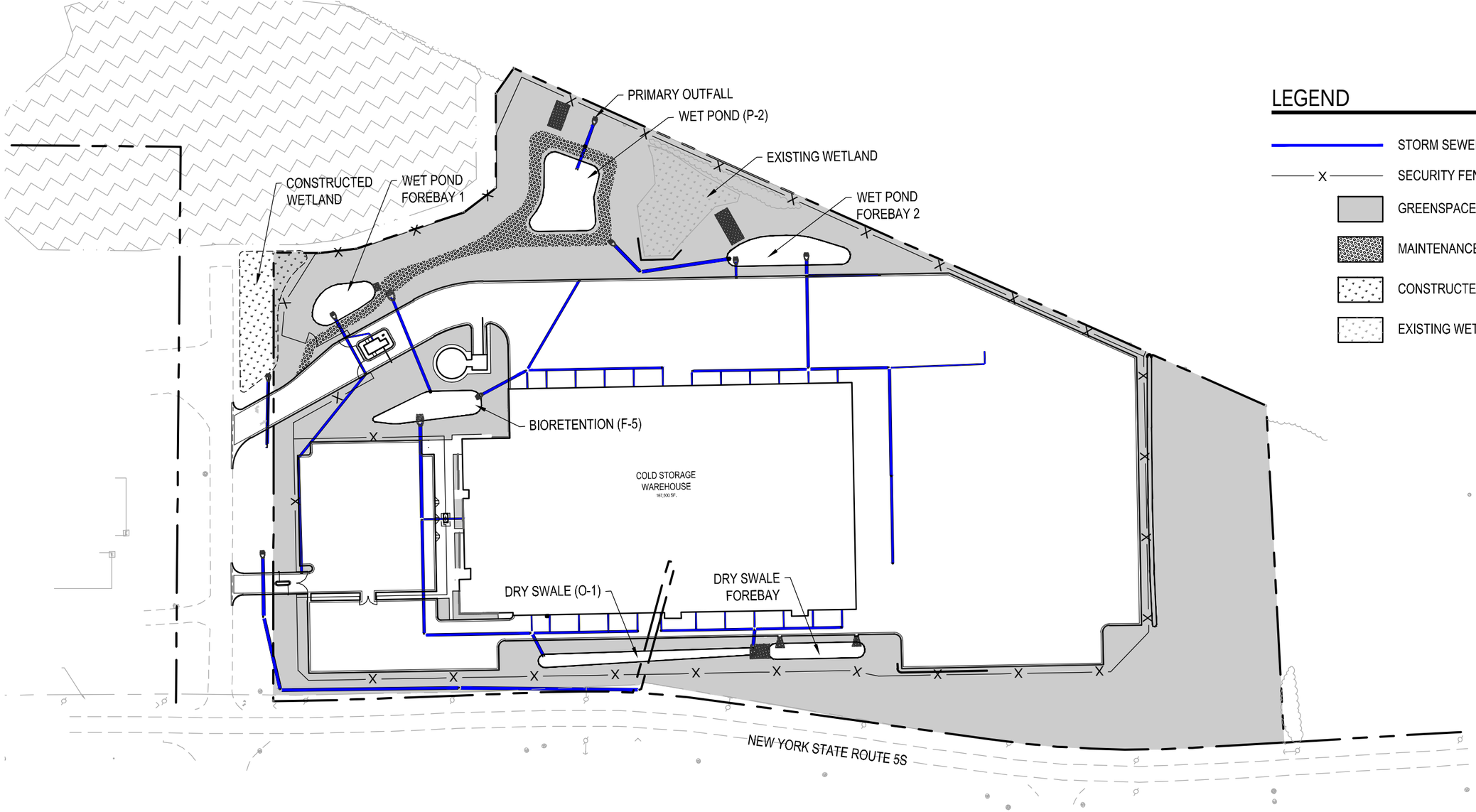
Wetlands:

- If a minimum coverage of 50% is not achieved in the planted wetland zones after the second growing season, a reinforcement planting is required.

Closing

The following documents are enclosed:

- Map of Stormwater SMP Locations
- Maintenance Log/Inspection Checklist
- Copy of Official Maintenance Agreement (Pending)



LEGEND

- STORM SEWER
- SECURITY FENCE
- GREENSPACE
- MAINTENANCE ACCESS
- CONSTRUCTED WETLAND
- EXISTING WETLAND

DOLLAR GENERAL FRESH

AMSTERDAM, NEW YORK
DGC22025

SMP SCHEMATIC
10/13/2023

310 4TH SOUTH, SUITE 1006
MINNEAPOLIS, MN 55415
p 612.260.7980 | www.elanlab.com
f 612.260.7990

150 300
SCALE IN FEET

Élan DESIGN LAB
Civil Engineering | Landscape Architecture

1 SMP SCHEMATIC
1" = 150'

Bioretention Stormwater Management Practices Level 1 Inspection Checklist

SMP ID #		**SMP Owner**		☐ Private ☐ Public
SMP Location (Address; Latitude & Longitude)				
	Latitude		**Longitude**	

Party Responsible for Maintenance	**System Type**		**Type of Site**
☐ Same as SMP Owner ☐ Other _____	☐ Seasonal ☐ Continuous Use ☐ Other	☐ Above Ground ☐ Below Ground	☐ Commercial ☐ Industrial ☐ Residential ☐ State

Inspection Date		**Inspection Time**	
Inspector			
Date of Last Inspection			

BR Drainage Area

Look for areas that are uphill from the Bioretention cell.

Problem (Check if Present)	**Follow-Up Actions**
 ☐ Bare soil, erosion of the ground (rills washing out the dirt)	☐ Seed and mulch areas of bare soil to establish vegetation. ☐ Fill in erosion areas with soil, compact, and seed and straw to establish vegetation. ☐ If a rill or small channel is forming, try to redirect water flowing to this area by creating a small berm or adding topsoil to areas that are heavily compacted. ☐ Other:

BR Drainage Area

Look for areas that are uphill from the Bioretention cell.

Problem (Check if Present)	Follow-Up Actions
	☐ Kick-Out to Level 2 Inspection: Large areas of soil have been eroded, or larger channels are forming. May require rerouting of flow paths.
 ☐ Piles of grass clippings, mulch, dirt, salt, or other materials	☐ Remove or cover piles of grass clippings, mulch, dirt, etc. ☐ Other:
 ☐ Open containers of oil, grease, paint, or other substances	☐ Cover or properly dispose of materials; consult your local solid waste authority for guidance on materials that may be toxic or hazardous. ☐ Other:

BR Inlets

Stand in the Bioretention cell itself and look for all the places where water flows in. Often there will be multiple points of inflow to the practice.

Problem (Check if Present)	Follow-Up Actions
 ☐ Inlets collect grit and debris or grass/weeds. Some water may not be getting into the Bioretention cell. The objective is to have a clear pathway for water to flow into the cell.	☐ Use a flat shovel to remove grit and debris (especially at curb inlets or openings). Parking lots generate fine grit that will accumulate at these spots. ☐ Pull out clumps of growing grass or weeds and scoop out the soil or grit that the plants are growing in. ☐ Remove any grass clippings, leaves, sticks, and other debris that is collecting at inlets. ☐ For pipes and ditches, remove sediment and debris that is partially blocking the pipe or ditch opening where it enters the Bioretention cell. ☐ Dispose of all material properly where it will not re-enter the Bioretention cell. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Inlets are blocked to the extent that most of the water does not seem to be entering the Bioretention cell.
 ☐ Some or all of the inlets are eroding so that rills, gullies, and other erosion is present, or there is bare dirt that is washing into the Bioretention cell.	☐ For small areas of erosion, smooth out the eroded part and apply rock or stone (e.g., river cobble) to prevent further erosion. Usually, filter fabric is placed under the rock or stone. ☐ In some cases, reseeding and applying erosion-control matting can be used to prevent further erosion. Some of these materials may be available at a garden center, but it may be best to consult a landscape contractor. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Erosion is occurring at most of the inlets, and it looks like there is too much water that is concentrating at these points. The inlet design may have to be modified.

BR Ponding Area

Examine the entire Bioretention surface and side slopes

Problem (Check if Present)	Follow-Up Actions
 ☐ Mulch (if used) needs to be replaced or replenished. The mulch layer had decomposed or is less than 1-inch thick.	☐ Add new mulch to a total depth (including any existing mulch that is left) of 2 to 3 inches. The mulch should be shredded hardwood mulch that is less likely to float away during rainstorms. ☐ Avoid adding too much mulch so that inlets are obstructed or certain areas become higher than the rest of the Bioretention surface. ☐ Other:
 ☐ Minor areas of sediment, grit, trash, or other debris are accumulating on the bottom.	☐ Use a shovel to scoop out minor areas of sediment or grit, especially in the spring after winter sanding materials may wash in and accumulate. Dispose of the material where it cannot re-enter the Bioretention cell . ☐ If removing the material creates a hole or low area, fill with soil mix that matches original mix and cover with mulch so that the Bioretention surface area is as flat as possible. ☐ Remove trash, vegetative debris, and other undesirable materials. ☐ Other:
	☐ Kick-Out to Level 2 Inspection: Sediment has accumulated more than 2-inches deep and covers 25% or more of the Bioretention surface. ☐ Kick-Out to Level 2 Inspection: The Bioretention cell is too densely vegetated to assess sediment accumulation or ponding; see BR-4, Vegetation.

BR Ponding Area

Examine the entire Bioretention surface and side slopes

Problem (Check if Present)	Follow-Up Actions
 ☐ There is erosion in the bottom or on the side slopes. Water seems to be carving out rills as it flows across the Bioretention surface or on the slopes, or sinkholes are forming in certain areas. ☐ Source: Stormwater Maintenance, LLC.	☐ Try filling the eroded areas with clean topsoil or sand, and cover with mulch. ☐ If the problem recurs, you may have to use stone (e.g., river cobble) to fill in problem areas. ☐ If the erosion is on a side slope, fill with clay that can be compacted and seed and mulch the area. ☐ Other: ☐ Kick-Out to Level 2 Inspection: The problem persists or the erosion is more than 3-inches deep and seems to be an issue with how water enters and moves through the Bioretention cell. ☐ Kick-Out to Level 2 Inspection: The problem does not seem to be caused by flowing water, but a collapse or sinking of the surface (e.g., “sinkhole”) due to some underground problem.
 ☐ The bottom of the Bioretention cell is not flat, and the water pools at one end, along an edge, or in certain pockets. The whole bottom is not uniformly covered with water. See design plan to verify that bioretention surface is intended to be flat. Check during or immediately after a rainstorm.	☐ If the problem is minor (just small, isolated areas are not covered with water), try raking the surface OR adding mulch to low spots to create a more level surface. You may need to remove and replace plantings in order to properly even off the surface. ☐ Check the surface with a string and bubble level to get the surface as flat as possible. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Ponding water is isolated to less than half of the Bioretention surface area, and there seem to be elevation differences of more than a couple of inches across the surface.

BR Ponding Area

Examine the entire Bioretention surface and side slopes

Problem (Check if Present)	Follow-Up Actions
 ☐ Water stands on the surface more than 72 hours after a rainstorm and /or wetland-type vegetation is present. The Bioretention cell does not appear to be draining properly.	☐ Kick-Out to Level 2 Inspection: This is generally a serious problem, and it will be necessary to activate a Level 2 Inspection.

BR Vegetation

Examine all Bioretention cell vegetation.

Problem (Check if Present)	Follow-Up Actions
 ☐ Vegetation requires regular maintenance—pulling weeds, removing dead and diseased plants, replacing mulch around plants, adding plants to fill in areas that are not well vegetated, etc.	☐ If you can identify which plants are weeds or not intended to be part of the planting plan, eliminate these, preferably by hand pulling. ☐ If weeds are widespread, check with the local stormwater authority and/or Extension Office about proper use of herbicides for areas connected with the flow of water. ☐ Even vegetation that is intended to be present can become large, overgrown, and/or crowd out surrounding plants. Prune and thin accordingly. ☐ If weeds or invasive plants have overtaken the whole Bioretention cell , bush-hog the entire area before seedheads form in the spring. It will be necessary to remove the root mat manually or with appropriate herbicides, as noted above. ☐ Re-plant with species that are aesthetically pleasing and seem to be doing well in the Bioretention cell. ☐ Other: ☐ Kick-Out to Level 2 Inspection: You are unsure of the original planting design, or the vegetation maintenance task is beyond your capabilities of time, expertise, or resources. If you are unsure of the health of the vegetation (e.g. salt damage, invasives, which plants are undesirable) or the appropriate season to conduct vegetation management, consult a landscape professional before undertaking any cutting, pruning, mowing, or brush hogging.

BR Vegetation

Examine all Bioretention cell vegetation.

Problem (Check if Present)	Follow-Up Actions
 ☐ Vegetation is too thin, is not healthy, and there are many spots that are not well vegetated.	☐ The original plants are likely not suited for the actual conditions within the Bioretention cell . If you are knowledgeable about plants, select and plant more appropriate vegetation (preferably native plants) so that almost the entire surface area will be covered by the end of the second growing season. ☐ Other:
	☐ Kick-Out to Level 2 Inspection: For all but small practices (e.g., rain gardens), this task will likely require a landscape design professional or horticulturalist.

BR Outlets

Examine outlets that release water out of the Bioretention cell.

Problem (Check if Present)	Follow-Up Actions
☐ Erosion at outlet	☐ Add stone to reduce the impact from the water flowing out of the outlet pipe or weir during storms. ☐ Other:
	☐ Kick-Out to Level 2 Inspection: Rills have formed and erosion problem becomes more severe.
 ☐ Outlet obstructed with mulch, sediment, debris, trash, etc.	☐ Remove the debris and dispose of it where it cannot re-enter the Bioretention cell . ☐ Other:
	☐ Kick-Out to Level 2 Inspection: Outlet is completely clogged or obstructed; there is too much material to remove by hand or with simple hand tools.

Additional Notes:

Inspector:_____ Date: _____

Complete the following if follow-up/corrective actions were identified during this inspection:

Certified Completion of Follow-Up Actions:

"I hereby certify that the follow-up/corrective actions identified in the inspection performed on _____ (DATE) have been completed and any required maintenance deficiencies have been adequately corrected."

Inspector/Operator: _____ Date: _____

Bioretention Stormwater Management Practices Level 2 Inspection Checklist

SMP ID #		**SMP Owner**		☐ Private ☐ Public
SMP Location (Address; Latitude & Longitude)				
	Latitude		**Longitude**	

Party Responsible for Maintenance	**System Type**		**Type of Site**
☐ Same as SMP Owner ☐ Other _____	☐ Seasonal ☐ Continuous Use ☐ Other	☐ Above Ground ☐ Below Ground	☐ Commercial ☐ Industrial ☐ Residential ☐ State

Inspection Date		**Inspection Time**	
Inspector			
Date of Last Inspection			

Level 2 Inspection: BIORETENTION NOTE: Key Source for this Information *(CSN, 2013)*	
Recommended Repairs	**Triggers for Level 3 Inspection**
Observed Condition: Water Stands on Surface for More than 72 Hours after Storm	
☐ Condition 1: Small pockets of standing water Use a soil probe or auger to examine the soil profile. If isolated areas have accumulated grit, fines, or vegetative debris or have bad soil media, try scraping off top 3 inches of media and replacing with clean material. Also check to see that surface is level and water is not ponding selectively in certain areas. ☐ Condition 2: Standing water is widespread or covers entire surface Requires diagnosis and resolution of problem: • Clogged underdrain? • Filter fabric between soil media and underdrain stone? • Need to install underdrain if not present? • Too much sediment/grit washing in from drainage area? • Too much ponding depth? • Improper soil media?	• Soil media is clogged and problem is not evident from Level 2 inspection. • Level 2 inspection identifies problem, but it cannot be resolved easily or is associated with the original design of the practice. ☐ Level 3 inspection necessary
Observed Condition: Vegetation is sparse or out of control	
☐ Condition 1: Original design planting plan seems good but has not been maintained, so there are many invasives and/or dead plants Will require some horticultural experience to restore vegetation to intended condition by weeding, pruning, removing plants, and adding new plants. ☐ Condition 2: Original design planting plan is unknown or cannot be actualized A landscape architect or horticulturalist will be needed to redo the planting plan. Will likely require analysis of soil pH, moisture, organic content, sun/shade, and other conditions to make sure plants match conditions. Plan should include invasive plant management and maintenance plan to include mulching, watering, disease intervention, periodic thinning/pruning, etc.	• Vegetation deviates significantly from original planting plan; Bioretention has been neglected and suffered from deferred maintenance. • Owner/responsible party does not know how to maintain the practice. ☐ Level 3 inspection necessary
Observed Condition: Bioretention does not conform to original design plan in surface area or storage	
☐ Condition 1: Level 2 Inspection reveals that practice is too small based on design dimension, does not have adequate storage (e.g., ponding depth) based on the plan, and/or does not treat the drainage area runoff as indicated on the plan Small areas of deviation can be corrected by the property owner or responsible party, but it is likely that a Qualified Professional will have to revisit the design and attempt a redesign that meets original objectives or that can be resubmitted to the municipality for approval.	• More than a 25% departure from the approved plan in surface area, storage, or drainage area; sometimes less than this threshold at the discretion of the Level 2 inspector. ☐ Level 3 inspection necessary

Level 2 Inspection: BIORETENTION NOTE: Key Source for this Information *(CSN, 2013)*	
Recommended Repairs	**Triggers for Level 3 Inspection**
Observed Condition: Severe erosion of filter bed, inlets, or around outlets	
☐ Condition 1: Erosion at inlets The lining (e.g., grass, matting, stone, rock) may not be adequate for the actual flow velocities coming through the inlets. First line of defense is to try a more non-erosive lining and/or to extend the lining further down to where inlet slopes meet the Bioretention surface. If problem persists, analysis by a Qualified Professional is warranted. ☐ Condition 2: Erosion of Bioretention filter bed This is often caused by "preferential flow paths" through and along the Bioretention surface. The source of flow should be analyzed and methods employed to dissipate energy and disperse the flow (e.g., check dams, rock splash pads). ☐ Condition 3: Erosion on side slopes Again, the issue is likely linked with unanticipated flow paths down the side slopes (probably overland flow that concentrates as it hits the edge of the slope). For small or isolated areas, try filling, compacting, and re-establishing healthy ground cover vegetation. If the problem is more widespread, further analysis is required to determine how to redirect the flow.	• Erosion (rills, gullies) is more than 12 inches deep at inlets or the filter bed or more than 3 inches deep on side slopes. • If the issue is not caused by moving water but some sort of subsurface defect. This may manifest as a sinkhole or linear depression and be associated with problems with the underdrain stone or pipe or underlying soil. ☐ Level 3 inspection necessary
Observed Condition: Significant sediment accumulation, indicating an uncontrolled source of sediment	
☐ Condition 1: Isolated areas of sediment accumulation, generally less than 3-inches deep Sediment source may be from a one-time or isolated event. Remove accumulated sediment and top 2 to 3 inches of Bioretention soil media; replace with clean material. Check drainage area for any ongoing sources of sediment. ☐ Condition 2: Majority of the surface is caked with "hard pan" (thin layer of clogging material) or accumulated sediment that is 3-inches deep or more This can be caused by an improper construction sequence (drainage area not fully stabilized prior to installation of Bioretention soil media) or another chronic source of sediment in the drainage area. Augering several holes down through the media can indicate how severe the problem is; often the damage is confined to the first several inches of soil media. Removing and replacing this top layer (or to the depth where sediment incursion is seen in auger holes) can be adequate, as long as the problem does not recur.	• More than 2 inches of accumulated sediment cover 25% or more of the Bioretention surface area. • "Hard pan" of thin, crusty layer covers majority of Bioretention surface area and seems to be impeding flow of water down through the soil media. • New sources of sediment seem to be accumulating with each significant rainfall event. ☐ Level 3 inspection necessary

Notes:

Inspector:_____ Date: _____

Complete the following if follow-up/corrective actions were identified during this inspection:

Certified Completion of Follow-Up Actions:

"I hereby certify that the follow-up/corrective actions identified in the inspection performed on _____ (DATE) have been completed and any required maintenance deficiencies have been adequately corrected."

Inspector/Operator: _____ Date: _____

Disconnection & Sheetflow Stormwater Management Practices Level 1 Inspection Checklist

SMP ID #		**SMP Owner**		☐ Private ☐ Public
SMP Location (Address; Latitude & Longitude)				
	Latitude		**Longitude**	

Party Responsible for Maintenance	**System Type**		**Type of Site**
☐ Same as SMP Owner ☐ Other _____	☐ Seasonal ☐ Continuous Use ☐ Other	☐ Above Ground ☐ Below Ground	☐ Commercial ☐ Industrial ☐ Residential ☐ State

Inspection Date		**Inspection Time**	
Inspector			
Date of Last Inspection			

Table 2.4.1 D&S Drainage Area

Visually inspect any surfaces in the drainage area.

Problem (Check if Present)	**Follow-Up Actions**
 ☐ Changes in flow; more runoff; runoff bypassing the practice	☐ For rooftop areas, make sure downspouts are still disconnected and conveying water into the treatment area. ☐ Look for and remove any “dams” of sediment and grass clippings that prevent water from entering the treatment area as sheet flow. ☐ Other:

Table 2.4.1 D&S Drainage Area

Visually inspect any surfaces in the drainage area.

Problem (Check if Present)	Follow-Up Actions
	☐ Kick-Out to Level 2 Inspection: Changes to drainage area size or amount of runoff due to construction, tillage, etc.
 ☐ For parking lots in the drainage area—sediment, grass clippings, or other debris has accumulated at pavement edge.	☐ For small, isolated amounts of debris, sweep up by hand and dispose properly so that it will not be exposed to runoff. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Sediment is widespread and cannot be removed by manual sweeping.
 ☐ For parking lots in the drainage area—dips or damage at pavement edge caused flow to concentrate.	☐ Kick-Out to Level 2 Inspection: This will likely require special expertise to diagnose and fix pavement edge.

Table 2.4.2 D&S Level Spreader/Energy Dissipator

Inspect the energy dissipator closely, during a rain event if possible.

Problem (Check if Present)	Follow-Up Actions
 ☐ Debris and/or sediment accumulated behind or around the level spreader.	☐ Remove debris and sediment by hand and ensure that the area behind the level spreader is relatively flat. Too much debris and sediment can cause runoff to bypass the level spreader structure. ☐ Other:
 ☐ Sinking, cracking, sloughing, or other structural problem makes the energy dissipator no longer level.	☐ For stone/gravel spreaders, add new material or rake out as needed to make it even. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Structural issues that cannot be easily fixed by hand

Table 2.4.3 D&S Treatment Area

Examine where flow enters the treatment area as well as the whole flow path. Look for signs of concentrated flow.

Problem (Check if Present)	Follow-Up Actions
☐ Trash and/or debris in the treatment area	☐ Collect trash/debris and dispose of properly.
 ☐ Grass filter strip has grown very tall, to the point that runoff cannot easily enter or is getting concentrated.	☐ Mow filter strip twice a year or more frequently in a residential yard.

Table 2.4.3 D&S Treatment Area

Examine where flow enters the treatment area as well as the whole flow path. Look for signs of concentrated flow.

Problem (Check if Present)	Follow-Up Actions
☐ Sparse vegetation or bare spots	☐ For grassy areas, add topsoil (as needed), grass seed, mulch, and water during the growing season to re-establish consistent vegetation cover. ☐ Other:
 ☐ Rills or gullies are forming in treatment area where flow has become concentrated	☐ For minor rills, fill in with soil, compact, and add seed and straw to establish vegetation. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Rills are more than 2" to 3" deep and require more than just hand raking and re-seeding.

Additional Notes:

Inspector:_____ Date: _____

Complete the following if follow-up/corrective actions were identified during this inspection:

Certified Completion of Follow-Up Actions:

> "I hereby certify that the follow-up/corrective actions identified in the inspection performed on _____ (DATE) have been completed and any required maintenance deficiencies have been adequately corrected."

Inspector/Operator: _____ Date: _____

Disconnection & Sheetflow Stormwater Management Practices Level 2 Inspection Checklist

SMP ID #		**SMP Owner**		☐ Private ☐ Public
SMP Location (Address; Latitude & Longitude)				
	Latitude		**Longitude**	

Party Responsible for Maintenance	**System Type**		**Type of Site**
☐ Same as SMP Owner ☐ Other _____	☐ Seasonal ☐ Continuous Use ☐ Other	☐ Above Ground ☐ Below Ground	☐ Commercial ☐ Industrial ☐ Residential ☐ State

Inspection Date		**Inspection Time**	
Inspector			
Date of Last Inspection			

Level 2 Inspection – DISCONNECTION AND SHEETFLOW	
Recommended Repairs	**Triggers for Level 3 Inspection**
Observed Condition: Significant sediment on pavement that drains to disconnection area (e.g., grass strip)	
☐ Condition 1: Sediment on parking lot is widespread Enlist a mechanical sweeper or vacuum sweeper to remove sediment across entire pavement surface. Pay special attention to downhill edges of pavement where more sediment may have accumulated.	• Sediment accumulation is so serious that it cannot be sufficiently removed with mechanical sweeper. May indicate a high sediment load from uphill in the drainage area that needs to be mitigated. ☐ Level 3 inspection necessary
Observed Condition: Pavement edge deteriorating	
☐ Condition 1: Dips or damage at pavement edge causing runoff to concentrate Determine whether the damaged edge is causing significant enough concentration of runoff to warrant repair or regrading of the pavement.	• Edge must be patched or re-paved to make secure and level. • Parking lot not draining properly to the energy dissipator and treatment area. ☐ Level 3 inspection necessary
Observed Condition: Level spreader/energy dissipator	
☐ Condition 1: Level spreader sinking or uneven If basic equipment can be used, prop up and secure any section of level spreader that is sinking. Regrade soil all around level spreader and add stone as necessary to prevent erosion and bypassing. ☐ Condition 2: Level spreader is broken These repairs can be simple for small, residential-scale practices, such as at a downspout. Ensure the level spreader is level across, keyed in to soil at the edges, and made of durable material that can withstand the flow of water running across it. Larger or more complicated level spreaders (e.g., concrete) will likely require specialized skill and equipment.	• Level spreader requires specialized equipment, regrading, or large amount of material to make level again. • Level spreader needs to be re-designed and replaced. ☐ Level 3 inspection necessary

Level 2 Inspection – DISCONNECTION AND SHEETFLOW	
Recommended Repairs	**Triggers for Level 3 Inspection**
Observed Condition: Erosion in treatment area	
☐ Condition 1: Rills from concentrated flow Inspect energy dissipator to see whether it needs to be improved to better spread out incoming flow. Regrade flow path to ensure that it is relatively flat (if minor). If major re-grading is needed, the treatment area may need to be redesigned and fixed with specialized equipment.	• Major rills and gullies • Treatment area needs to be re-designed and major grading needed. ☐ Level 3 inspection necessary

Notes:

Inspector:_____ Date: _____

Complete the following if follow-up/corrective actions were identified during this inspection:

Certified Completion of Follow-Up Actions:

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Inspector/Operator: _____ Date: _____

Pond and Wetland Stormwater Management Practices Level 1 Inspection Checklist

SMP ID #		**SMP Owner**		☐ Private ☐ Public
SMP Location (Address; Latitude & Longitude)				
	Latitude		**Longitude**	

Party Responsible for Maintenance	**System Type**		**Type of Site**
☐ Same as SMP Owner ☐ Other _____	☐ Seasonal ☐ Continuous Use ☐ Other	☐ Above Ground ☐ Below Ground	☐ Commercial ☐ Industrial ☐ Residential ☐ State

Inspection Date		**Inspection Time**	
Inspector			
Date of Last Inspection			

PW Drainage Area

Look for areas that are uphill from the pond.

Problem (Check if Present)	**Follow-Up Actions**
☐ Bare soil, erosion of the ground (rills washing out the dirt)	☐ Seed and straw areas of bare soil to establish vegetation. ☐ Fill in eroded areas with soil, compact, seed and mulch with straw to establish vegetation. ☐ Other:

☐ Bare soil, erosion of the ground (rills washing out the dirt)	☐ Kick-Out to Level 2 Inspection: If a rill or small channel is forming, try to redirect water flowing to this area by creating a small berm or adding topsoil to areas that are heavily compacted. ☐ If large areas of soil have been eroded or larger channels are forming, this may require rerouting of flow paths or use of an erosion-control seed mat or blanket to reestablish acceptable ground cover or anchor sod where it is practical.
 ☐ Piles of grass clippings, mulch, dirt, salt, or other materials	☐ Remove or cover piles of grass clippings, mulch, dirt, etc. ☐ Remove excessive vegetation or woody debris that can block drainage systems. ☐ Other:
 ☐ Open containers of oil, grease, paint, or other substances exposed to rain in the drainage area	☐ Cover or properly dispose of materials; consult your local solid waste authority for guidance on materials that may be toxic or hazardous. ☐ Other:

Pond Inlets

Look for all areas where water flows into the pond during storms. Note that there may be multiple points of inflow and types of structures (e.g., pipes, open ditches, etc.).

Problem (Check if Present)	Follow-Up Actions
 ☐ Inlets are buried, covered or filled with silt, debris, or trash, or blocked by excessive vegetation.	☐ If the problem can be remedied with hand tools and done in a safe manner, remove vegetation, trash, woody debris, etc. from blocking inlet structures. ☐ Other: ☐ Kick-Out to Level 2 or 3 Inspection: If the amount of material is too large to handle OR there are ANY safety concerns about working in standing water, soft sediment, etc., the work will likely have to be performed by a qualified contractor.

Pond Inlets

Look for all areas where water flows into the pond during storms. Note that there may be multiple points of inflow and types of structures (e.g., pipes, open ditches, etc.).

Problem (Check if Present)		Follow-Up Actions
	☐ Inlets are buried, covered or filled with silt, debris, or trash, or blocked by excessive vegetation.	☐ Kick-Out to Level 2 or 3 Inspection: If the amount of material is too large to handle OR there are ANY safety concerns about working in standing water, soft sediment, etc., the work will likely have to be performed by a qualified contractor.
	☐ Inlets are broken, and, with pieces of pipe or concrete falling into the pond, there is erosion around the inlet, there is open space under the pipe, or there is erosion where the inlet meets the pond	☐ Kick-Out to Level 2 Inspection: These types of structural or erosion problems are more serious and will require a qualified contractor to repair.

PW Pond Area and Embankments

Examine both interior and exterior pond banks as well as the pond body. Observe from the inlet pipes to the outfall structure and emergency overflow.

Problem (Check if Present)		Follow-Up Actions
	☐ The pretreatment area(s) or forebay(s) are filled with sediment, trash, vegetation, or other debris.	☐ If the problem can be remedied with hand tools and done in a safe manner, use a flat shovel or other equipment to remove small amounts of sediment. ☐ Remove trash and excessive vegetation from forebays if this can be done in a safe manner. ☐ Other:

PW Pond Area and Embankments

Examine both interior and exterior pond banks as well as the pond body. Observe from the inlet pipes to the outfall structure and emergency overflow.

Problem (Check if Present)		Follow-Up Actions
	☐ The pretreatment area(s) or forebay(s) are filled with sediment, trash, vegetation, or other debris.	☐ Kick-Out to Level 2 Inspection: Large amounts of sediment or debris will have to be removed by a qualified contractor. ANY condition that poses a safety concern for working in standing water or soft sediments should be referred to a Level 2 Inspection or qualified contractor.
	☐ The pond area itself has accumulated sediment, trash, debris, or excessive vegetation that is choking the flow of the water, OR the pond area is covered with algae or aquatic plants.	☐ Level 1 includes handling only small amounts of material that can be removed by hand, or with rakes or other hand tools. Do not attempt any repair that poses a safety issue. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Most cases will call for a Level 2 Inspection and/or a qualified contractor. ☐ You are not sure what type and amount of vegetation is supposed to be in the pond. ☐ The algae or aquatic plants should be identified so that proper control techniques can be applied.
	☐ The side slopes of the pond are unstable, eroding, and have areas of bare dirt.	☐ If there are only minor areas, try filling in small rills or gullies with topsoil, compacting, and seeding and mulching all bare dirt areas with an appropriate seed. Alternatively, try using herbaceous plugs to get vegetation established in tricky areas, such as steep slopes. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Erosion and many bare dirt areas on steep side slopes will require a Level 2 Inspection and repair by a qualified contractor.

PW Pond Area and Embankments

Examine both interior and exterior pond banks as well as the pond body. Observe from the inlet pipes to the outfall structure and emergency overflow.

Problem (Check if Present)		Follow-Up Actions
 	☐ The riser structure is clogged with trash, debris, sediment, vegetation, etc., OR is open, unlocked, or has a steep drop and poses a safety concern. The pond level may have dropped below its "normal" level.	☐ If you can safely access the riser on foot or with a small boat, clear minor amounts of debris and remove it from the pond area for safe disposal. ☐ Other: ☐ Kick-Out to Level 2 Inspection: The riser cannot be accessed safely, the amount of debris is substantial, or the riser seems to be completely clogged and the water level has risen too high. ☐ There are safety issues with the riser and concern about access to pipes, drops, or any other life safety concern. ☐ The riser is leaning, broken, settling or slumping, corroded, eroded or any other structural problem.
	☐ The dam/embankment is slumping, sinking, settling, eroding, or has medium or large trees growing on it.	☐ If there are small isolated areas, try to fix them by adding clean material (clay and topsoil) and seeding and mulching. ☐ Periodically mow embankments to enable inspection of the banks and to minimize establishment of woody vegetation. ☐ Remove any woody vegetation that has already established on embankments. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Most of these situations will require a Level 2 Inspection or evaluation and repair by a qualified contractor. Seepage through the dam or problems with the pipe through the dam can be a serious issue that should be addressed to avoid possible dam failure.

PW Pond Area and Embankments

Examine both interior and exterior pond banks as well as the pond body. Observe from the inlet pipes to the outfall structure and emergency overflow.

Problem (Check if Present)		Follow-Up Actions
	☐ The emergency spillway or outfall (if it exists) has ☐ Erosion, settlement, or loss of material. Rock-lined spillways have excessive debris or vegetation.	☐ Clear light debris and vegetation. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Displacement of rock lining, excessive vegetation and erosion/settlement may warrant review and decision by Level 2 Inspector to check against original plan. ☐ Any uncertainty about the integrity of the emergency spillway should be referred to a Level 2 Inspector. ☐ Erosion or settlement such that design has been compromised should be reviewed by an engineer.

PW Pond Outlet

Examine the outlet of the pipe on the downstream side of the dam/embankment where it empties into a stream, channel, or drainage system.

Problem (Check if Present)	Follow-Up Actions
 ☐ The pond outlet is clogged with sediment, trash, debris, vegetation, or is eroding, caving in, slumping, or falling apart.	☐ If there is a minor blockage, remove the debris or vegetation to allow free flow of water. ☐ Remove any accumulated trash at the outlet. ☐ Outlet: ☐ Kick-Out to Level 2 Inspection: ☐ If the area at the outlet cannot be easily accessed or if the blockage is substantial, a Level 2 Inspection is warranted. ☐ Erosion at and downstream of the outfall should be evaluated by a qualified professional. ☐ Any structural problems, such as broken pipes, structures falling into the stream, or holes or tunnels around the outfall pipe, should be evaluated by a Level 2 Inspector and will require repair by a qualified contractor. ☐ The pool of water at the outlet pipe is discolored, has an odor, or has excessive algae or vegetative growth.

Additional Notes:

Inspector:_____ Date: _____

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Inspector/Operator: _____ Date: _____

Pond and Wetland Stormwater Management Practices Level 2 Inspection Checklist

SMP ID #		**SMP Owner**		☐ Private ☐ Public
SMP Location (Address; Latitude & Longitude)				
	Latitude		**Longitude**	

Party Responsible for Maintenance	**System Type**		**Type of Site**
☐ Same as SMP Owner ☐ Other _____	☐ Seasonal ☐ Continuous Use ☐ Other	☐ Above Ground ☐ Below Ground	☐ Commercial ☐ Industrial ☐ Residential ☐ State

Inspection Date		**Inspection Time**	
Inspector			
Date of Last Inspection			

Level 2 Inspection: PONDS and WETLANDS

Recommended Repairs and Required Skills	Triggers for Level 3 Inspection
Observed Condition: Bare Soil or Erosion in the Drainage Area	
☐ Condition 1: Extensive problem spots, but no channels or rills forming Reseed problem areas. If problem persists or grass does not take, consider hiring a landscape contractor. ☐ Condition 2: Problem is extensive, and rills/channels are beginning to form May be necessary to divert or redirect water that is causing the erosion problem. If it appears that simple regrading—such as installing a berm or leveling a low spot–will fix the problem, make repairs and ensure that the problem is repaired after the next storm.	• Large rills or gullies are forming in the drainage area. • An attempt to regrade the drainage area has been unsuccessful. • Fixing the problem would require major regrading (i.e., redirecting more than a 100-square-foot area. • It is not clear why the problem is occurring. ☐ Level 3 inspection necessary
Observed Condition: Manholes or Inlet Pipe Buried or Covered with Vegetation	
☐ Condition 1: Nearest manhole and inlet pipe not found Consult as-built drawings to get to closest suspected location and use metal detector to search for metal manhole cover. If unsuccessful, identify nearest drain inlets and approximate pipe direction to locate next manhole. ☐ Condition 2: Manhole located and inspected Never enter a manhole, except by following confined-space entry protocols. If outlet pipe is not visible or greater than 25% full of sediment/debris or trash, it will typically require a qualified contractor to flush, clean and clear blockages. ☐ Condition 3: Inlet pipe not found at pond Clear vegetation and brush that may be covering the inlet pipe. Buried inlet pipes may be found through use of a metal probe. ☐ Condition 4: Inlet pipe buried in sediment or blocked by vegetation Once located, the pipe path can be cleared of vegetation with brush hook or other brush tools. Light digging may clear sediment from the end of the pipe.	• To locate buried manholes and lost storm lines, it is sometimes necessary to hire a pipeline inspection contractor with televising equipment or ground-penetrating radar and enter at the closest upstream access point. • Locating a buried inlet pipe may require wading in the edge of the pond and using a metal probe and brush axe to find and expose the pipe. • If other than light digging is necessary to remove accumulated sediment, a contractor with heavy equipment may be required. ☐ Level 3 inspection necessary

Level 2 Inspection: PONDS and WETLANDS	
Recommended Repairs and Required Skills	**Triggers for Level 3 Inspection**
Observed Condition: Pipe or Headwall Settlement, Erosion, Corrosion or Failure	
☐ Condition 1: Pipe or headwall settlement or failure Severe sinkholes, settlement or corrosion should be kicked out to Level 3 Inspection. ☐ Condition 2: Flow not confined to pipe and visible outside pipe wall With flashlight, observe the inside of the pipe and note its condition. Take photographs. Look for sinkholes developing that indicate pipe failure beneath the surface. Kick out to Level 3 inspection.	• Where blockages are visible, a decision is needed on whether to clear them or leave in place. If a third of the pipe is full of sediment, it should be removed by a contractor with pipe-cleaning equipment. • Corrosion of inlet pipes that allows flow around the pipe exterior is a structural concern because it can lead to settlement, sinkholes and undermining pond embankment. Evidence of this type of failure may require specialized pipe-inspection equipment and investigation by an engineer. ☐ Level 3 inspection necessary
Observed Condition: Pond Conditions	
☐ Condition 1: Pond pre-treatment zone is full of sediment or not constructed as shown on as-built drawings. ☐ Condition 2: Excessive buildup of sediment or overgrowth If the pre-treatment area or pond pool is overgrown or filled with sediment so that the original design is compromised, corrective measures are required. If plants have died, then replanting is necessary. If none of the original design exists due to alteration or sediment, kick out to Level 3 inspection.	• It may require inspection by an engineer to determine next steps for clearing, replanting or reconstruction. • Erosion or settlement such that design has been compromised should be reviewed by an engineer. Recurring erosion may require redesign and/or regrading to direct flow away from eroding area. • If sediment has filled more than 50% of the pond's capacity, dredging is likely needed and should be evaluated by a qualified contractor. • Removal or control of excessive algae or aquatic plants can be assessed by a qualified pond maintenance company. ☐ Level 3 inspection necessary

Notes:

Inspector:_____ Date: _____

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Inspector/Operator: _____ Date: _____

Swale Stormwater Management Practices
Level 1 Inspection Checklist

SMP ID #		**SMP Owner**		☐ Private ☐ Public
SMP Location (Address; Latitude & Longitude)				
	Latitude		**Longitude**	

Party Responsible for Maintenance	**System Type**		**Type of Site**
☐ Same as SMP Owner ☐ Other _____	☐ Seasonal ☐ Continuous Use ☐ Other	☐ Above Ground ☐ Below Ground	☐ Commercial ☐ Industrial ☐ Residential ☐ State

Inspection Date		**Inspection Time**	
Inspector			
Date of Last Inspection			

SW Drainage Area

Look at areas that are uphill from the swale.

Problem (Check if Present)	Follow-Up Actions
 ☐ Bare soil, erosion of the ground (rills washing out the dirt)	☐ Seed and mulch or sod areas of bare soil to establish vegetation. ☐ Fill in erosion areas with soil, compact, and add seed and straw to establish vegetation. ☐ If a rill or small channel is forming, try to redirect water flowing to this area by creating a small berm or adding topsoil to areas that are heavily compacted. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Large areas of soil have been eroded, or larger channels are forming. May require rerouting of flow paths
 ☐ Piles of grass clippings, mulch, dirt, salt, or other materials	☐ Remove or cover piles of grass clippings, mulch, dirt, etc. ☐ Other:
 ☐ Open containers of oil, grease, paint, or other substances	☐ Cover or properly dispose of materials; consult your local solid waste authority for guidance on materials that may be toxic or hazardous.
☐ Grass dying at edge of road	☐ Seed and mulch; add topsoil or compost if needed. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Grass on edge of pavement continues to die off for unknown reasons. Swale edge may need to be replaced with other materials (e.g., stone diaphragm).

SW Inlets

Stand in the swale and look for all the places where water flows in.

Problem (Check if Present)	Follow-Up Actions
☐ Inlets or the swale edge are collecting grit, grass clippings, or debris or have grass/weeds growing. Some water may not be getting into the swale. The objective is to have a clear pathway for water to flow into the swale.	☐ Use a flat shovel to remove grit and debris (especially at curb inlets or opening). Parking lots will generate fine grit that will accumulate at these spots. ☐ Pull out clumps of growing grass or weeds, and scoop out the soil or grit that the plants are growing in. ☐ Remove any grass clippings, leaves, sticks, and other debris that is collecting at inlets or along the edge of the swale where water is supposed to enter. ☐ For pipes and ditches, remove sediment and debris that is partially blocking the pipe or ditch opening where it enters the swale. ☐ Dispose of all material properly in an area where it will not re-enter the swale. ☐ Other:
	☐ Kick-Out to Level 2 Inspection: Inlets are blocked to the extent that most of the water does not seem to be entering the swale.
 ☐ Some or all of the inlets are eroding so that rills, gullies, and other erosion are present, or there is bare dirt that is washing into the swale.	☐ For small areas of erosion, smooth out the eroded part and apply rock or stone (e.g., river cobble) to prevent further erosion. Usually, filter fabric is placed under the rock or stone. ☐ In some cases, reseeding and applying an erosion control matting can be used to prevent further erosion. Some of these materials may be available at a garden center, but it may be best to consult a landscape contractor. ☐ Other:
	☐ Level 2 Inspection: Erosion is occurring at most of the inlets or along much of the swale edge. The inlet design may have to be modified.

SW Surface Area

Examine the entire swale surface and side slopes.

Problem (Check if Present)	Follow-Up Actions
☐ Minor areas of sediment, grit, trash, or other debris are accumulating in the swale.	☐ Use a shovel to scoop out minor areas of sediment or grit, especially in the spring after winter sanding materials may wash in and accumulate. Dispose of the material where it cannot re-enter the swale. ☐ If removing the material creates a hole or low area, fill with good topsoil and add seed and straw to re-vegetate. ☐ Remove trash, vegetative debris, and other undesirable materials. ☐ If the swale is densely vegetated, it may be difficult to do the maintenance; check for excessive ponding or other issues described in this section to see if the accumulated material is causing a problem. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Sediment has accumulated more than 3 inches deep and covers 25% or more of the swale surface. ☐ The source of sediment is unknown or cannot be controlled with simple measures.
 ☐ There is erosion in the bottom or on the side slopes. Water seems to be carving out rills as it flows through the swale or on the slopes.	☐ Try filling the eroded areas with clean topsoil, and then seed and mulch to establish vegetation. ☐ If the problem recurs, you may have to use some type of matting, stone (e.g., river cobble), or other material to fill in eroded areas. ☐ If the erosion is on a side slope, fill with soil and cover with erosion-control matting or at least straw mulch after re-seeding. ☐ Kick-Out to Level 2 Inspection: The problem persists or the erosion is more than 3 inches deep and seems to be an issue with how water enters and moves through the swale. ☐ Kick-Out to Level 2 Inspection: The problem does not seem to be caused by flowing water, but a collapse or sinking of the surface (e.g., “sinkhole”) due to some underground problem.
☐ Water does not flow evenly down the length of the swale, but ponds in certain areas for long periods of time (e.g., 72 hours after a storm). The swale does not seem to have “positive drainage.” Check during or immediately after a rain storm.	☐ If the problem is minor (just small, isolated areas), try using a metal rake or other tools to create a more even flow path; remove excessive vegetative growth, sediment, or other debris that may be blocking the flow. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Water ponds in more than 25% of the swale for three days or more after a storm. The issue may be with the underlying soil or the grade of the swale. ☐ Water ponds behind check dams for three days or more after a storm. Check dams may be clogged or not functioning properly.

SW Surface Area

Examine the entire swale surface and side slopes.

Problem (Check if Present)	Follow-Up Actions
 ☐ Check dams (if present): water is flowing around the edges of check dams, creating erosion or sinkholes on the uphill or downhill side, or the check dams are breaking apart or breaching .	☐ If the problem is isolated to just a few check dams, try simple repairs. ☐ It is very important for the center of each check dam (where most of the water flows) to be lower (by at least several inches) than the edges of the check dams where they meet the side slopes. Also, the check dams should be keyed into side slopes so water does not flow between the check dam and side slope. ☐ Use a level to check the right check-dam configuration, as noted above. Repair by moving around stone, filling and compacting soil, or adding new material so that water will be directed to the center of the check dam instead of the edges. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Many check dams are impacted and/or the problem seems to be a design issue with height, spacing, shape, or materials used to construct them.

SW Vegetation

Assess the swale vegetation.

Problem (Check if Present)	Follow-Up Actions
 ☐ Vegetation is too overgrown to access swale for maintenance activities	☐ Mow or bush-hog the path. ☐ Other:

SW Vegetation

Assess the swale vegetation.

Problem (Check if Present)	Follow-Up Actions
 ☐ Vegetation requires regular maintenance: pulling weeds, removing dead and diseased plants, adding plants to fill in areas that are not well vegetated, etc.	☐ If you can identify which plants are weeds or not intended to be part of the planting plan, eliminate these, preferably by hand pulling. ☐ If weeds are widespread, check with the local stormwater authority and/or Extension Office about proper use of herbicides for areas connected with the flow of water. ☐ Even vegetation that is intended to be present can become large, overgrown, block flow, and/or crowd out surrounding plants. Prune and thin accordingly. ☐ If weeds or invasive plants have overtaken the whole swale, bush-hog the entire area before seed heads form in the spring. It will be necessary to remove the root mat manually or with appropriate herbicides, as noted above. ☐ Replant with species that are aesthetically pleasing and seem to be doing well in the swale. ☐ Other: ☐ Kick-Out to Level 2 Inspection: You are unsure of the original planting design or the vegetation maintenance task is beyond your capabilities of time, expertise, or resources. If you are unsure of the health of the vegetation (e.g. salt damage, invasives, which plants are undesirable) or the appropriate season to conduct vegetation management, consult a landscape professional before undertaking any cutting, pruning, mowing, or brush hogging.
☐ Vegetation is too thin, is not healthy, and there are many spots that are not well vegetated.	☐ The original plants are likely not suited for the actual conditions within the swale. If you are knowledgeable about plants, select and plant more appropriate vegetation (preferably native plants) so that almost the entire surface area will be covered by the end of the second growing season. ☐ Other: ☐ Kick-Out to Level 2 Inspection: For all but small practices (e.g., in residential yards), this task will likely require a landscape design professional or horticulturalist.

SW Outlets

Examine outlets that release water out of the swale.

Problem (Check if Present)	Follow-Up Actions
☐ Outlet is obstructed with mulch, sediment, debris, trash, etc.	☐ Remove the debris and dispose of it where it cannot re-enter the swale. ☐ Other: ☐ Kick-Out to Level 2 Inspection: Outlet is completely clogged or obstructed; there is too much material to remove by hand or with simple hand tools.

Additional Notes:

Inspector:_____ Date: _____

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Inspector/Operator: _____ Date: _____

Swale Stormwater Management Practices
Level 2 Inspection Checklist

SMP ID #		**SMP Owner**		☐ Private ☐ Public
SMP Location (Address; Latitude & Longitude)				
	Latitude		**Longitude**	

Party Responsible for Maintenance	**System Type**		**Type of Site**
☐ Same as SMP Owner ☐ Other _____	☐ Seasonal ☐ Continuous Use ☐ Other	☐ Above Ground ☐ Below Ground	☐ Commercial ☐ Industrial ☐ Residential ☐ State

Inspection Date		**Inspection Time**	
Inspector			
Date of Last Inspection			

Level 2 Inspection: SWALE	
Recommended Repairs	**Triggers for Level 3 Inspection**
Observed Condition: Water Stands on Surface for More than 72 Hours after Storm	
☐ Condition 1: Small pockets of standing water Use a soil probe or auger to examine the soil profile. If isolated areas have accumulated grit, fines, or vegetative debris or have compacted soil, try scraping off top 3 to 6 inches of soil and replacing with clean material. Also check to see that surface is level and water is not ponding selectively in certain areas. ☐ Condition 2: Standing water is widespread or covers entire surface Requires diagnosis and resolution of problem: • Bad or compacted soil • Filter fabric on the swale bottom • Too much sediment/grit washing in from drainage area? • Too much ponding depth? • Longitudinal slope is too flat?	• Soil is overly compacted or clogged and problem is not evident from Level 2 inspection. • Level 2 inspection identifies problem, but it cannot be resolved easily or is associated with the original design of the practice (e.g., not enough slope down through the swale). ☐ Level 3 inspection necessary
Observed Condition: Vegetation is predominantly weeds and invasive species	
For a small area, weed and dig up invasive plants. Replant with natives or plants from original planting plan. If longer than 100 feet, develop a new planting plan and have it professionally reviewed.	• Vegetation deviates significantly from original planting plan; swale has been neglected and suffered from deferred maintenance. • Owner/responsible party does not know how to maintain the practice. • For large area, hire a professional to develop a grading plan and develop a planting plan. ☐ Level 3 inspection necessary

Notes:

Inspector:_____ Date: _____

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Inspector/Operator: _____ Date: _____

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Tree Planting Stormwater Management Practices Level 1 Inspection Checklist

SMP ID #		**SMP Owner**		☐ Private ☐ Public
SMP Location (Address; Latitude & Longitude)				
	Latitude		**Longitude**	

Party Responsible for Maintenance	**System Type**		**Type of Site**
☐ Same as SMP Owner ☐ Other _____	☐ Seasonal ☐ Continuous Use ☐ Other	☐ Above Ground ☐ Below Ground	☐ Commercial ☐ Industrial ☐ Residential ☐ State

Inspection Date		**Inspection Time**	
Inspector			
Date of Last Inspection			

TP Watering

Inspect the trees to determine whether they need watering.

Problem (Check if Present)	**Follow-Up Actions**
☐ Soil is not moist to the touch and/or it has not rained in a week, and leaves/needles are starting to appear wilted/dry.	☐ Water trees deeply and slowly near the base. Soaker hoses and drip irrigation work best for deep watering of trees and shrubs. ☐ Other:

TP Mulch

Mulch should be applied in the late spring and during leaf fall. Check the depth of mulch regularly. Rake the old mulch to break up any matted layers and to refresh the appearance.

Problem (Check if Present)	Follow-Up Actions
☐ Mulch is too thin or thick (should be approximately 3" deep) or does not extend to tree canopy (or 5' radius if tree has a larger than 10' canopy reach).	☐ Add or remove mulch around tree canopy to maximum 5' radius but not within 3" of the bark. ☐ If mulch is against the stems or tree trunks, pull it back several inches to expose the base of the trunk and root crown. ☐ Other:

TP Pruning

Examine the branches and tree shape.

Problem (Check if Present)	Follow-Up Actions
☐ Presence of suckers, dead or diseased branches, branches that interfere with pedestrian traffic	☐ Selective cutting ☐ Prune to make the tree more aesthetically pleasing and remove disease. ☐ Other:
	☐ Kick-Out to Level 2 Inspection: Use an arborist or landscaper for more extensive pruning jobs.

Additional Notes:

Inspector:_____ Date: _____

Complete the following if follow-up/corrective actions were identified during this inspection:

Certified Completion of Follow-Up Actions:

> "I hereby certify that the follow-up/corrective actions identified in the inspection performed on _____ (DATE) have been completed and any required maintenance deficiencies have been adequately corrected."

Inspector/Operator: _____ Date: _____

Tree Planting Stormwater Management Practices
Level 2 Inspection Checklist

SMP ID #		**SMP Owner**		☐ Private ☐ Public
SMP Location (Address; Latitude & Longitude)				
	Latitude		**Longitude**	

Party Responsible for Maintenance	**System Type**		**Type of Site**
☐ Same as SMP Owner ☐ Other _____	☐ Seasonal ☐ Continuous Use ☐ Other	☐ Above Ground ☐ Below Ground	☐ Commercial ☐ Industrial ☐ Residential ☐ State

Inspection Date		**Inspection Time**	
Inspector			
Date of Last Inspection			

Level 2 Inspection: TREE PLANTING	
Recommended Repairs	**Triggers for Level 3 Inspection**
Observed Condition: Appearance of fungus or pest damage	
☐ Condition 1: Fungus, discoloration, browning leaves or holes in leaves Check with arborist or other tree professional about the best way to proceed. This requires a Level 3 inspection. ☐ Condition 2: Burrowing insects, holes Check with arborist or other tree professional about the best way to proceed. This requires a Level 3 inspection.	• Any concerns about how to address infestation or disease ☐ Level 3 inspection necessary

Notes:

Inspector:_____ Date: _____

Complete the following if follow-up/corrective actions were identified during this inspection:

Certified Completion of Follow-Up Actions:

"I hereby certify that the follow-up/corrective actions identified in the inspection performed on _____ (DATE) have been completed and any required maintenance deficiencies have been adequately corrected."

Inspector/Operator: _____ Date: _____

USGS
science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

TRIBES HILL QUADRANGLE
NEW YORK
7.5-MINUTE SERIES

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 18T

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, September 2017 - December 2017
Roads.....U.S. Census Bureau, 2016
Names.....GNIS, 1980 - 2019
Hydrography.....National Hydrography Dataset, 1899 - 2015
Contours.....National Elevation Dataset, 1998 - 2019
Boundaries.....Multiple sources; see metadata file 2017 - 2018

Wetlands.....FWS National Wetlands Inventory Not Available

13°14´ 235 MILS
0°28´ 8 MILS
UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
WN
Grid Zone Designation 18T

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

QUADRANGLE LOCATION

ADJOINING QUADRANGLES
1 Peck Lake
2 Gloversville
3 Broadalbin
4 Randall
5 Amsterdam
6 Carlisle
7 Esperance
8 Duanesburg

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

TRIBES HILL, NY
2019

7643016387255
NSN. 7643016387255
NGA REF NO. USGSX24K45659

DANIEL G. LOUCKS, P.E.

GEOTECHNICAL ENGINEERING

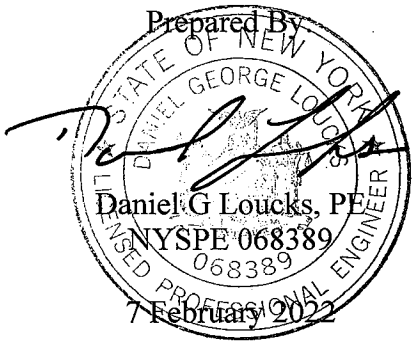
Geotechnical Report
For
MCIDA Warehouse Site
Rt 5S, Town of Florida, New York

File No. 3960

Prepared For:

Prime AE Group of NY

Prepared By:



Daniel G Loucks, PE
NYSPE 068389
7 February 2022

14 AMBER WAY, BALLSTON SPA, NY 12020 ■ 518-369-9453 ■ E-MAIL: DGLGEOENG@GMAIL.COM

INTRODUCTION:

The subsurface investigation for the proposed MCIDA Warehouse Facility, Town of Florida, New York has been completed. Aztech Environmental Technologies Inc. of Ballston Spa, New York has completed ten (10) soil borings at the site. Soil boring B-1 was not performed. The logs of these borings, along with a location diagram, have been included in the appendix of this report.

It is my understanding that the final design for the site hasn't been completed, but the estimated construction may include one to two single-story warehouse building(s) located approximately as indicated on the boring location diagram. The building(s) will have a steel frame design.

The maximum column loadings could range from 150 to 200 kips. The settlement tolerances are normal. Settlement tolerances are considered to include up to 1 inch of total settlement and 3/4 inch of differential settlement between column locations.

The current preliminary plan has an estimated first floor slab will be established at between elevations 490 and 495. This would require up to approximately 25 feet of cut and fill over the site.

The purpose of this report is to describe the investigation conducted and the results obtained; to analyze and interpret the data obtained; and to make preliminary recommendations for the design and construction of the feasible foundation types and earthworks for the project. The preliminary recommendations contained in this report are based on the information that was provided up to the date the report was completed. Any changes in the design of the project or changes to the recommendations provided in this report should be brought to my attention to determine if there needs to be any revision of the geotechnical recommendations. I am not responsible for any changes made to the recommendations provided in this report unless I have provided written approval of the changes.

The scope of my services has been limited to coordinating the boring and laboratory investigation, analyzing the soils information, and providing a geotechnical report with preliminary foundation recommendations and seismic site classifications as per NYS Building Code. Environmental aspects of the project as well as grading and site design should be performed by qualified others. Additional soil borings may be required depending on the final building placement and grading.

FIELD INVESTIGATION PROCEDURES:

The borings were extended by means of 3.75 inch ID, hollow-stem augers, by using various cutting bits using circulating drilling fluid to remove the cuttings from the casing and by continuous sampling with a split-spoon sampler.

Representative samples were obtained from the boring holes by means of the split-spoon sampling procedure performed in accordance with ASTM D 1586. The standard penetration values obtained from this procedure have been indicated on the soil boring logs.

Soil samples obtained from these procedures were examined in the field, sealed in containers, and shipped to the laboratory for further examination, classification, and testing, as applicable.

During the investigation, water level readings were obtained at various times where water accumulated in the boring hole. The water level readings, along with an indication of the time of the reading relative to the boring procedure, have been indicated on the soil boring logs.

LABORATORY INVESTIGATION:

All samples were examined in the laboratory by the soil engineer and classified according to the Unified Soil Classification System. In this system, the soils are visually classified according to texture and plasticity. The appropriate group symbol is indicated on the soil boring logs.

Atterberg limit tests were performed on representative samples in accordance with ASTM D 4318. The results of these tests are included in the appendix of this report.

Sieve Analyses were performed on representative samples in accordance with ASTM Specification D 422. These tests were performed to verify the visual soil classifications. Results of the tests can be found in the appendix of the report.

SITE CONDITIONS:

The site is currently a farm field. The ground surface at the site slopes down from approximately elevation 520 down to 470.

Geologic mapping of the area indicates upper silt/clay soils with bedrock consisting of sales and some siltstone.

SUBSURFACE CONDITIONS:

The specific subsurface conditions encountered at each boring location are indicated on the individual soil boring logs. However, to aid in the evaluation of this data, I have prepared a generalized description of the soil conditions based on the boring data. Ground surface elevations as shown on the boring logs, when available, have be estimated from the existing topographic mapping as shown on the site plan provided to this office.

The borings generally encountered an upper layer of clayey silt topsoil that extends to between approximately 1 and 2 feet below the existing ground surface.

Beneath the topsoil is clayey silt soils with varying amounts of sand and gravel. These soils extended to the bottom of the borings at between 10 and 42 feet below the existing ground surface and they are loose to very dense. Borings B-10 and B-11 encountered split spoon/auger refusal at 20.2 and 12.6 feet below the existing ground surface respectively. No rock core was able to be taken due to site limitations. I recommend that when available, the borings be extended and rock core be taken at these locations to determine if refusal was on bedrock of very dense glacial till soils with possible cobbles/boulders.

GROUNDWATER CONDITIONS:

Accurate groundwater levels are difficult to determine in clayey silt soils with only short term readings or observations. Clayey silt soils typically do not allow an adequate amount of water to flow through the soil to produce a water level reading during the drilling operation. I have indicated where water was observed on the boring logs.

Based on the groundwater levels observed during the boring investigation, the moisture condition of the samples recovered from the boring holes and coloration of the soil samples, I judge that the groundwater level was located below depth of 6 feet.

Perched groundwater tables may occur at higher elevations in the soil profile due to groundwater being retained by layers or lenses of silt or clay soils.

Some fluctuation in hydrostatic groundwater levels and perched water conditions should be anticipated with variations in the seasonal rainfall and surface runoff.

It should be noted that the groundwater levels were obtained during the drilling procedure. Actual water levels may vary at the time of construction. Some groundwater could be encountered in soil layers labeled moist to wet on the boring logs.

ANALYSIS AND RECOMMENDATIONS:

The purpose of this investigation and report was to perform soil borings spaced across the potential building areas at the site to provide a better understanding of the subsurface conditions and look at possible foundation types for proposed building(s). It also was performed to identify possible geotechnical issues that may occur at the site.

I understand that the current preliminary plan includes on long warehouse building with a possible finished floor elevation of between 490 and 495. Depending on the size of the building this could require up to approximately 25 feet of cut and fill at the site. Borings B-8, B-9, B-10 and B-11 were all performed where the ground surface is currently higher than elevation 500. The other borings were performed at elevations of 489 or lower. Boring B-8 extended to approximately elevation 483, boring B-9 extended to approximately elevation 465, boring B-10 extended to approximately elevation 487 all of which are below the estimated proposed finished floor elevation of 490. Boring B-11 extended to approximately elevation 502 where power auger refusal was encountered. Depending on the final grading plan, I recommend at this boring be extended and possibly additional borings performed to more accurately determine the subsurface conditions in this area and if bedrock may be encountered.

Depending on the proposed grading, the lower portion of the site may require up to 25 feet of fill. The borings in this area indicate the soils are loose to dense clayey silt soils with varying amounts of sand and gravel. In my experience these soils

generally consolidate fairly quickly (within 30 to 45 days of loading). I would recommend monitoring this area with settlement plates during the placement of the fill to determine the rate of consolidation of the virgin soils. This will help determine when the rate has slowed to within allowable tolerances to allow the construction of the proposed building.

The other potential issue would be using on site soils as controlled fill in the proposed fill locations. These soils are predominantly clayey silt soils and will therefore be very sensitive to moisture content when placing them. If these soils become wet, they can be very difficult to place and achieve proper compaction. They also can become easily disturbed by construction traffic. Proper placement of these soils as controlled fill in the fall, winter and spring will be difficult. A summer placement of these soils as controlled fill would offer the best opportunity for success.

Site Work:

The proposed construction areas should be cleared and grubbed and all organic topsoil and vegetation along with any uncontrolled fill and debris. The subgrade should be proof-rolled with a 10-ton roller and the proof rolling should be observed by the soil engineer. This proof rolling will compact the subgrade and reveal the presence of soft spots. If saturated subgrade conditions exist, I recommend that the subgrade be observed and probed by the soil engineer in place of proof rolling. Any soft spots should be excavated and backfilled with controlled fill material.

A way to stabilize a spongy, but suitable, footing subgrade would be to spread a reinforcement or separation type of geotextile (Mirafi 600X or approved equal) on the subgrade and follow with a lift of clean, granular fill or uniform crushed stone. The thickness of the controlled fill can range from 0.5 to 1.5 feet, as necessary, to achieve a working mat upon which to place footings. If uniform crushed stone is used as controlled fill a layer of geotextile should be placed between the crushed stone and any sand/gravel controlled fill or virgin soil.

Building Foundations:

Based on the estimated loading, it is my preliminary opinion that the proposed structure(s) may be supported by spread footing foundations resting on firm virgin, inorganic, soils or on controlled fill which, in turn, rests on these virgin materials. Footings can be preliminarily designed for a maximum, net, allowable soil bearing pressure of 2000 psf. When a final plan has been developed and additional soil borings performed, a final recommendation can be provided.

A minimum footing width of 2.0 feet is recommended for load bearing strip footings. Isolated footings should be at least 3.0 feet wide.

Exterior footings or footings in unheated areas should have a minimum of 4.0 feet of embedment for protection from frost action. Interior footings should have a minimum embedment of 2.0 feet below finished grade to develop the bearing value of the soils.

All walls that retain soil on only one side should have a drain tile placed along the base of the wall. The drain tile should be a minimum of 4 inches in diameter, surrounded by a minimum of 6 inches of properly graded washed sand or crushed stone wrapped with a non-woven filter fabric with a maximum apparent opening size of 70 and a minimum trapezoid tearing strength of 100 lbs. The drain tile should drain to a stormwater sewer, daylight, or a sump equipped with a pump.

The wall should then be backfilled with a controlled, well graded, free-draining granular material. The material should extend away from the wall a horizontal distance of two-thirds the height of the fill being placed. The upper 1 foot of material should be a fairly impermeable material to shed surface water and should be pitched away from the building to provide proper drainage.

If these procedures are used, a static lateral soil pressure of 40 psf per foot of retained soil can be used for preliminary design of the wall. This static, active lateral soil pressure is based on a moist unit weight of 125 pcf and an angle of internal friction of 32 degrees. A wall soil friction angle of 18 degrees and a coefficient of base sliding of 0.35 can also be used for preliminary design.

If the retaining wall is braced or if the deflection is limited prior to backfilling so the active soil pressure is not achieved, a static, at-rest lateral soil pressure of 63 psf per foot of retained soil can be used for preliminary design.

To resist overturning and sliding a static lateral passive pressure of 250 psf per foot of embedment can be used for preliminary design, provided foundations are backfilled with controlled fill. This static, passive pressure resistance value has been reduced from the calculated full passive pressure because of stress/strain characteristics of the soil. To develop the full, calculated resistance a certain amount of movement or deflection in the structure is required. The amount of movement required to generate this resistance generally greater than is acceptable for structures. I therefore recommend that the full passive pressure not be used.

The passive resistance of the upper two feet of soil, not in floor slab areas, should be ignored due to surface effects of frost and moisture.

Any surcharge loading of existing adjacent building foundations or other adjacent structures/utilities should be addressed by the structural engineer using Boussinesq charts.

Floor Slabs:

Concrete floor slabs can be preliminarily designed to rest on controlled fills resting on virgin materials. A layer of well-graded, free-draining, granular material should be placed beneath the floor slab to provide drainage, act as a capillary break, and to provide better and more uniform support. The thickness of this layer will depend on the loading and differential settlement tolerances. I would preliminarily estimate that a minimum of 6 inches would be required in office floor areas and up to 18 inches in warehouse slab locations.

Seismic Conditions:

The potential seismic conditions at the proposed site have been investigated using the information provided in the NYS Building Code, ASCE-7 and the boring information obtained during my investigation and past experience with soils in the area.

Based on the soil boring information, estimated proposed finished floor elevations and my experience it is my opinion that the Site Soil Classification (ASCE-7 Table 20.3-1) could be assumed to be D. Using data from Reference Document ASCE7-16, Risk Category I, I estimate that the MCE spectral acceleration (S_{MS}) at short periods is 34.7 and the MCE spectral acceleration (S_{M1}) at 1 s period is 15.0. I have included a copy of the spectral accelerations for other Hazard Levels in the appendix of this report.

The probabilistic ground motion values are expressed in %g for rock site class B. Peak ground accelerations in the upper soil profile may vary. If specific peak ground accelerations or shear wave velocities are required for the upper soil profile additional testing would be required. If it is determined by the structural engineer that the Seismic Design Category is D, E or F additional geotechnical recommendations can be provided.

The soil borings and my analysis do not indicate any significant potential seismic hazards such as liquefaction, sensitive clays, weakly cemented soil, or surface rupture.

CONSTRUCTION PROCEDURES AND PROBLEMS:

The NYS Building Code Section 17 requires special inspections and follow up reports. These inspections should be performed to verify compliance with the recommendations contained in this report.

All excavations of more than a few feet should be sheeted and braced or laid back to prevent sloughing in of the sides.

Excavations should not extend below adjacent footings or structures unless properly designed sheeting and bracing or underpinning is installed.

Sump-pit and sump-pump-type dewatering may be required in excavations or low areas during wet weather or if groundwater is encountered. If large quantities of groundwater are encountered vacuum wells maybe required to stabilize the subgrade soils. All excavations should be dewatered to a minimum of 1 foot below the bottom of the excavation. All dewatering programs should be designed to prevent bottom heave. Any dewatering program should

be performed with properly designed filtration protection on all pumps to prevent loss of ground.

As previously noted, the on-site soils contain clayey silt which will make the soils sensitive to moisture content. If the material becomes wet or saturated, it will become spongy and easily disturbed. It will also be difficult to place as controlled fill if it becomes too wet. Imported well draining sand and gravel or possibly crushed stone may be required to prevent disturbance of the subgrade soils during construction and in roadway areas. Additional subbase, up to 24 inches of total thickness, may be required to support traffic loadings. Any areas of the pavement subgrades that become disturbed during construction should be removed and replaced with subbase materials.

Temporary paving using coarse fill material or separation/ reinforcement geotextile and coarse fill material will be required for moving about the site during wet or thaw weather.

MCIDA Warehouse Site
Rt 5S, Town of Florida, New York
File No. 3960

CONTENTS OF APPENDIX:

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS

SS : Split-Spoon — 1¾ " I.D., 2" O.D., except where noted
S : Shelby Tube — 2" O.D., except where noted
PA : Power Auger Sample
DB : Diamond Bit — NX: BX: AX:
CB : Carboloy Bit — NX: BX: AX:
OS : Osterberg Sampler — 3" Shelby Tube
HS : Housel Sampler
WS : Wash Sample
FT : Fish Tail
RB : Rock Bit
WO : Wash Out

Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch OD split spoon, except where noted

WATER LEVEL MEASUREMENT SYMBOLS

WL : Water Level
WCI : Wet Cave In
DCI : Dry Cave In
WS : While Sampling
WD : While Drilling
BCR : Before Casing Removal
ACR : After Casing Removal
AB : After Boring

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable ground water levels. In impervious soils the accurate determination of ground water elevations is not possible in even several day's observation, and additional evidence on ground water elevations must be sought.

CLASSIFICATION

COHESIONLESS SOILS

"Trace"	:	1% to 10%
"Trace to some"	:	10% to 20%
"Some"	:	20% to 35%
"And"	:	35% to 50%
Loose	:	0 to 9 Blows
Medium Dense	:	10 to 29 Blows
Dense	:	30 to 59 Blows
Very Dense	:	≥60 Blows

} or equivalent

COHESIVE SOILS

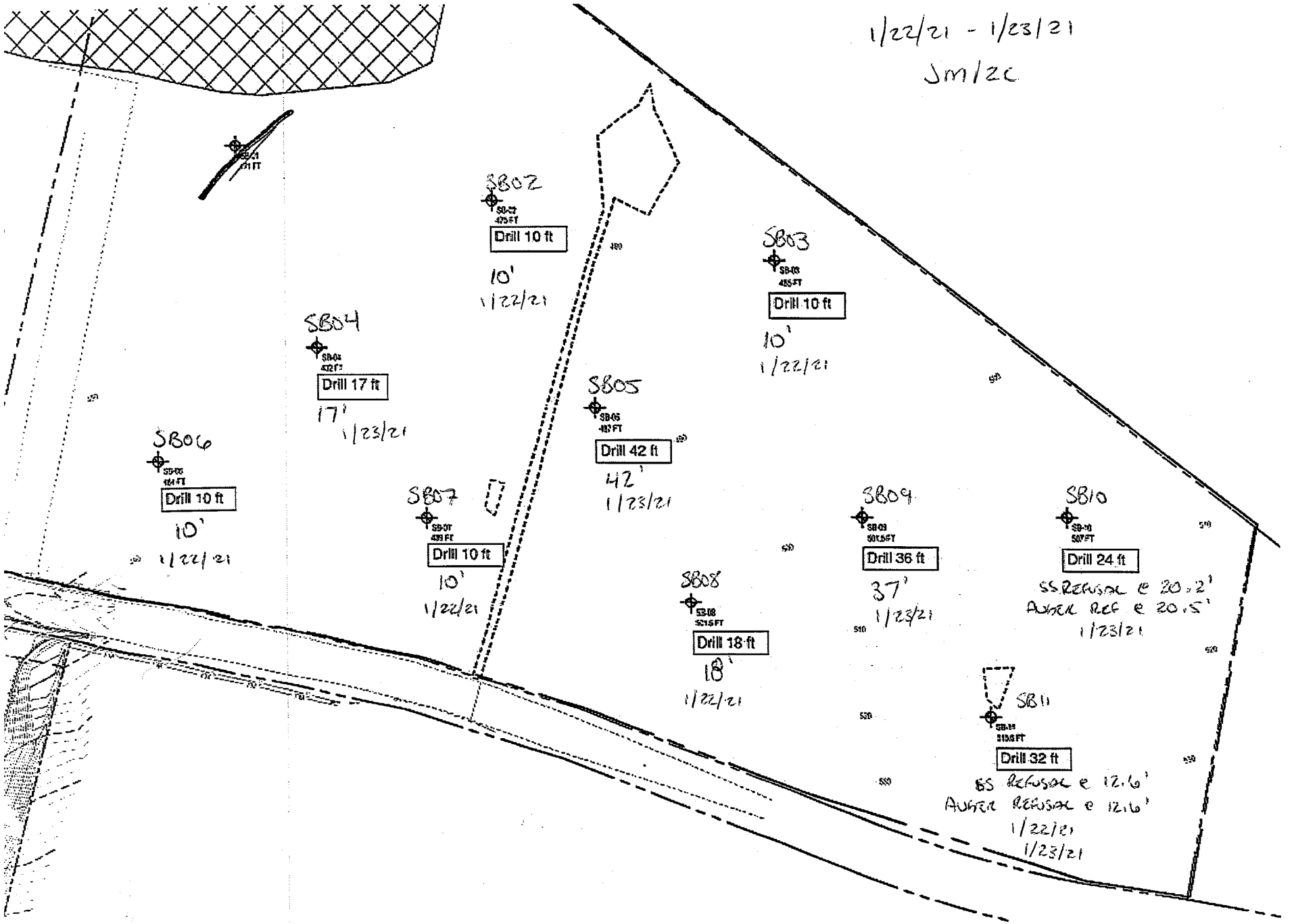
If clay content is sufficient so that clay dominates soil properties, then clay becomes the principle noun with the other major soil constituent as modifiers: i.e., silty clay. Other minor soil constituents may be added according to classification breakdown for cohesionless soils; i.e., silty clay, trace to some sand, trace gravel.

Soft	:	0.00 — 0.59 tons/ft²
Medium	:	0.60 — 0.99 tons/ft²
Stiff	:	1.00 — 1.99 tons/ft²
Very Stiff	:	2.00 — 3.99 tons/ft²
Hard	:	≥ 4.00 tons/ft²

2018 RT 5S AMSTERDAM NY

1/22/21 - 1/23/21

JM/ZC



BORING LOG

BORING NO: 2

SHEET 1 of 1

PROJECT NAME: MCIDA Project

FILE NUMBER: 3960

LOCATION: Town of Florida, New York

OFFSET: None

DATE STARTED/COMPLETED: January 2022

SURFACE ELEV.: 475 +/- ft

ENGINEER/ARCHITECT:

DRILL CONTRACTOR: Aztech Environmental Technology

DRILLING METHOD: Hollow Stem Auger

DRILL RIG TYPE: ATV

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.75 inch ID

WATER LEVEL DEPTH: None Observed **TIME:** WS

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
1	1	SS	8-12-10-11	22		Topsoil
2						Clayey Silt, trace Sand, Brown, Moist, Medium Dense (ML)
3	2	SS	7-5-7-6	12		Clayey Silt, some Sand, trace Gravel, Brown, Moist, Medium Dense to Dense (ML)
4						
5	3	SS	11-16-14-19	30		
6						
7	4	SS	16-22-26-18	48		
8						
9	5	SS	16-16-20-27	36		Clayey Silt, some Sand, trace to some Gravel, Dark Brown, Moist, Dense (ML)
10						End of Boring at 10.0 Feet
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						

BORING LOG

BORING NO: 3

SHEET 1 of 1

PROJECT NAME: MCIDA Project

FILE NUMBER: 3960

LOCATION: Town of Florida, New York

OFFSET: None

DATE STARTED/COMPLETED: January 2022

SURFACE ELEV.: 485 +/- ft

ENGINEER/ARCHITECT:

DRILL CONTRACTOR: Aztech Environmental Technology

DRILLING METHOD: Hollow Stem Auger

DRILL RIG TYPE: ATV

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.75 inch ID

WATER LEVEL DEPTH: None Observed **TIME:** WS

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
1						Topsoil
1	1	SS	4-7-6-12	13		Clayey Silt, trace to some Sand, trace Gravel, Brown, Moist, Medium Dense (ML)
2						
3	2	SS	7-7-7-7	14		
4						
5	3	SS	10-12-17-19	29		
6						
7	4	SS	6-8-19-15	27		
8						
9	5	SS	18-18-21-20	39		Clayey Silt, some Sand, trace to some Gravel, Dark Brown, Moist, Dense (ML)
10						End of Boring at 10.0 Feet
11						
12						
13						
14						
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23						
24						
25						
26						
27						

BORING LOG

BORING NO: 4

SHEET 1 of 1

PROJECT NAME: MCIDA Project

FILE NUMBER: 3960

LOCATION: Town of Florida, New York

OFFSET: None

DATE STARTED/COMPLETED: January 2022

SURFACE ELEV.: 482 +/- ft

ENGINEER/ARCHITECT:

DRILL CONTRACTOR: Aztech Environmental Technology

DRILLING METHOD: Hollow Stem Auger

DRILL RIG TYPE: ATV

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.75 inch ID

WATER LEVEL DEPTH: None Observed **TIME:** WS

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
1	1	SS	14-14-8-2	22		Clayey Silt, trace to some Sand, trace Gravel, Dark Brown, Moist, Medium Dense (ML) Topsoil
3	2	SS	4-4-4-4	8		Clayey Silt, trace to some Sand, trace Gravel, Brown, Moist, Loose to Medium Dense (ML)
5	3	SS	7-7-12-13	19		
7	4	SS	11-11-11-13	22		Clayey Silt, some Sand, trace Gravel, Brown, Moist, Medium Dense to Dense (ML)
9	5	SS	12-12-21-16	33		
11	6	SS	8-11-7-14	18		Clayey Silt, some Sand, trace to some Gravel, Dark Gray, Moist, Medium Dense (ML)
13		PA				Clayey Silt, some Gravel, trace to some Sand, Dark Gray, Moist, Medium Dense (ML)
16	7	SS	12-12-13-12	25		
17						End of Boring at 17.0 Feet

BORING LOG

BORING NO: 5

SHEET 1 of 2

PROJECT NAME: MCIDA Project

FILE NUMBER: 3960

LOCATION: Town of Florida, New York

OFFSET: None

DATE STARTED/COMPLETED: January 2022

SURFACE ELEV.: 487 +/- ft

ENGINEER/ARCHITECT:

DRILL CONTRACTOR: Aztech Environmental Technology

DRILLING METHOD: Hollow Stem Auger

DRILL RIG TYPE: ATV

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.75 inch ID

WATER LEVEL DEPTH: None Observed **TIME:** WS

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
1	1	SS	16-13-4-4	17		Clayey Silt, trace Sand, Dark Brown, Moist to Wet, Medium Dense (ML) Topsoil
3	2	SS	3-3-2-6	5		Clayey Silt, trace Sand, Brown, Moist to Wet, Loose (ML)
5	3	SS	8-3-3-5	6		Clayey Silt, trace to some Sand, Gravel, Brown, Moist, Loose (ML)
7	4	SS	8-16-10-10	26		Clayey Silt, some Sand, trace Gravel, Brown, Moist, Medium Dense to Dense (ML)
9	5	SS	10-10-20-31	30		
11	6	SS	6-6-11-9	17		Clayey Silt, trace to some Sand, trace Gravel, Brown, Moist, Medium Dense (ML)
13		PA				Clayey Silt, some Sand, trace to some Gravel, Dark Brown, Moist, Dense (ML)
16	7	SS	14-26-27-20	53		
18		PA				
21	8	SS	11-5-7-8	12		
23		PA				Clayey Silt, trace to some Sand, trace Gravel, Dark Gray, Moist to Wet, Medium Dense (ML)
26	9	SS	5-8-7-9	15		

BORING LOG

BORING NO: 5

SHEET 2 of 2

PROJECT NAME: MCIDA Project

LOCATION: Town of Florida, New York

DATE STARTED/COMPLETED: January 2022

ENGINEER/ARCHITECT:

DRILLING METHOD: Hollow Stem Auger

DRILL RIG TYPE: ATV

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.75 inch ID

WATER LEVEL DEPTH: None Observed **TIME:** WS

FILE NUMBER: 3960

OFFSET: None

SURFACE ELEV.: 487 +/- ft

DRILL CONTRACTOR: Aztech Environmental Technology

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Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
28		PA				Clayey Silt, trace to some Sand, trace Gravel, Dark Gray, Moist to Wet, Medium Dense (ML)
29						
30						
31	10	SS	5-5-8-9	13		
32						
33		PA				
34						
35						
36	11	SS	5-7-8-8	15		
37						
38		PA				Clayey Silt, some Sand, trace Gravel, Dark Gray, Moist to Wet, Medium Dense (ML)
39						
40						
41	12	SS	5-8-8-11	16		
42						Clayey Silt, trace to some Sand, trace Gravel, Dark Gray, Moist to Wet, Medium Dense (ML)
43						
44						
45						
46						
47						
48						
49						
50						
51						
52						
53						
54						

BORING LOG

BORING NO: 6

SHEET 1 of 1

PROJECT NAME: MCIDA Project

FILE NUMBER: 3960

LOCATION: Town of Florida, New York

OFFSET: None

DATE STARTED/COMPLETED: January 2022

SURFACE ELEV.: 484 +/- ft

ENGINEER/ARCHITECT:

DRILL CONTRACTOR: Aztech Environmental Technology

DRILLING METHOD: Hollow Stem Auger

DRILL RIG TYPE: ATV

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.75 inch ID

WATER LEVEL DEPTH: None Observed **TIME:** WS

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
1	1	SS	6-6-13-17	19		Topsoil
2						Clayey Silt and Sand, trace to some Gravel, Brown, Moist to Wet, Loose to Medium Dense (ML-SM)
3	2	SS	3-2-2-2	4		
4						
5	3	SS	2-2-5-4	7		Clayey Silt, some Sand, trace Gravel, Brown, Moist, Loose (ML)
6						
7	4	SS	6-5-5-5	10		
8						
9	5	SS	7-11-13-15	24		Clayey Silt, trace to some Sand, trace Gravel, Brown, Moist, Medium Dense (ML)
10						
11						End of Boring at 10.0 Feet
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						

BORING LOG

BORING NO: 7

SHEET 1 of 1

PROJECT NAME: MCIDA Project

FILE NUMBER: 3960

LOCATION: Town of Florida, New York

OFFSET: None

DATE STARTED/COMPLETED: January 2022

SURFACE ELEV.: 489 +/- ft

ENGINEER/ARCHITECT:

DRILL CONTRACTOR: Aztech Environmental Technology

DRILLING METHOD: Hollow Stem Auger

DRILL RIG TYPE: ATV

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.75 inch ID

WATER LEVEL DEPTH: None Observed **TIME:** WS

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Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
1	1	SS	16-6-4-4	10		Topsoil Clayey Silt, some Sand, trace Gravel, Moist, Medium Dense (ML)
3	2	SS	4-4-4-4	8		Clayey Silt, trace to some Sand, trace Gravel, Brown, Moist, Loose (ML)
5	3	SS	12-15-17-36	32		Clayey Silt, some Sand, trace Gravel, Brown, Moist, Dense (ML)
7	4	SS	12-16-27-21	43		Clayey Silt, some Sand, trace to some Gravel, Dark Brown, Moist, Very Dense (ML)
9	5	SS	27-33-40-46	73		
10						End of Boring at 10.0 Feet

BORING LOG

BORING NO: 8

SHEET 1 of 1

PROJECT NAME: MCIDA Project

FILE NUMBER: 3960

LOCATION: Town of Florida, New York

OFFSET: None

DATE STARTED/COMPLETED: January 2022

SURFACE ELEV.: 501 +/- ft

ENGINEER/ARCHITECT:

DRILL CONTRACTOR: Aztech Environmental Technology

DRILLING METHOD: Hollow Stem Auger

DRILL RIG TYPE: ATV

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.75 inch ID

WATER LEVEL DEPTH: 5 ft **TIME:** WS

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
1	1	SS	10-4-4-4	8		Clayey Silt, trace Sand, Dark Brown, Moist to Wet, Loose (ML) Topsoil
3	2	SS	4-4-4-4	8		Clayey Silt, trace to some Sand, Brown, Moist, Loose (ML)
5	3	SS	12-16-17-17	33		Clayey Silt, trace to some Sand, Gravel, Brown, Moist, Dense (ML)
7	4	SS	17-22-21-32	43		
9	5	SS	22-22-27-43	49		Clayey Silt, some Sand, trace to some Gravel, Dark Brown, Moist, Dense (ML)
11	6	SS	29-28-23-27	51		Clayey Silt, some Sand, trace to some Gravel, Dark Gray, Moist, Dense (ML)
13		PA				
16	7	SS	19-20-19-20	39		
17						End of Boring at 17.0 Feet
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						

BORING LOG

BORING NO: 9

SHEET 1 of 2

PROJECT NAME: MCIDA Project

FILE NUMBER: 3960

LOCATION: Town of Florida, New York

OFFSET: None

DATE STARTED/COMPLETED: January 2022

SURFACE ELEV.: 502 +/- ft

ENGINEER/ARCHITECT:

DRILL CONTRACTOR: Aztech Environmental Technology

DRILLING METHOD: Hollow Stem Auger

DRILL RIG TYPE: ATV

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.75 inch ID

WATER LEVEL DEPTH: 18 ft **TIME:** WS

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
1						Topsoil
2	1	SS	14-3-4-3	7		Clayey Silt, trace to some Sand, trace Gravel, Brown, Moist, Loose to Medium Dense (ML)
3						
4	2	SS	6-4-4-3	8		
5						
6	3	SS	8-8-7-6	15		
7						Clayey Silt, some Sand, trace Gravel, Brown, Moist, Dense to Very Dense (ML)
8	4	SS	27-27-33-46	60		
9						
10	5	SS	18-21-21-27	42		
11						Clayey Silt and Sand, some Gravel, Brown, Moist, Dense (ML-SM)
12	6	SS	18-23-20-38	43		
13						
14		PA				Clayey Silt, some Sand, trace Gravel, Dark Gray, Moist, Dense (ML)
15						
16	7	SS	32-26-27-22	53		
17						
18		PA				Clayey Silt, trace to some Sand, trace Gravel, Dark Gray, Moist to Wet, Medium Dense (ML)
19						
20						
21	8	SS	5-7-8-7	15		
22						
23		PA				
24						
25						
26	9	SS	4-6-5-8	11		
27						

BORING LOG

BORING NO: 9

SHEET 2 of 2

PROJECT NAME: MCIDA Project

FILE NUMBER: 3960

LOCATION: Town of Florida, New York

OFFSET: None

DATE STARTED/COMPLETED: January 2022

SURFACE ELEV.: 502 +/- ft

ENGINEER/ARCHITECT:

DRILL CONTRACTOR: Aztech Environmental Technology

DRILLING METHOD: Hollow Stem Auger

DRILL RIG TYPE: ATV

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.75 inch ID

WATER LEVEL DEPTH: 18 ft **TIME:** WS

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
28		PA				Clayey Silt, trace to some Sand, trace Gravel, Dark Gray, Moist to Wet, Medium Dense (ML)
29						
30						
31	10	SS	6-6-11-13	17		
32						
33		PA				
34						
35						
36	11	SS	6-5-5-9	10		
37						End of Boring at 37.0 Feet
38						
39						
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53						
54						

BORING LOG

BORING NO: 11

SHEET 1 of 1

PROJECT NAME: MCIDA Project

FILE NUMBER: 3960

LOCATION: Town of Florida, New York

OFFSET: None

DATE STARTED/COMPLETED: January 2022

SURFACE ELEV.: 515 +/- ft

ENGINEER/ARCHITECT:

DRILL CONTRACTOR: Aztech Environmental Technology

DRILLING METHOD: Hollow Stem Auger

DRILL RIG TYPE: ATV

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.75 inch ID

WATER LEVEL DEPTH: 6 ft **TIME:** WS

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
1						Topsoil
2	1	SS	4-3-3-2	6		Clayey Silt, trace to some Sand, trace Gravel, Brown, Moist, Loose (ML)
3	2	SS	5-4-3-3	7		Clayey Silt and Sand, trace Gravel, Brown, Moist to Wet, Loose (ML-SM)
4						
5	3	SS	2-4-6-8	10		
6						
7	4	SS	12-27-19-23	46		Clayey Silt, some Sand, trace Gravel, Brown, Moist to Wet, Medium Dense to Dense (ML)
8						
9	5	SS	11-11-13-10	23		
10						
11	6	SS	7-9-9-11	18		Clayey Silt, some Sand, trace to some Gravel. Dark Brown, Moist to Wet, Medium Dense (ML)
12	7			100+		No Recovery
13						End of Boring at 12.6 Feet Power Auger Refusal
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						

BORING LOG

BORING NO: 10

SHEET 1 of 1

PROJECT NAME: MCIDA Project

FILE NUMBER: 3960

LOCATION: Town of Florida, New York

OFFSET: None

DATE STARTED/COMPLETED: January 2022

SURFACE ELEV.: 507 +/- ft

ENGINEER/ARCHITECT:

DRILL CONTRACTOR: Aztech Environmental Technology

DRILLING METHOD: Hollow Stem Auger

DRILL RIG TYPE: ATV

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.75 inch ID

WATER LEVEL DEPTH: None Observed **TIME:** WS

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

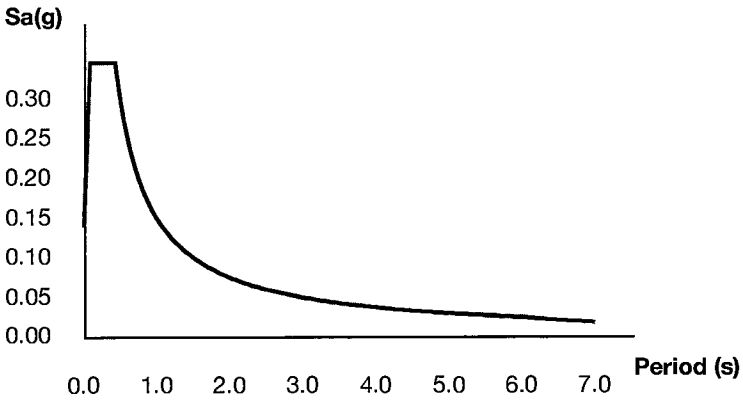
DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
1						Topsoil
2	1	SS	9-5-3-4	8		Clayey Silt, trace to some Sand, trace Gravel, Brown, Moist, Loose (ML)
3	2	SS	6-5-6-12	11		Clayey Silt, some Sand, trace Gravel, Brown, Moist, Medium Dense (ML)
4						
5	3	SS	11-12-13-15	25		
6						
7	4	SS	15-17-24-23	41		Clayey Silt, some Sand, trace to some Gravel, Brown, Moist, Dense (ML)
8						
9	5	SS	15-18-30-30	48		Clayey Silt, some Sand, trace Gravel, Dark Brown, Moist, Dense (ML)
10						
11	6	SS	14-14-43-31	57		Clayey Silt, some Sand, trace Gravel, Dark Gray, Moist, Dense to Very Dense (ML)
12						
13		PA				
14						
15						
16	7	SS	20-23-27-17	50		
17						
18		PA				
19						
20						
21	8	SS	30-50	80+		Clayey Silt and Gravel, trace to some Sand, Dark Gray, Moist, Very Dense (ML-GM)
22						End of Boring at 21.0 Feet Split Spoon Refusal
23						
24						
25						
26						
27						

Hazards by Location

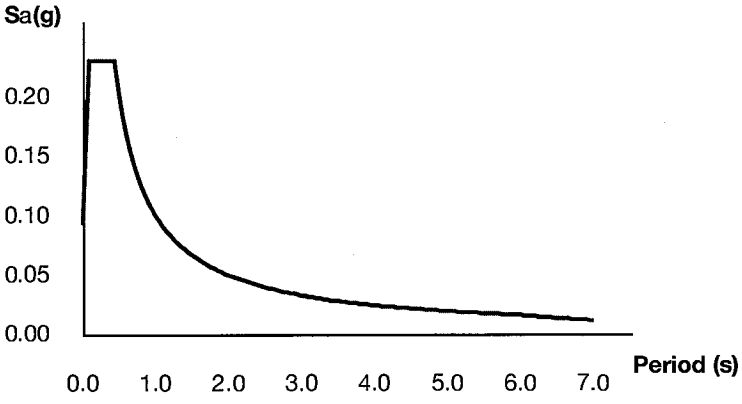
Search Information

Address:	2018 NY-5S, Amsterdam, NY 12010, USA
Coordinates:	42.93706189999999, -74.26052969999999
Elevation:	489 ft
Timestamp:	2022-02-04T16:02:29.891Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	I
Site Class:	D

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	0.217	MCE_R ground motion (period=0.2s)
S_1	0.063	MCE_R ground motion (period=1.0s)
S_{MS}	0.347	Site-modified spectral acceleration value
S_{M1}	0.15	Site-modified spectral acceleration value
S_{DS}	0.231	Numeric seismic design value at 0.2s SA
S_{D1}	0.1	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	B	Seismic design category
F_a	1.6	Site amplification factor at 0.2s

F_v	2.4	Site amplification factor at 1.0s
CR_S	0.945	Coefficient of risk (0.2s)
CR_1	0.922	Coefficient of risk (1.0s)
PGA	0.12	MCE_G peak ground acceleration
F_{PGA}	1.56	Site amplification factor at PGA
PGA_M	0.187	Site modified peak ground acceleration
T_L	6	Long-period transition period (s)
SsRT	0.217	Probabilistic risk-targeted ground motion (0.2s)
SsUH	0.23	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.063	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.068	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.5	Factored deterministic acceleration value (PGA)

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

CONSTRUCTION TECHNOLOGY

INSPECTION & TESTING DIVISION, P.D.& T.S., INC.
4 William Street, Ballston Lake, New York 12019
Phone: (518) 399-1848 Email: constructiontech@live.com

CLIENT: **DANIEL LOUCKS, P.E.**
POST OFFICE BOX 163
BALLSTON SPA, NEW YORK 12020

REPORT DATE: 02/02/22
SAMPLE NUMBER: 21648
OUR FILE NO: 750.001

Robert Behan

ATTN: MR. DANIEL LOUCKS, P.E.
REVIEWED BY: ROBERT BEHAN, NICET

PROJECT: **MCIDA: AMSTERDAM, NEW YORK**

ASTM C136 / C117 / D422: SIZE DISTRIBUTION OF SOIL & AGGREGATES: SIEVE ANALYSIS

MATERIAL SOURCE: **CLIENT ID: SB-8, 2'-4'**
MATERIAL DESCRIPTION: SILT/CLAY; and fine Sand; trace fine Gravel
MATERIAL PROJECT USE: PER CLIENT:
EVALUATION SPECIFICATION: PER CLIENT:

COARSE SIEVE SERIES: US STANDARD			
SIEVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECIFICATION ALLOWANCE
4"			
3"			
2 1/2"			
2"			
1 1/2"			
1"			
3/4"			
1/2"		100.0	
3/8"	2.3	97.7	

MEDIUM SIEVE SERIES: US STANDARD			
SIEVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECIFICATION ALLOWANCE
1/4"	3.6	96.4	
#4	5.6	94.4	
1/8"			
#8	9.2	90.8	
#10			
#16	12.0	88.0	
#20			
#30	16.0	84.0	
#40	18.9	81.1	

FINE SIEVE SERIES: US STANDARD			
SIEVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECIFICATION ALLOWANCE
#50	22.7	77.3	
#60			
#80			
#100	33.7	66.3	
#140			
#200	42.7	57.3	
SILT			
CLAY			
COLLOID			

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4 William Street, Ballston Lake, New York 12019
Phone: (518) 399-1848 Email: constructiontech@live.com

CLIENT: **DANIEL LOUCKS, P.E.**
POST OFFICE BOX 163
BALLSTON SPA, NEW YORK 12020

REPORT DATE: 02/02/22
SAMPLE NUMBER: 21649
OUR FILE NO: 750.001

Robert Behan

ATT'N: MR. DANIEL LOUCKS, P.E.
REVIEWED BY: ROBERT BEHAN, NICET

PROJECT: **MCIDA: AMSTERDAM, NEW YORK**

ASTM C136 / C117 / D422: SIZE DISTRIBUTION OF SOIL & AGGREGATES: SIEVE ANALYSIS

MATERIAL SOURCE: **CLIENT ID: SB-9, 4'-6'**
MATERIAL DESCRIPTION: SILT/CLAY; and fine Sand; trace fine Gravel
MATERIAL PROJECT USE: PER CLIENT:
EVALUATION SPECIFICATION: PER CLIENT:

COARSE SIEVE SERIES: US STANDARD				MEDIUM SIEVE SERIES: US STANDARD				FINE SIEVE SERIES: US STANDARD			
SIEVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECIFICATION ALLOWANCE	SIEVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECIFICATION ALLOWANCE	SIEVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECIFICATION ALLOWANCE
4"				1/4"	6.0	94.0		#50	28.2	71.8	
3"				#4	7.6	92.4		#60			
2 1/2"				1/8"				#80			
2"				#8	12.0	88.0		#100	38.7	61.3	
1 1/2"				#10				#140			
1"				#16	16.1	83.9		#200	46.8	53.2	
3/4"		100.0		#20				SILT			
1/2"	1.9	98.1		#30	21.0	79.0		CLAY			
3/8"	4.1	95.9		#40	24.1	75.9		COLLOID			

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4 William Street, Ballston Lake, New York 12019
Phone: (518) 399-1848 Email: constructiontech@live.com

CLIENT: **DANIEL LOUCKS, P.E.**
POST OFFICE BOX 163
BALLSTON SPA, NEW YORK 12020

REPORT DATE: 02/02/22
SAMPLE NUMBER: 21650
OUR FILE NO: 750.001

Robert Behan

ATT'N: MR. DANIEL LOUCKS, P.E.
REVIEWED BY: ROBERT BEHAN, NICET

PROJECT: **MCIDA: AMSTERDAM, NEW YORK**

ASTM C136 / C117 / D422: SIZE DISTRIBUTION OF SOIL & AGGREGATES: SIEVE ANALYSIS

MATERIAL SOURCE: **CLIENT ID: SB-10, 4'-6'**
MATERIAL DESCRIPTION: SILT/CLAY; and fine Sand; little fine Gravel
MATERIAL PROJECT USE: PER CLIENT:
EVALUATION SPECIFICATION: PER CLIENT:

COARSE SIEVE SERIES: US STANDARD			
SIEVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECIFICATION ALLOWANCE
4"			
3"			
2 1/2"			
2"			
1 1/2"			
1"		100.0	
3/4"	9.5	90.5	
1/2"			
3/8"	10.5	89.5	

MEDIUM SIEVE SERIES: US STANDARD			
SIEVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECIFICATION ALLOWANCE
1/4"	12.0	88.0	
#4	13.4	86.6	
1/8"			
#8	18.7	81.3	
#10			
#16	22.3	77.7	
#20			
#30	26.7	73.3	
#40	29.3	70.7	

FINE SIEVE SERIES: US STANDARD			
SIEVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECIFICATION ALLOWANCE
#50	32.6	67.4	
#60			
#80			
#100	42.3	57.7	
#140			
#200	50.7	49.3	
SILT			
CLAY			
COLLOID			

CONSTRUCTION TECHNOLOGY

INSPECTION & TESTING DIVISION, P.D.& T.S., INC.
4 William Street, Ballston Lake, New York 12019
Phone: (518) 399-1848 Email: constructiontech@live.com

CLIENT: **DANIEL LOUCKS, P.E.**
POST OFFICE BOX 163
BALLSTON SPA, NEW YORK 12020

REPORT NUMBER: 1 : PAGE: 1
REPORT DATE: 02/02/22
OUR FILE NUMBER: 750.001
LAB CONTROL NUMBER: 21651

ATT'N: MR. DANIEL LOUCKS, P.E.

PROJECT: **MCIDA: AMSTERDAM, NEW YORK**

DETERMINATION OF PLASTICITY INDEX & WATER (MOISTURE) CONTENT IN SOILS

SAMPLE ID: **CLIENT ID: SB-5, 35'-37'**

ASTM D-4318 LIQUID LIMIT	ASTM D-4318 PLASTIC LIMIT	ASTM D-4318 PLASTICITY INDEX
23.1%	**14.3%**	**9**

REPORT DISTRIBUTION
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3:
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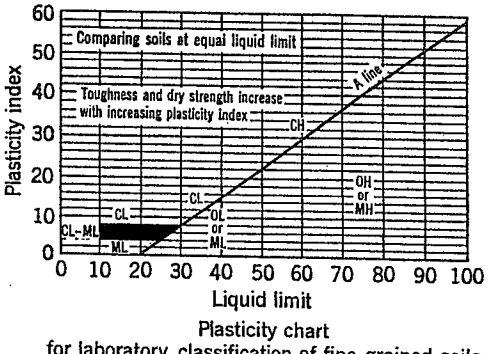
RESPECTFULLY SUBMITTED,
CONSTRUCTION TECHNOLOGY
Robert Behan
ROBERT BEHAN (NICET)
MANAGER TECHNICAL SERVICES

Table 3.5 Unified Soil Classification

Field Identification Procedures (Excluding particles larger than 3 in. and basing fractions on estimated weights)						Group Symbols[a]	Typical Names	Information Required for Describing Soils	Laboratory Classification Criteria
Coarse-grained soils More than half of material is *larger* than No. 200 sieve size[b] (The No. 200 sieve size is about the smallest particle visible to naked eye)	Gravels More than half of coarse fraction is larger than No. 4 sieve size	Clean gravels (little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes			*GW*	Well graded gravels, gravel-sand mixtures, little or no fines	Give typical name; indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics Example: *Silty sand*, gravelly; about 20% hard, angular gravel particles ½-in. maximum size; rounded and subangular sand grains coarse to fine, about 15% nonplastic fines with low dry strength; well compacted and moist in place; alluvial sand; (*SM*)	Use grain size curve in identifying the fractions as given under field identification Determine percentages of gravel and sand from grain size curve Depending on percentage of fines (fraction smaller than No. 200 sieve size) coarse grained soils are classified as follows: Less than 5% *GW, GP, SW, SP* More than 12% *GM, GC, SM, SC* 5% to 12% *Borderline* cases requiring use of dual symbols	$C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3
			Predominantly one size or a range of sizes with some intermediate sizes missing			*GP*	Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for *GW*
		Gravels with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures see *ML* below)			*GM*	Silty gravels, poorly graded gravel-sand-silt mixtures		Atterberg limits below "A" line, or *PI* less than 4 / Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols
			Plastic fines (for identification procedures, see *CL* below)			*GC*	Clayey gravels, poorly graded gravel-sand-clay mixtures		Atterberg limits above "A" line, with *PI* greater than 7
	Sands More than half of coarse fraction is smaller than No. 4 sieve size (For visual classification, the ¼ in. size may be used as equivalent to the No. 4 sieve size)	Clean sands (little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes			*SW*	Well graded sands, gravelly sands, little or no fines		$C_U = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3
			Predominantly one size or a range of sizes with some intermediate sizes missing			*SP*	Poorly graded ssnds, gravelly sands, little or no fines		Not meeting all gradation requirements for *SW*
		Sands with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures, see *ML* below)			*SM*	Silty sands, poorly graded sand-silt mixtures		Atterberg limits below "A" line or *PI* less than 5 / Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols
			Plastic fines (for identification procedures, see *CL* below)			*SC*	Clayey sands, poorly graded sand-clay mixtures		Atterberg limits below "A" line with *PI* greater than 7
Fine-grained soils More than half of material is *smaller* than No. 200 sieve size (The No. 200 sieve size is about the smallest particle visible to naked eye)	Identification Procedures on Fraction Smaller than No. 40 Sieve Size		Dry Strength (crushing characteristics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)				
	Silts and clays liquid limit less than 50		None to slight	Quick to slow	None	*ML*	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions Example: *Clayey silt*, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (*ML*)	
			Medium to high	None to very slow	Medium	*CL*	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
			Slight to medium	Slow	Slight	*OL*	Organic silts and organic silt-clays of low plasticity		
	Silts and clays liquid limit greater than 50		Slight to medium	Slow to none	Slight to medium	*MH*	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			High to very high	None	High	*CH*	Inorganic clays of high plasticity, fat clays		
			Medium to high	None to very slow	Slight to medium	*OH*	Organic clays of medium to high plasticity		
Highly Organic Soils			Readily identified by colour, odour, spongy feel and frequently by fibrous texture			*Pt*	Peat and other highly organic soils		



Plasticity chart
for laboratory classification of fine grained soils

From Wagner, 1957.

[a] *Boundary classifications.* Soils possessing characteristics of two groups are designated by combinations of group symbols. For example *GW–GC*, well graded gravel-sand mixture with clay binder.

[b] All sieve sizes on this chart are U.S. standard.

These procedures are to be performed on the minus No. 40 sieve size particles, approximately ½₆₄ in. For field classification purposes, screening is not intended, simply remove by hand the coarse particles that interfere with the tests.

Field Identification Procedure for Fine Grained Soils or Fractions

Dilotancy (Reaction to shaking):

After removing particles larger than No. 40 sieve size, prepare a pat of moist soil with a volume of about one-half cubic inch. Add enough water if necessary to make the soil soft but not sticky.

Place the pat in the open palm of one hand and shake horizontally, striking vigorously against the other hand several times. A positive reaction consists of the appearance of water on the surface of the pat which changes to a livery consistency and becomes glossy. When the sample is squeezed between the fingers, the water and gloss disappear from the surface, the pat stiffens and finally it cracks or crumbles. The rapidity of appearance of water during shaking and of its disappearance during squeezing assist in identifying the character of the fines in a soil.

Very fine clean sands give the quickest and most distinct reaction whereas a plastic clay has no reaction. Inorganic silts, such as a typical rock flour, show a moderately quick reaction.

Dry Strength (Crushing characteristics):

After removing particles larger than No. 40 sieve size, mould a pat of soil to the consistency of putty, adding water if necessary. Allow the pat to dry completely by oven, sun or air drying, and then test its strength by breaking and crumbling between the fingers. This strength is a measure of the character and quantity of the colloidal fraction contained in the soil. The dry strength increases with increasing plasticity.

High dry strength is characteristic for clays of the CH group. A typical inorganic silt possesses only very slight dry strength. Silty fine sands and silts have about the same slight dry strength, but can be distinguished by the feel when powdering the dried specimen. Fine sand feels gritty whereas a typical silt has the smooth feel of flour.

Toughness (Consistency near plastic limit):

After removing particles larger than the No. 40 sieve size, a specimen of soil about one-half inch cube in size, is moulded to the consistency of putty. If too dry, water must be added and if sticky, the specimen should be spread out in a thin layer and allowed to lose some moisture by evaporation. Then the specimen is rolled out by hand on a smooth surface or between the palms into a thread about one-eight inch in diameter. The thread is then folded and re-rolled repeatedly. During this manipulation the moisture content is gradually reduced and the specimen stiffens, finally loses its plasticity, and crumbles when the plastic limit is reached.

After the thread crumbles, the pieces should be lumped together and a slight kneading action continued until the lump crumbles.

The tougher the thread near the plastic limit and the stiffer the lump when it finally crumbles, the more potent is the colloidal clay fraction in the soil. Weakness of the thread at the plastic limit and quick loss of coherence of the lump below the plastic limit indicate either inorganic clay of low plasticity, or materials such as kaolin-type clays and organic clays which occur below the A-line.

Highly organic clays have a very weak and spongy feel at the plastic limit.

Soil Characteristics Pertinent to Roads and Airfields

Major Divisions		Letter (1)	Name	Value as Subgrade When Not Subject to Frost Action	Value as Subbase When Not Subject to Frost Action	Value as Base When Not Subject to Frost Action	Potential Frost Action	Compressibility and Expansion	Drainage Characteristics	Compaction Equipment	Unit Dry Weight lb. per cu. ft.	Typical Design Values	
												CBR (2)	Subgrade Modulus k lb. per cu. in.
Coarse-Grained Soils	Gravel and Gravelly soils	GW	Well-graded gravels or gravel-sand mixtures, little or no fines	Excellent	Excellent	Good	None to very slight	Almost none	Excellent	Crawler-type tractor, rubber-tired roller, steel-wheeled roller	125-140	40-80	300-500
		GP	Poorly graded gravels or gravel-sand mixtures, little or no fines	Good to excellent	Good	Fair to good	None to very slight	Almost none	Excellent	Crawler-type tractor, rubber-tired roller, steel-wheeled roller	110-140	30-60	300-500
		GM d	Silty gravels, gravel-sand-silt mixtures	Good to excellent	Good	Fair to good	Slight to medium	Very slight	Fair to poor	Rubber-tired roller, sheepsfoot roller; close control of moisture	125-145	40-60	300-500
		GM u		Good	Fair	Poor to not suitable	Slight to medium	Slight	Poor to practically impervious	Rubber-tired roller, sheepsfoot roller	115-135	20-30	200-500
		OC	Clayey gravels, gravel-sand-clay mixtures	Good	Fair	Poor to not suitable	Slight to medium	Slight	Poor to practically impervious	Rubber-tired roller, sheepsfoot roller	130-145	20-40	200-500
	Sand and Sandy soils	SW	Well-graded sands or gravelly sands, little or no fines	Good	Fair to good	Poor	None to very slight	Almost none	Excellent	Crawler-type tractor, rubber-tired roller	110-130	20-40	200-400
		SP	Poorly graded sands or gravelly sands, little or no fines	Fair to good	Fair	Poor to not suitable	None to very slight	Almost none	Excellent	Crawler-type tractor, rubber-tired roller	105-135	10-40	150-400
		SM d	Silty sands, sand-silt mixtures	Fair to good	Fair to good	Poor	Slight to high	Very slight	Fair to poor	Rubber-tired roller, sheepsfoot roller; close control of moisture	120-135	15-40	150-400
		SM u		Fair	Poor to fair	Not suitable	Slight to high	Slight to medium	Poor to practically impervious	Rubber-tired roller, sheepsfoot roller	100-130	10-20	100-300
		SC	Clayey sands, sand-clay mixtures	Poor to fair	Poor	Not suitable	Slight to high	Slight to medium	Poor to practically impervious	Rubber-tired roller, sheepsfoot roller	100-135	5-20	100-300
Fine-Grained Soils	Silts and Clays LL is less than 50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	Poor to fair	Not suitable	Not suitable	Medium to very high	Slight to medium	Fair to poor	Rubber-tired roller, sheepsfoot roller; close control of moisture	90-130	15 or less	100-200
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Poor to fair	Not suitable	Not suitable	Medium to high	Medium	Practically impervious	Rubber-tired roller, sheepsfoot roller	90-130	15 or less	50-150
		OL	Organic silts and organic silt-clays of low plasticity	Poor	Not suitable	Not suitable	Medium to high	Medium to high	Poor	Rubber-tired roller, sheepsfoot roller	90-105	5 or less	50-100
	Silts and Clays LL is Greater than 50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	Poor	Not suitable	Not suitable	Medium to very high	High	Fair to poor	Sheepsfoot roller, rubber-tired roller	80-105	10 or less	50-100
		CH	Inorganic clays of medium to high plasticity, organic silts	Poor to fair	Not suitable	Not suitable	Medium	High	Practically impervious	Sheepsfoot roller, rubber-tired roller	90-115	15 or less	50-150
		OH	Organic clays of high plasticity, fat clays	Poor to very poor	Not suitable	Not suitable	Medium	High	Practically impervious	Sheepsfoot roller, rubber-tired roller	80-110	5 or less	25-100
Highly Organic Soils		Pt	Peat and other highly organic soils	Not suitable	Not suitable	Not suitable	Slight	Very high	Fair to poor	Compaction not practical	—	—	—

Note:

(1) Unit Dry Weights are for compacted soil at optimum moisture content for modified AASHO compaction effort. Division of GM and SM groups into subdivision of d and u are for roads and airfields only. Subdivision is basis of Atterberg limits; suffix d (e.g., GMd) will be used when the liquid limit (LL) is 25 or less and the plasticity index is 6 or less; the suffix u will be used otherwise.

(2) The maximum value that can be used in design of airfields is, in some cases, limited by gradation and plasticity requirements.

GENERAL QUALIFICATIONS

This report has been prepared in order to aid in the evaluation of this property and to assist the architect and/or engineer in the design of this project. The scope of the project and location described herein, and my description of the project represents my understanding of the significant aspects relevant to soil and foundation characteristics. In the event that any changes in the design or location of the proposed facilities, as outlined in this report, are planned, I should be informed so the changes can be reviewed and the conclusions of this report modified or approved in writing by myself.

It is recommended that all construction operations dealing with earthwork and foundations be inspected by an experienced soil engineer to assure that the design requirements are fulfilled in the actual construction. If you wish, I would welcome the opportunity to review the plans and specifications when they have been prepared so that I may have the opportunity of commenting on the effect of soil conditions on the design and specifications.

The analysis and recommendations submitted in this report are based upon the data obtained from the soil borings and/or test pits performed at the locations indicated on the location diagram and from any other information discussed in the report. This report does not reflect any variations which may occur between these boring and/or test pits. In the performance of subsurface investigations, specific information is obtained at specific locations at specific times. However, it is a well-known fact that variations in soil and rock conditions exist on most sites between boring locations and also such situations as groundwater conditions vary from time to time. The nature and extent of variations may may not become evident until the course of construction. If variations then appear evident, it will be necessary for a reevaluation of the recommendations of this report after performing on-site observations during the construction period and noting the characteristics of any variations.