Stormwater Management Plan

One Acre Oaks
Minnetonka, MN

Prepared by Loucks

April 12, 2024

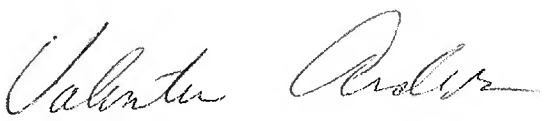
Loucks Project No. 21509.00

One Acre Oaks

Minnetonka, MN

Stormwater Management Plan

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.



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Introduction

This stormwater management plan was created for the One Acre Oaks project located along Plymouth Road in Minnetonka, Minnesota. The project site encompasses 9.51 acres (10.01 acres with the ROW) which is surrounded to the west by Plymouth Road, between Bent Tree Road and Woodbridge Trail and Crescent Ridge Road to the east. The property is surrounded by residential. The parcel to the north is included in modeling as there is a floodplain that encompasses both parcels.

The project generally consists of constructing a residential road with residential lots, stormwater pond, and associated utilities.

Included in this plan are calculations for the proposed discharge of stormwater at the One Acre Oaks property.

Requirements and Methodology

City of Minnetonka and Minnehaha Creek Watershed District Requirements

1. Rate Control – Runoff rates for the proposed activity shall not exceed existing runoff rates for the 1, 10, and 100-year critical storm events.

2. Volume Control – 1.1-inch abstraction over the impervious surface. Where soils don't allow the full infiltration, alternative methods are used with infiltration used to the greatest extent possible

3. Water Quality – Total Phosphorus (TP) removal equivalent to that achieved from infiltration of 1-inch over impervious surface. With alternative design, 90% total suspended solids removal and 60% total phosphorus removal.

Methodology

The stormwater calculations were made utilizing the stormwater-modeling program HydroCAD 10.00. Calculations were performed for the Type II 24-hour Atlas 14 100-year rainfall event of 7.32 inches, 10-year rainfall event of 4.26 inches and 1-year rainfall event of 2.48 inches. For purposes of analyzing the site, a drainage area of about 11.8 acres is included in the hydrologic model to account for all runoff from the site.

Existing Conditions

The existing site is residential with four residences present on the parcels. The property is split into five major drainage areas, with the north split into 2 more drainage areas. Most of the site drains to the north (1S) to a depression within the site with a piped outlet. There are two more drainage areas to the north (10S,11S), there are two small areas to the south (3S, 4S), one to the east (2S) and one to the west (5S).
No treatment is present for the existing impervious surfaces. The depression on site has a HWL of 982.62 in modeling and a floodplain elevation of 982.9 based on City data.

Existing soils are assumed to be type D soils based on the soil borings done. Soil boring data can be found in the Figures section.

The existing site model consists of 11.75 acres with 0.53 acres of impervious surface.

Proposed Conditions

The proposed site consists of a redeveloped residential development with public road and 8 lots with utilities. A proposed pond (10P) is provided for the largest treatment, volume control and rate control prior to discharging to existing storm sewer. Two small catchment basins (3P and 4P) are located on the south side for rate control and rerouting drainage to treatment. The proposed site being analyzed contains 2.70 acres of new impervious surface.

The proposed site is broken up into eleven drainage areas. The six drainage areas (1S, 2S, 3S, 4S, 5S and 10S) going directly off site like existing and the five drainage areas going to the basins onsite for treatment or floodplain depressions before leaving the site. The runoff from the proposed street area is collected by storm sewer and discharged to the treatment pond 10P. This also collects parts of many of the lots that drain to the street. The remainder of the inner back yards sheet drain to the pond 10P.

The depression within the site (between the two parcels), that is part of the City floodplain is broken up close to the property line. The part within the proposed project contains the treatment basin and has a higher HWL with a berm between it and the remainder of the floodplain. The HWL of the onsite floodplain with the treatment basin is 983.87 and the north floodplain has a HWL of 982.19. The overall drainage area to the floodplain is similar with most area going to the onsite section, which now has a treatment system, rates are controlled going to the north floodplain section and total offsite.

The south basins capture the backyard of two of the proposed lots. The basins' main goal is to control rates leaving the site and redirect flow to treatment basin. The basins contain a piped outlet at the bottom and overland overflows with a weir that keeps flow rates and velocities down.

The proposed site model consists of 11.75 acres with 3.23 acres of impervious surface, 2.70 acres of that being new.

Rate Control

The stormwater runoff rate from the proposed site shall be equal to or less than the runoff rate from the existing conditions for the 1-, 10- and 100-year storm events. The only area that does not meet existing is the drainage to Plymouth Road, as most of the addition flow comes from paving new ROW in Plymouth Road for the turn lane.

A NURP pond with filtration bench within the floodplain is used to treat the site development and provide rate control. Disconnected impervious is also used for appropriate areas. Soils maps show soils to be C and D soils mostly. Borings are rough borings currently. With the current boring information, it is assumed large amounts of infiltration cannot be achieved on-site as only type D soils have been found. The site is treated to the extent possible without infiltration while still meeting TSS and TP removals.

Tables 1 and 2 compare the existing and proposed peak runoff rates for the discharge points analyzed.

Table 1 –Existing Peak Runoff Rates

		1-Year Storm		10-Year Storm		100-Year Storm	
Drainage Area	Area acres	Rate cfs	Volume cf	Rate cfs	Volume cf	Rate cfs	Volume cf
11R-North	8.392	8.27	0.728	12.53	1.757	14.37	3.727
2S-East	1.421	1.26	0.098	3.47	0.258	7.71	0.578
3S-Southeast	0.562	0.46	0.039	1.27	0.102	2.82	0.228
4S-South	0.45	0.41	0.033	1.1	0.085	2.4	0.187
5S-West	0.921	1.1	0.071	2.82	0.18	6.06	0.392
Plymouth Road	1.371	1.46	0.104	3.8	0.264	8.19	0.579
North	8.392	8.27	0.728	12.54	1.757	14.37	3.727
East	1.983	1.71	0.136	4.72	0.36	10.48	0.806
Total North Plymouth & North	9.763	9.73	0.832	16.33	2.021	22.56	4.306
Total	11.75	11.05	0.968	19.94	2.381	32.7	5.112

Table 2 – Proposed Peak Runoff Rates

		1-Year Storm		10-Year Storm		100-Year Storm	
Drainage Area	Area acres	Rate cfs	Volume cf	Rate cfs	Volume cf	Rate cfs	Volume cf
1S-North	0.247	0.35	0.021	0.86	0.052	1.77	0.11
2S-East	1.114	1.14	0.081	3.04	0.21	6.62	0.463
3S-Southeast	0.036	0.04	0.003	0.11	0.007	0.23	0.015
4S-South	0.431	0.6	0.04	1.43	0.093	2.91	0.196
5S-West	0.852	1.02	0.074	2.5	0.178	5.19	0.378
10S-Northeast	0.048	0.07	0.004	0.18	0.01	0.38	0.021
10P-Filtration	7.216	1.89	0.824	6.37	1.762	12.22	3.481
1P-N Floodplain	1.508	1.78	0.124	4.01	0.442	8.07	1.533
11P - Depression	1.803	2	0.148	4.3	0.501	8.31	1.661
3P-SW Basin	0.78	0.06	0.06	1.73	0.133	2.02	0.022
4P-S Basin	0.141	0.34	0.019	0.68	0.038	1.25	0.073
Plymouth Road	1.283	1.61	0.113	3.89	0.272	8.03	0.574
North	9.314	3.9	0.997	9.16	2.188	14.21	4.395
East	1.15	1.18	0.084	3.14	0.216	7.63	0.5
Total North Plymouth & North	10.597	5.51	1.11	13.05	2.46	22.24	4.969
Total	11.75	6.69	1.194	16.09	2.676	28.88	5.469

Elevations are evaluated for flooding of the site. All overflows are designed to keep the adjacent buildings from flooding. All flood elevations have at least 2 feet freeboard to the lowest opening elevation.

Volume Control

Based on the soils information we have; most treatment will be by filtration. Soil borings that were taken on site show only D soils, it does not cover the entire site but the natural grade of the site and location of storm sewer to tie into make it unlikely that large amounts of stormwater treatment could take place in another location. Since infiltration cannot be used on this site, alternative methods are being used. With D soils, even meeting the 0.55-inches of infiltration is not feasible on this site without removing all the trees on the site.

Therefore, the site moves to using filtration and sedimentation in treatment trains to reach the total suspended solids and total phosphorus removal requirements. Many of the backyards are disconnected impervious as they will drain through grass and woodland before leaving the site or reaching farther treatment. The existing depression area is to remain the main collection area on the site. It would be split into two depressions to allow for treatment on the proposed parcel while leaving the north parcel untouched. Most of the site and impervious surface is routed to the treatment system. The street drainage has a larger manhole with sump and SAFL baffle to increase sedimentation before entering the sedimentation basin. The woodland and

back yards are directed to a swale that routes drainage to the sedimentation basin. The basin has a wider bench area with draintile and biofiltration media to allow biofiltration of at least the first 1.1-inch of rainfall. For purposes of designing the treatment for possible future impervious surface, was added to each lot for patios in the back yard, which would all be disconnected impervious surface.

The total impervious surface designed for is 2.87 acres of impervious surface for a volume control of 0.263 ac-ft or 11,456 cf.

The proposed storage volume below the outlet for the filtration bench (1P) is **11,679 cubic-feet**. This volume is filtered through the biofiltration media mix in less than 48 hours.

Depth equivalent proposed: 11,679 cf / 7,530 sf(surface area of bench) = **1.55 ft**
Depth maximum allowed: 1.0 in/hr*48 hours/12in/ft = **4.0 ft**

Quality Control

With no infiltration, removals is the main requirement. The site is required to remove the total phosphorus equivalent to infiltration of the 1-inch over the impervious surface and 90% TSS and 60% TP removal. MIDS is used to model the 1.1-inch in1filtration and proposed TSS and TP for the site. The basins are used in the proposed condition to reduce the TSS and TP particulate loads. Disconnected impervious is only used for the back half of building pads draining directly offsite or to the main pond/filtration system. The pond/filtration bench system is used to capture the remainder of removals. The majority of the impervious surface to the main system is pretreated in a sump manhole. The manhole has a SAFL baffle to aid in additional removals before going to the system. SHSAM is used to determine the modeled removal of the SAFL baffle for MIDS (it is rounded down to the nearest 5%). The pond acts as pretreatment for the filtration bench which is designed with biofiltration media. The pond dead volume is designed to meet a minimum of 1800 sf per acre of drainage to the pond, which is 8.535 acres * 1800 = 15,363 cf. The dead storage in the pond is 16,948 cf.

The table below shows the results for infiltration and proposed loads removed from the site. Model data can be found in the Figures section.

Table 3 – Proposed TSS and TP Removals

	1.1-inch Infiltration Removal lbs/yr	Proposed Removals lbs/yr	% Removals based on yearly load
TSS	875.5	1298.5	90
TP	4.82	4.705	60

Floodplain

There is an existing City floodplain with in the site. The existing flood elevation from the City is 982.9, our modeling shows 982.6, based on a 96-hour 100-year storm event. The difference can be from different modeling platforms or difference in parameters. Our model uses survey data from the site for the drainage area and cover. The drainage area seems similar to the City drainage area and survey data shows that there is an overland overflow below 983. The drainage to the floodplain comes mainly from the site with a small area from outside this site. The proposed condition splits the floodplain into two drainage areas and two depressions. The drainage area north of the proposed berm in the floodplain area is much smaller and the outlet remains the same, the modeled floodplain elevation is 979.23 with an overland overflow elevation of 981.50. Most of the drainage is captured and routed to a main floodplain area, which has a floodplain elevation of 981.62 and an overland overflow of 981.75.

The surveyed floodplain volume for the existing conditions is 57,947 cf. The proposed floodplain in this same area is 75,801 cf of live storage available. This is an increase of 17,854 cf of floodplain storage.

Best Management Practices

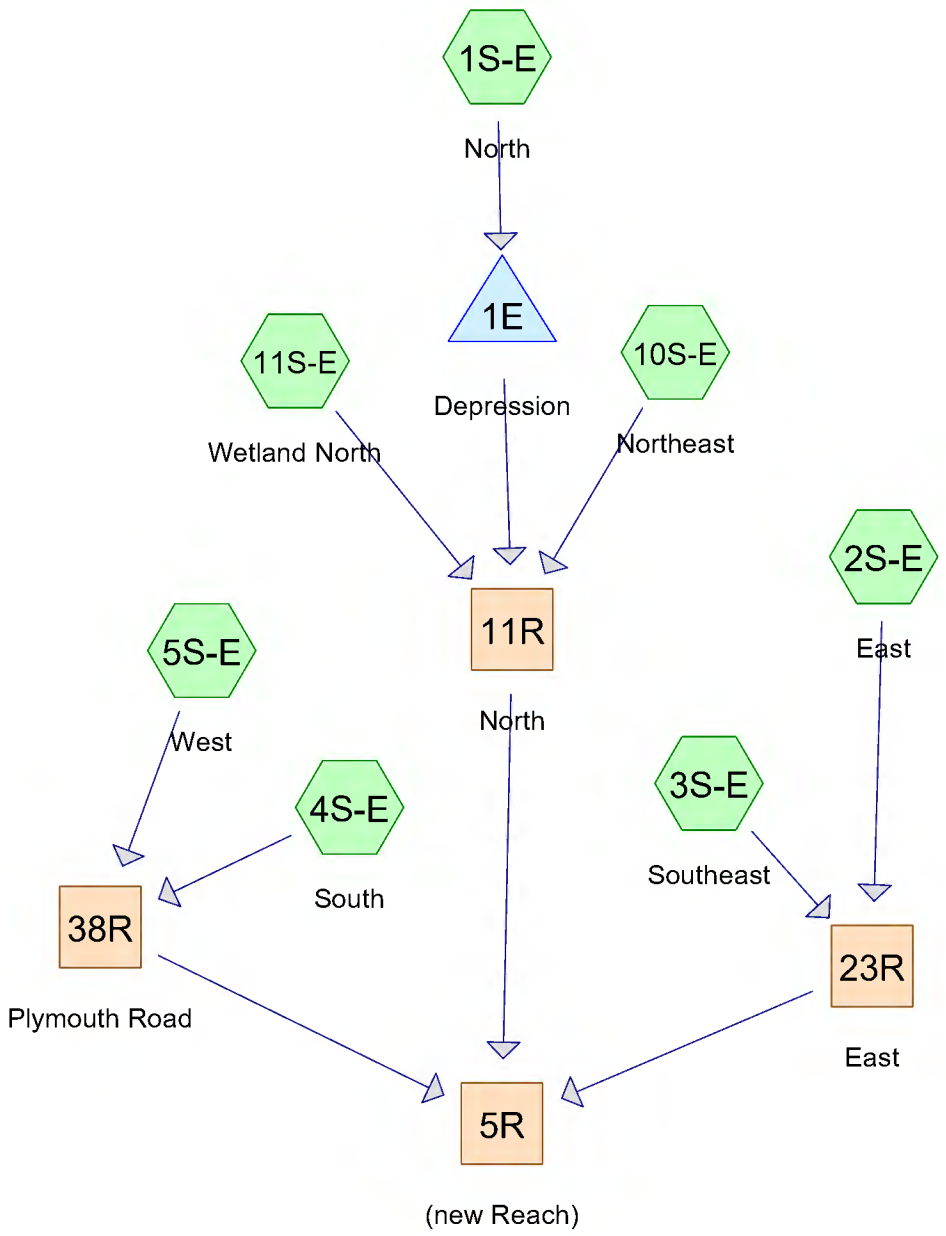
Best management practices (BMP's) will be implemented during construction per the project Stormwater Pollution Prevention Plan. During construction, erosion control measures will include dust control, silt fencing, inlet protection, and a temporary rock construction entrance. Permanent BMP's will include a stormwater pond, a large swale, sump storm sewer structures, surface pavements, and turf establishment (vegetation) of disturbed areas.

Conclusion

The proposed Stormwater Management Plan for the One Acre Oaks property project provides an improved solution for the conveyance of stormwater on this site. The stormwater pond will capture runoff and provide additional water quality treatment on the site.

Appendix A

HydroCAD Report, Existing
(1, 10, 100)



EXISTING
CONDITIONS

Subcat Reach Pond Link

Routing Diagram for Prop-21509-8Lot
Prepared by Loucks & Associates, Printed 3/5/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	MSE 24-hr	3	Default	24.00	1	2.48	
2	10-Year	MSE 24-hr	3	Default	24.00	1	4.26	
3	100-Year base	MSE 24-hr	3	Default	24.00	1	7.32	
4	100-yr 96hr	PF_Depth_English_PDS 96-hr S1	100-yr	Default	96.00	1	8.51	

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.532	98	(1S-E, 2S-E, 3S-E, 4S-E, 5S-E, 10S-E, 11S-E)
3.421	79	Woods, Fair, HSG D (2S-E, 3S-E, 4S-E, 5S-E, 10S-E, 11S-E)
7.793	82	Woods/grass comb., Fair, HSG D (1S-E)
11.746	**82**	**TOTAL AREA**

Summary for Subcatchment 1S-E: North

Runoff = 8.64 cfs @ 12.35 hrs, Volume= 0.702 af, Depth= 1.04"
Routed to Pond 1E : Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

	Area (ac)	CN	Description
*	0.304	98	
	7.793	82	Woods/grass comb., Fair, HSG D
	8.097	83	Weighted Average
	7.793	82	96.25% Pervious Area
	0.304	98	3.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0570	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
1.4	100	0.0550	1.17		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.6	100	0.0085	0.65		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.0	500	0.1700	2.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.9	800	Total			

Summary for Subcatchment 2S-E: East

Runoff = 1.26 cfs @ 12.31 hrs, Volume= 0.098 af, Depth= 0.82"
Routed to Reach 23R : East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

	Area (ac)	CN	Description
*	0.028	98	
	1.393	79	Woods, Fair, HSG D
	1.421	79	Weighted Average
	1.393	79	98.03% Pervious Area
	0.028	98	1.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	100	0.0380	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
2.1	100	0.0250	0.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.7	200	Total			

Summary for Subcatchment 3S-E: Southeast

Runoff = 0.46 cfs @ 12.36 hrs, Volume= 0.039 af, Depth= 0.82"
Routed to Reach 23R : East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

	Area (ac)	CN	Description
*	0.004	98	
	0.558	79	Woods, Fair, HSG D
	0.562	79	Weighted Average
	0.558	79	99.29% Pervious Area
	0.004	98	0.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0300	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
3.7	250	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.0	350	Total			

Summary for Subcatchment 4S-E: South

Runoff = 0.41 cfs @ 12.33 hrs, Volume= 0.033 af, Depth= 0.88"
Routed to Reach 38R : Plymouth Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

	Area (ac)	CN	Description
*	0.021	98	
	0.429	79	Woods, Fair, HSG D
	0.450	80	Weighted Average
	0.429	79	95.33% Pervious Area
	0.021	98	4.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.8	100	0.0250	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
0.5	35	0.0650	1.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.3	135	Total			

Summary for Subcatchment 5S-E: West

Runoff = 1.10 cfs @ 12.24 hrs, Volume= 0.071 af, Depth= 0.93"
Routed to Reach 38R : Plymouth Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

	Area (ac)	CN	Description
*	0.121	98	
	0.800	79	Woods, Fair, HSG D
	0.921	81	Weighted Average
	0.800	79	86.86% Pervious Area
	0.121	98	13.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0660	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
0.3	30	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.4	130	Total			

Summary for Subcatchment 10S-E: Northeast

Runoff = 0.07 cfs @ 12.17 hrs, Volume= 0.004 af, Depth= 0.98"
Routed to Reach 11R : North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

	Area (ac)	CN	Description
*	0.007	98	
	0.041	79	Woods, Fair, HSG D
	0.048	82	Weighted Average
	0.041	79	85.42% Pervious Area
	0.007	98	14.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	90	0.1500	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"

Summary for Subcatchment 11S-E: Wetland North

Runoff = 0.35 cfs @ 12.22 hrs, Volume= 0.021 af, Depth= 1.04"
Routed to Reach 11R : North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

	Area (ac)	CN	Description
*	0.047	98	
	0.200	79	Woods, Fair, HSG D
	0.247	83	Weighted Average
	0.200	79	80.97% Pervious Area
	0.047	98	19.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"

Summary for Reach 5R: (new Reach)

Inflow Area = 11.746 ac, 4.53% Impervious, Inflow Depth = 0.99" for 1-Year event
Inflow = 11.05 cfs @ 12.35 hrs, Volume= 0.968 af
Outflow = 11.05 cfs @ 12.35 hrs, Volume= 0.968 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 11R: North

Inflow Area = 8.392 ac, 4.27% Impervious, Inflow Depth = 1.04" for 1-Year event
Inflow = 8.27 cfs @ 12.41 hrs, Volume= 0.728 af
Outflow = 8.27 cfs @ 12.41 hrs, Volume= 0.728 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : (new Reach)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 23R: East

Inflow Area = 1.983 ac, 1.61% Impervious, Inflow Depth = 0.82" for 1-Year event
Inflow = 1.71 cfs @ 12.32 hrs, Volume= 0.136 af
Outflow = 1.71 cfs @ 12.32 hrs, Volume= 0.136 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : (new Reach)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 38R: Plymouth Road

Inflow Area = 1.371 ac, 10.36% Impervious, Inflow Depth = 0.91" for 1-Year event
Inflow = 1.46 cfs @ 12.26 hrs, Volume= 0.104 af
Outflow = 1.46 cfs @ 12.26 hrs, Volume= 0.104 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : (new Reach)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Pond 1E: Depression

Inflow Area = 8.097 ac, 3.75% Impervious, Inflow Depth = 1.04" for 1-Year event
Inflow = 8.64 cfs @ 12.35 hrs, Volume= 0.702 af
Outflow = 8.07 cfs @ 12.42 hrs, Volume= 0.702 af, Atten= 7%, Lag= 4.1 min
Primary = 8.07 cfs @ 12.42 hrs, Volume= 0.702 af
Routed to Reach 11R : North

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Peak Elev= 980.32' @ 12.42 hrs Surf.Area= 2,529 sf Storage= 562 cf

Plug-Flow detention time= 0.4 min calculated for 0.702 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (832.5 - 832.1)

Volume	Invert	Avail.Storage	Storage Description
#1	978.67'	63,415 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
978.67	10	0	0
979.00	26	6	6
980.00	211	119	124
981.00	7,479	3,845	3,969
982.00	28,736	18,108	22,077
983.00	53,940	41,338	63,415

Device	Routing	Invert	Outlet Devices
#1	Primary	978.35'	**18.0" Round Culvert** L= 275.0' Ke= 0.500 Inlet / Outlet Invert= 978.35' / 975.09' S= 0.0119 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	978.67'	**18.0" Round Culvert** L= 9.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 978.67' / 978.39' S= 0.0311 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=8.04 cfs @ 12.42 hrs HW=980.31' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 8.04 cfs of 9.37 cfs potential flow)
↑—**2=Culvert** (Inlet Controls 8.04 cfs @ 4.55 fps)

Stage-Area-Storage for Pond 1E: Depression

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
978.67	10	0
978.72	12	1
978.77	15	1
978.82	17	2
978.87	20	3
978.92	22	4
978.97	25	5
979.02	30	6
979.07	39	8
979.12	48	10
979.17	57	13
979.22	67	16
979.27	76	20
979.32	85	24
979.37	94	28
979.42	104	33
979.47	113	39
979.52	122	44
979.57	131	51
979.62	141	58
979.67	150	65
979.72	159	73
979.77	168	81
979.82	178	89
979.87	187	99
979.92	196	108
979.97	205	118
980.02	356	130
980.07	720	157
980.12	1,083	202
980.17	1,447	265
980.22	1,810	347
980.27	2,173	446
980.32	2,537	564
980.37	2,900	700
980.42	3,264	854
980.47	3,627	1,026
980.52	3,990	1,217
980.57	4,354	1,425
980.62	4,717	1,652
980.67	5,081	1,897
980.72	5,444	2,160
980.77	5,807	2,442
980.82	6,171	2,741
980.87	6,534	3,059
980.92	6,898	3,394
980.97	7,261	3,748
981.02	7,904	4,123
981.07	8,967	4,545
981.12	10,030	5,020
981.17	11,093	5,548
981.22	12,156	6,129
981.27	13,218	6,764
981.32	14,281	7,451
981.37	15,344	8,192
981.42	16,407	8,985
981.47	17,470	9,832
981.52	18,533	10,732
981.57	19,595	11,686
981.62	20,658	12,692
981.67	21,721	13,752
981.72	22,784	14,864
981.77	23,847	16,030
981.82	24,910	17,249
981.87	25,973	18,521
981.92	27,035	19,846
981.97	28,098	21,224
982.02	29,240	22,657
982.07	30,500	24,150
982.12	31,760	25,707
982.17	33,021	27,326
982.22	34,281	29,009
982.27	35,541	30,754
982.32	36,801	32,563
982.37	38,061	34,434
982.42	39,322	36,369
982.47	40,582	38,367
982.52	41,842	40,427
982.57	43,102	42,551
982.62	44,362	44,737
982.67	45,623	46,987
982.72	46,883	49,300
982.77	48,143	51,675
982.82	49,403	54,114
982.87	50,663	56,616
982.92	51,924	59,180
982.97	**53,184**	**61,808**

Summary for Subcatchment 1S-E: North

Runoff = 21.13 cfs @ 12.33 hrs, Volume= 1.696 af, Depth= 2.51"
Routed to Pond 1E : Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (ac)	CN	Description
*	0.304	98	
	7.793	82	Woods/grass comb., Fair, HSG D
	8.097	83	Weighted Average
	7.793	82	96.25% Pervious Area
	0.304	98	3.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0570	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
1.4	100	0.0550	1.17		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.6	100	0.0085	0.65		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.0	500	0.1700	2.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.9	800	Total			

Summary for Subcatchment 2S-E: East

Runoff = 3.47 cfs @ 12.30 hrs, Volume= 0.258 af, Depth= 2.18"
Routed to Reach 23R : East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (ac)	CN	Description
*	0.028	98	
	1.393	79	Woods, Fair, HSG D
	1.421	79	Weighted Average
	1.393	79	98.03% Pervious Area
	0.028	98	1.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	100	0.0380	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
2.1	100	0.0250	0.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.7	200	Total			

Summary for Subcatchment 3S-E: Southeast

Runoff = 1.27 cfs @ 12.34 hrs, Volume= 0.102 af, Depth= 2.18"
Routed to Reach 23R : East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (ac)	CN	Description
*	0.004	98	
	0.558	79	Woods, Fair, HSG D
	0.562	79	Weighted Average
	0.558	79	99.29% Pervious Area
	0.004	98	0.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0300	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
3.7	250	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.0	350	Total			

Summary for Subcatchment 4S-E: South

Runoff = 1.10 cfs @ 12.32 hrs, Volume= 0.085 af, Depth= 2.26"
Routed to Reach 38R : Plymouth Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (ac)	CN	Description
*	0.021	98	
	0.429	79	Woods, Fair, HSG D
	0.450	80	Weighted Average
	0.429	79	95.33% Pervious Area
	0.021	98	4.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.8	100	0.0250	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
0.5	35	0.0650	1.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.3	135	Total			

Summary for Subcatchment 5S-E: West

Runoff = 2.82 cfs @ 12.23 hrs, Volume= 0.180 af, Depth= 2.34"
Routed to Reach 38R : Plymouth Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (ac)	CN	Description
*	0.121	98	
	0.800	79	Woods, Fair, HSG D
	0.921	81	Weighted Average
	0.800	79	86.86% Pervious Area
	0.121	98	13.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0660	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
0.3	30	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.4	130	Total			

Summary for Subcatchment 10S-E: Northeast

Runoff = 0.18 cfs @ 12.17 hrs, Volume= 0.010 af, Depth= 2.43"
Routed to Reach 11R : North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (ac)	CN	Description
*	0.007	98	
	0.041	79	Woods, Fair, HSG D
	0.048	82	Weighted Average
	0.041	79	85.42% Pervious Area
	0.007	98	14.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	90	0.1500	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"

Summary for Subcatchment 11S-E: Wetland North

Runoff = 0.86 cfs @ 12.21 hrs, Volume= 0.052 af, Depth= 2.51"
Routed to Reach 11R : North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (ac)	CN	Description
*	0.047	98	
	0.200	79	Woods, Fair, HSG D
	0.247	83	Weighted Average
	0.200	79	80.97% Pervious Area
	0.047	98	19.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"

Summary for Reach 5R: (new Reach)

Inflow Area = 11.746 ac, 4.53% Impervious, Inflow Depth = 2.43" for 10-Year event
Inflow = 19.94 cfs @ 12.31 hrs, Volume= 2.381 af
Outflow = 19.94 cfs @ 12.31 hrs, Volume= 2.381 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 11R: North

Inflow Area = 8.392 ac, 4.27% Impervious, Inflow Depth = 2.51" for 10-Year event
Inflow = 12.54 cfs @ 12.54 hrs, Volume= 1.757 af
Outflow = 12.54 cfs @ 12.54 hrs, Volume= 1.757 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : (new Reach)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 23R: East

Inflow Area = 1.983 ac, 1.61% Impervious, Inflow Depth = 2.18" for 10-Year event
Inflow = 4.72 cfs @ 12.31 hrs, Volume= 0.360 af
Outflow = 4.72 cfs @ 12.31 hrs, Volume= 0.360 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : (new Reach)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 38R: Plymouth Road

Inflow Area = 1.371 ac, 10.36% Impervious, Inflow Depth = 2.31" for 10-Year event
Inflow = 3.80 cfs @ 12.25 hrs, Volume= 0.264 af
Outflow = 3.80 cfs @ 12.25 hrs, Volume= 0.264 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : (new Reach)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Pond 1E: Depression

Inflow Area = 8.097 ac, 3.75% Impervious, Inflow Depth = 2.51" for 10-Year event
Inflow = 21.13 cfs @ 12.33 hrs, Volume= 1.696 af
Outflow = 12.27 cfs @ 12.58 hrs, Volume= 1.696 af, Atten= 42%, Lag= 14.6 min
Primary = 12.27 cfs @ 12.58 hrs, Volume= 1.696 af
Routed to Reach 11R : North

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Peak Elev= 981.50' @ 12.58 hrs Surf.Area= 18,121 sf Storage= 10,378 cf

Plug-Flow detention time= 5.2 min calculated for 1.695 af (100% of inflow)
Center-of-Mass det. time= 5.2 min (819.2 - 814.0)

Volume	Invert	Avail.Storage	Storage Description
#1	978.67'	63,415 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
978.67	10	0	0
979.00	26	6	6
980.00	211	119	124
981.00	7,479	3,845	3,969
982.00	28,736	18,108	22,077
983.00	53,940	41,338	63,415

Device	Routing	Invert	Outlet Devices
#1	Primary	978.35'	**18.0" Round Culvert** L= 275.0' Ke= 0.500 Inlet / Outlet Invert= 978.35' / 975.09' S= 0.0119 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	978.67'	**18.0" Round Culvert** L= 9.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 978.67' / 978.39' S= 0.0311 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=12.27 cfs @ 12.58 hrs HW=981.50' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 12.27 cfs of 12.30 cfs potential flow)
↑—**2=Culvert** (Inlet Controls 12.27 cfs @ 6.94 fps)

Stage-Area-Storage for Pond 1E: Depression

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
978.67	10	0
978.72	12	1
978.77	15	1
978.82	17	2
978.87	20	3
978.92	22	4
978.97	25	5
979.02	30	6
979.07	39	8
979.12	48	10
979.17	57	13
979.22	67	16
979.27	76	20
979.32	85	24
979.37	94	28
979.42	104	33
979.47	113	39
979.52	122	44
979.57	131	51
979.62	141	58
979.67	150	65
979.72	159	73
979.77	168	81
979.82	178	89
979.87	187	99
979.92	196	108
979.97	205	118
980.02	356	130
980.07	720	157
980.12	1,083	202
980.17	1,447	265
980.22	1,810	347
980.27	2,173	446
980.32	2,537	564
980.37	2,900	700
980.42	3,264	854
980.47	3,627	1,026
980.52	3,990	1,217
980.57	4,354	1,425
980.62	4,717	1,652
980.67	5,081	1,897
980.72	5,444	2,160
980.77	5,807	2,442
980.82	6,171	2,741
980.87	6,534	3,059
980.92	6,898	3,394
980.97	7,261	3,748
981.02	7,904	4,123
981.07	8,967	4,545
981.12	10,030	5,020
981.17	11,093	5,548
981.22	12,156	6,129
981.27	13,218	6,764
981.32	14,281	7,451
981.37	15,344	8,192
981.42	16,407	8,985
981.47	17,470	9,832
981.52	18,533	10,732
981.57	19,595	11,686
981.62	20,658	12,692
981.67	21,721	13,752
981.72	22,784	14,864
981.77	23,847	16,030
981.82	24,910	17,249
981.87	25,973	18,521
981.92	27,035	19,846
981.97	28,098	21,224
982.02	29,240	22,657
982.07	30,500	24,150
982.12	31,760	25,707
982.17	33,021	27,326
982.22	34,281	29,009
982.27	35,541	30,754
982.32	36,801	32,563
982.37	38,061	34,434
982.42	39,322	36,369
982.47	40,582	38,367
982.52	41,842	40,427
982.57	43,102	42,551
982.62	44,362	44,737
982.67	45,623	46,987
982.72	46,883	49,300
982.77	48,143	51,675
982.82	49,403	54,114
982.87	50,663	56,616
982.92	51,924	59,180
982.97	**53,184**	**61,808**

Summary for Subcatchment 1S-E: North

Runoff = 43.98 cfs @ 12.33 hrs, Volume= 3.597 af, Depth= 5.33"
Routed to Pond 1E : Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

	Area (ac)	CN	Description
*	0.304	98	
	7.793	82	Woods/grass comb., Fair, HSG D
	8.097	83	Weighted Average
	7.793	82	96.25% Pervious Area
	0.304	98	3.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0570	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
1.4	100	0.0550	1.17		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.6	100	0.0085	0.65		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.0	500	0.1700	2.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.9	800	Total			

Summary for Subcatchment 2S-E: East

Runoff = 7.71 cfs @ 12.29 hrs, Volume= 0.578 af, Depth= 4.88"
Routed to Reach 23R : East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

	Area (ac)	CN	Description
*	0.028	98	
	1.393	79	Woods, Fair, HSG D
	1.421	79	Weighted Average
	1.393	79	98.03% Pervious Area
	0.028	98	1.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	100	0.0380	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
2.1	100	0.0250	0.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.7	200	Total			

Summary for Subcatchment 3S-E: Southeast

Runoff = 2.82 cfs @ 12.33 hrs, Volume= 0.228 af, Depth= 4.88"
Routed to Reach 23R : East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

	Area (ac)	CN	Description
*	0.004	98	
	0.558	79	Woods, Fair, HSG D
	0.562	79	Weighted Average
	0.558	79	99.29% Pervious Area
	0.004	98	0.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0300	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
3.7	250	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.0	350	Total			

Summary for Subcatchment 4S-E: South

Runoff = 2.40 cfs @ 12.31 hrs, Volume= 0.187 af, Depth= 4.99"
Routed to Reach 38R : Plymouth Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

	Area (ac)	CN	Description
*	0.021	98	
	0.429	79	Woods, Fair, HSG D
	0.450	80	Weighted Average
	0.429	79	95.33% Pervious Area
	0.021	98	4.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.8	100	0.0250	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
0.5	35	0.0650	1.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.3	135	Total			

Summary for Subcatchment 5S-E: West

Runoff = 6.06 cfs @ 12.22 hrs, Volume= 0.392 af, Depth= 5.10"
Routed to Reach 38R : Plymouth Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

	Area (ac)	CN	Description
*	0.121	98	
	0.800	79	Woods, Fair, HSG D
	0.921	81	Weighted Average
	0.800	79	86.86% Pervious Area
	0.121	98	13.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0660	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
0.3	30	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.4	130	Total			

Summary for Subcatchment 10S-E: Northeast

Runoff = 0.38 cfs @ 12.16 hrs, Volume= 0.021 af, Depth= 5.22"
Routed to Reach 11R : North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

	Area (ac)	CN	Description
*	0.007	98	
	0.041	79	Woods, Fair, HSG D
	0.048	82	Weighted Average
	0.041	79	85.42% Pervious Area
	0.007	98	14.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	90	0.1500	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"

Summary for Subcatchment 11S-E: Wetland North

Runoff = 1.77 cfs @ 12.21 hrs, Volume= 0.110 af, Depth= 5.33"
Routed to Reach 11R : North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

	Area (ac)	CN	Description
*	0.047	98	
	0.200	79	Woods, Fair, HSG D
	0.247	83	Weighted Average
	0.200	79	80.97% Pervious Area
	0.047	98	19.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"

Summary for Reach 5R: (new Reach)

Inflow Area = 11.746 ac, 4.53% Impervious, Inflow Depth = 5.22" for 100-Year base event
Inflow = 32.70 cfs @ 12.27 hrs, Volume= 5.112 af
Outflow = 32.70 cfs @ 12.27 hrs, Volume= 5.112 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 11R: North

Inflow Area = 8.392 ac, 4.27% Impervious, Inflow Depth = 5.33" for 100-Year base event
Inflow = 14.37 cfs @ 12.26 hrs, Volume= 3.727 af
Outflow = 14.37 cfs @ 12.26 hrs, Volume= 3.727 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : (new Reach)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 23R: East

Inflow Area = 1.983 ac, 1.61% Impervious, Inflow Depth = 4.88" for 100-Year base event
Inflow = 10.48 cfs @ 12.30 hrs, Volume= 0.806 af
Outflow = 10.48 cfs @ 12.30 hrs, Volume= 0.806 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : (new Reach)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 38R: Plymouth Road

Inflow Area = 1.371 ac, 10.36% Impervious, Inflow Depth = 5.07" for 100-Year base event
Inflow = 8.19 cfs @ 12.24 hrs, Volume= 0.579 af
Outflow = 8.19 cfs @ 12.24 hrs, Volume= 0.579 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : (new Reach)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Pond 1E: Depression

Inflow Area = 8.097 ac, 3.75% Impervious, Inflow Depth = 5.33" for 100-Year base event
Inflow = 43.98 cfs @ 12.33 hrs, Volume= 3.597 af
Outflow = 13.63 cfs @ 12.77 hrs, Volume= 3.597 af, Atten= 69%, Lag= 26.7 min
Primary = 13.63 cfs @ 12.77 hrs, Volume= 3.597 af
Routed to Reach 11R : North

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Peak Elev= 982.62' @ 12.77 hrs Surf.Area= 44,347 sf Storage= 44,711 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 22.8 min (821.8 - 799.0)

Volume	Invert	Avail.Storage	Storage Description
#1	978.67'	63,415 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
978.67	10	0	0
979.00	26	6	6
980.00	211	119	124
981.00	7,479	3,845	3,969
982.00	28,736	18,108	22,077
983.00	53,940	41,338	63,415

Device	Routing	Invert	Outlet Devices
#1	Primary	978.35'	**18.0" Round Culvert** L= 275.0' Ke= 0.500 Inlet / Outlet Invert= 978.35' / 975.09' S= 0.0119 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	978.67'	**18.0" Round Culvert** L= 9.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 978.67' / 978.39' S= 0.0311 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=13.63 cfs @ 12.77 hrs HW=982.62' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 13.63 cfs @ 7.71 fps)
↑—**2=Culvert** (Passes 13.63 cfs of 15.22 cfs potential flow)

Stage-Area-Storage for Pond 1E: Depression

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
978.67	10	0
978.72	12	1
978.77	15	1
978.82	17	2
978.87	20	3
978.92	22	4
978.97	25	5
979.02	30	6
979.07	39	8
979.12	48	10
979.17	57	13
979.22	67	16
979.27	76	20
979.32	85	24
979.37	94	28
979.42	104	33
979.47	113	39
979.52	122	44
979.57	131	51
979.62	141	58
979.67	150	65
979.72	159	73
979.77	168	81
979.82	178	89
979.87	187	99
979.92	196	108
979.97	205	118
980.02	356	130
980.07	720	157
980.12	1,083	202
980.17	1,447	265
980.22	1,810	347
980.27	2,173	446
980.32	2,537	564
980.37	2,900	700
980.42	3,264	854
980.47	3,627	1,026
980.52	3,990	1,217
980.57	4,354	1,425
980.62	4,717	1,652
980.67	5,081	1,897
980.72	5,444	2,160
980.77	5,807	2,442
980.82	6,171	2,741
980.87	6,534	3,059
980.92	6,898	3,394
980.97	7,261	3,748
981.02	7,904	4,123
981.07	8,967	4,545
981.12	10,030	5,020
981.17	11,093	5,548
981.22	12,156	6,129
981.27	13,218	6,764
981.32	14,281	7,451
981.37	15,344	8,192
981.42	16,407	8,985
981.47	17,470	9,832
981.52	18,533	10,732
981.57	19,595	11,686
981.62	20,658	12,692
981.67	21,721	13,752
981.72	22,784	14,864
981.77	23,847	16,030
981.82	24,910	17,249
981.87	25,973	18,521
981.92	27,035	19,846
981.97	28,098	21,224
982.02	29,240	22,657
982.07	30,500	24,150
982.12	31,760	25,707
982.17	33,021	27,326
982.22	34,281	29,009
982.27	35,541	30,754
982.32	36,801	32,563
982.37	38,061	34,434
982.42	39,322	36,369
982.47	40,582	38,367
982.52	41,842	40,427
982.57	43,102	42,551
982.62	44,362	44,737
982.67	45,623	46,987
982.72	46,883	49,300
982.77	48,143	51,675
982.82	49,403	54,114
982.87	50,663	56,616
982.92	51,924	59,180
982.97	**53,184**	**61,808**

Summary for Subcatchment 1S-E: North

Runoff = 39.88 cfs @ 48.26 hrs, Volume= 4.363 af, Depth= 6.47"
Routed to Pond 1E : Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

	Area (ac)	CN	Description
*	0.304	98	
	7.793	82	Woods/grass comb., Fair, HSG D
	8.097	83	Weighted Average
	7.793	82	96.25% Pervious Area
	0.304	98	3.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0570	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
1.4	100	0.0550	1.17		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.6	100	0.0085	0.65		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.0	500	0.1700	2.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.9	800	Total			

Summary for Subcatchment 2S-E: East

Runoff = 7.03 cfs @ 48.22 hrs, Volume= 0.709 af, Depth= 5.98"
Routed to Reach 23R : East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

	Area (ac)	CN	Description
*	0.028	98	
	1.393	79	Woods, Fair, HSG D
	1.421	79	Weighted Average
	1.393	79	98.03% Pervious Area
	0.028	98	1.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	100	0.0380	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
2.1	100	0.0250	0.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.7	200	Total			

Summary for Subcatchment 3S-E: Southeast

Runoff = 2.59 cfs @ 48.27 hrs, Volume= 0.280 af, Depth= 5.98"
Routed to Reach 23R : East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

	Area (ac)	CN	Description
*	0.004	98	
	0.558	79	Woods, Fair, HSG D
	0.562	79	Weighted Average
	0.558	79	99.29% Pervious Area
	0.004	98	0.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0300	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
3.7	250	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.0	350	Total			

Summary for Subcatchment 4S-E: South

Runoff = 2.19 cfs @ 48.25 hrs, Volume= 0.229 af, Depth= 6.10"
Routed to Reach 38R : Plymouth Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

	Area (ac)	CN	Description
*	0.021	98	
	0.429	79	Woods, Fair, HSG D
	0.450	80	Weighted Average
	0.429	79	95.33% Pervious Area
	0.021	98	4.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.8	100	0.0250	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
0.5	35	0.0650	1.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.3	135	Total			

Summary for Subcatchment 5S-E: West

Runoff = 5.42 cfs @ 48.15 hrs, Volume= 0.478 af, Depth= 6.22"
Routed to Reach 38R : Plymouth Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

	Area (ac)	CN	Description
*	0.121	98	
	0.800	79	Woods, Fair, HSG D
	0.921	81	Weighted Average
	0.800	79	86.86% Pervious Area
	0.121	98	13.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0660	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
0.3	30	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.4	130	Total			

Summary for Subcatchment 10S-E: Northeast

Runoff = 0.33 cfs @ 48.08 hrs, Volume= 0.025 af, Depth= 6.35"
Routed to Reach 11R : North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

	Area (ac)	CN	Description
*	0.007	98	
	0.041	79	Woods, Fair, HSG D
	0.048	82	Weighted Average
	0.041	79	85.42% Pervious Area
	0.007	98	14.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	90	0.1500	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"

Summary for Subcatchment 11S-E: Wetland North

Runoff = 1.56 cfs @ 48.13 hrs, Volume= 0.133 af, Depth= 6.47"
Routed to Reach 11R : North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

	Area (ac)	CN	Description
*	0.047	98	
	0.200	79	Woods, Fair, HSG D
	0.247	83	Weighted Average
	0.200	79	80.97% Pervious Area
	0.047	98	19.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"

Summary for Reach 5R: (new Reach)

Inflow Area = 11.746 ac, 4.53% Impervious, Inflow Depth = 6.35" for 100-yr 96hr event
Inflow = 30.68 cfs @ 48.21 hrs, Volume= 6.217 af
Outflow = 30.68 cfs @ 48.21 hrs, Volume= 6.217 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 11R: North

Inflow Area = 8.392 ac, 4.27% Impervious, Inflow Depth = 6.46" for 100-yr 96hr event
Inflow = 14.10 cfs @ 48.53 hrs, Volume= 4.521 af
Outflow = 14.10 cfs @ 48.53 hrs, Volume= 4.521 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : (new Reach)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 23R: East

Inflow Area = 1.983 ac, 1.61% Impervious, Inflow Depth = 5.98" for 100-yr 96hr event
Inflow = 9.56 cfs @ 48.24 hrs, Volume= 0.989 af
Outflow = 9.56 cfs @ 48.24 hrs, Volume= 0.989 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : (new Reach)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 38R: Plymouth Road

Inflow Area = 1.371 ac, 10.36% Impervious, Inflow Depth = 6.19" for 100-yr 96hr event
Inflow = 7.37 cfs @ 48.17 hrs, Volume= 0.707 af
Outflow = 7.37 cfs @ 48.17 hrs, Volume= 0.707 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : (new Reach)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Pond 1E: Depression

Inflow Area = 8.097 ac, 3.75% Impervious, Inflow Depth = 6.47" for 100-yr 96hr event
Inflow = 39.88 cfs @ 48.26 hrs, Volume= 4.363 af
Outflow = 13.61 cfs @ 48.78 hrs, Volume= 4.363 af, Atten= 66%, Lag= 31.0 min
Primary = 13.61 cfs @ 48.78 hrs, Volume= 4.363 af
Routed to Reach 11R : North

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Peak Elev= 982.60' @ 48.78 hrs Surf.Area= 43,963 sf Storage= 44,037 cf

Plug-Flow detention time= 18.2 min calculated for 4.363 af (100% of inflow)
Center-of-Mass det. time= 18.1 min (3,086.2 - 3,068.2)

Volume	Invert	Avail.Storage	Storage Description
#1	978.67'	63,415 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
978.67	10	0	0
979.00	26	6	6
980.00	211	119	124
981.00	7,479	3,845	3,969
982.00	28,736	18,108	22,077
983.00	53,940	41,338	63,415

Device	Routing	Invert	Outlet Devices
#1	Primary	978.35'	**18.0" Round Culvert** L= 275.0' Ke= 0.500 Inlet / Outlet Invert= 978.35' / 975.09' S= 0.0119 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	978.67'	**18.0" Round Culvert** L= 9.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 978.67' / 978.39' S= 0.0311 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=13.61 cfs @ 48.78 hrs HW=982.60' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 13.61 cfs @ 7.70 fps)
↑—**2=Culvert** (Passes 13.61 cfs of 15.18 cfs potential flow)

Stage-Area-Storage for Pond 1E: Depression

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
978.67	10	0
978.72	12	1
978.77	15	1
978.82	17	2
978.87	20	3
978.92	22	4
978.97	25	5
979.02	30	6
979.07	39	8
979.12	48	10
979.17	57	13
979.22	67	16
979.27	76	20
979.32	85	24
979.37	94	28
979.42	104	33
979.47	113	39
979.52	122	44
979.57	131	51
979.62	141	58
979.67	150	65
979.72	159	73
979.77	168	81
979.82	178	89
979.87	187	99
979.92	196	108
979.97	205	118
980.02	356	130
980.07	720	157
980.12	1,083	202
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980.47	3,627	1,026
980.52	3,990	1,217
980.57	4,354	1,425
980.62	4,717	1,652
980.67	5,081	1,897
980.72	5,444	2,160
980.77	5,807	2,442
980.82	6,171	2,741
980.87	6,534	3,059
980.92	6,898	3,394
980.97	7,261	3,748
981.02	7,904	4,123
981.07	8,967	4,545
981.12	10,030	5,020
981.17	11,093	5,548
981.22	12,156	6,129
981.27	13,218	6,764
981.32	14,281	7,451
981.37	15,344	8,192
981.42	16,407	8,985
981.47	17,470	9,832
981.52	18,533	10,732
981.57	19,595	11,686
981.62	20,658	12,692
981.67	21,721	13,752
981.72	22,784	14,864
981.77	23,847	16,030
981.82	24,910	17,249
981.87	25,973	18,521
981.92	27,035	19,846
981.97	28,098	21,224
982.02	29,240	22,657
982.07	30,500	24,150
982.12	31,760	25,707
982.17	33,021	27,326
982.22	34,281	29,009
982.27	35,541	30,754
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982.37	38,061	34,434
982.42	39,322	36,369
982.47	40,582	38,367
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982.57	43,102	42,551
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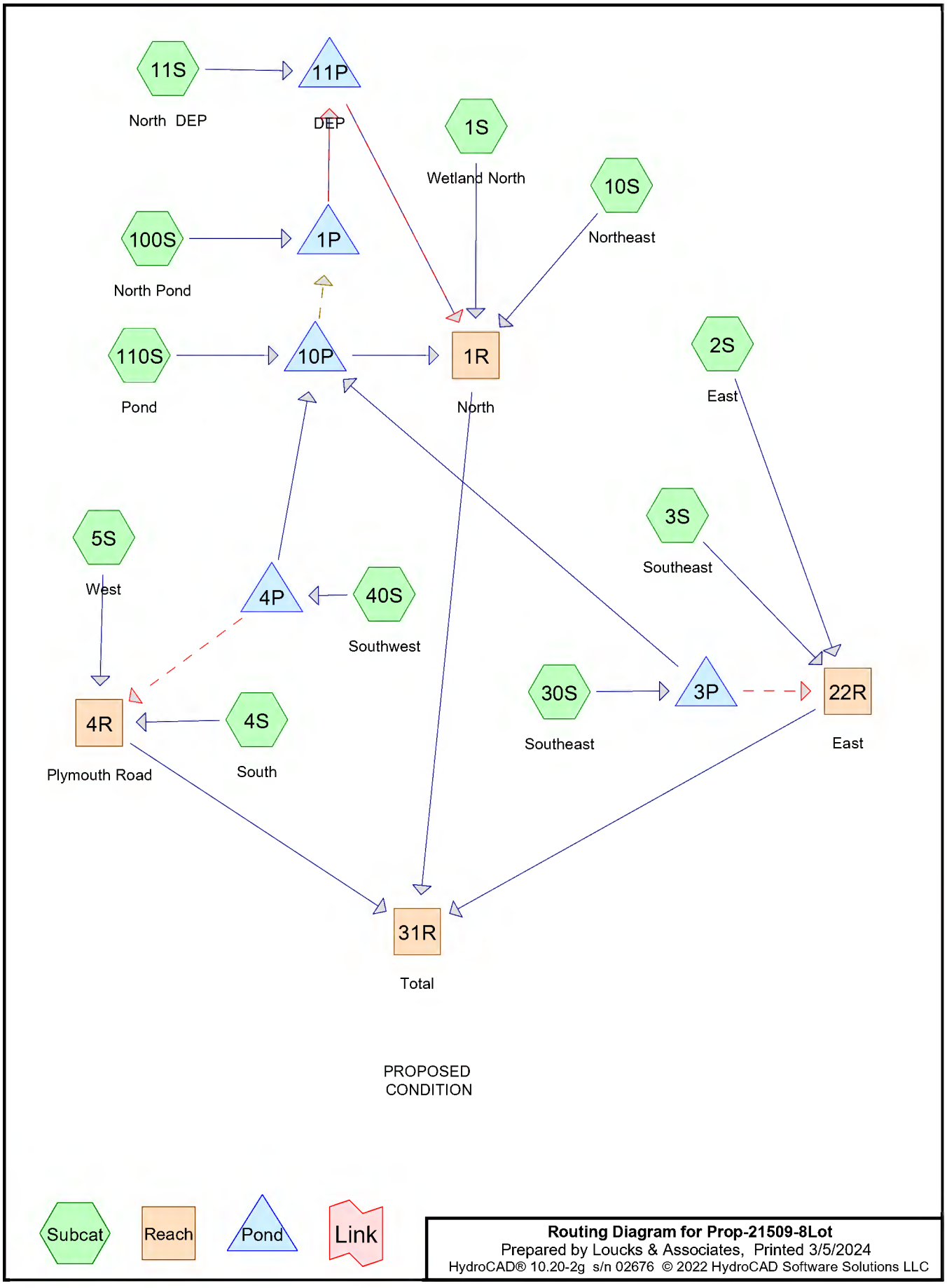
982.67	45,623	46,987
982.72	46,883	49,300
982.77	48,143	51,675
982.82	49,403	54,114
982.87	50,663	56,616
982.92	51,924	59,180
982.97	**53,184**	**61,808**

TABLE OF CONTENTS

100-yr 96hr Event

Appendix B

HydroCAD Report, Proposed
(1, 10, 100)



Routing Diagram for Prop-21509-8Lot
Prepared by Loucks & Associates, Printed 3/5/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	MSE 24-hr	3	Default	24.00	1	2.48	
2	10-Year	MSE 24-hr	3	Default	24.00	1	4.26	
3	100-Year base	MSE 24-hr	3	Default	24.00	1	7.32	
4	100-yr 96hr	PF_Depth_English_PDS 96-hr S1	100-yr	Default	96.00	1	8.51	

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.865	98	(1S, 4S, 5S, 10S, 11S, 100S, 110S)
4.451	80	>75% Grass cover, Good, HSG D (2S, 3S, 4S, 5S, 11S, 30S, 40S, 100S, 110S)
0.303	98	Unconnected pavement, HSG D (30S, 40S)
0.061	98	Unconnected roofs, HSG D (2S)
0.780	79	Woods, Fair, HSG D (1S, 3S, 4S, 5S, 10S, 30S)
3.287	79	Woods/grass comb., Good, HSG D (2S, 100S, 110S)
11.747	**85**	**TOTAL AREA**

Summary for Subcatchment 1S: Wetland North

Runoff = 0.35 cfs @ 12.22 hrs, Volume= 0.021 af, Depth= 1.04"
Routed to Reach 1R : North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

	Area (ac)	CN	Description
*	0.047	98	
	0.200	79	Woods, Fair, HSG D
	0.247	83	Weighted Average
	0.200	79	80.97% Pervious Area
	0.047	98	19.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"

Summary for Subcatchment 2S: East

Runoff = 1.14 cfs @ 12.28 hrs, Volume= 0.081 af, Depth= 0.88"
Routed to Reach 22R : East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

Area (ac)	CN	Adj	Description
0.061	98		Unconnected roofs, HSG D
0.568	80		>75% Grass cover, Good, HSG D
0.485	79		Woods/grass comb., Good, HSG D
1.114	81	80	Weighted Average, UI Adjusted
1.053	80	80	94.52% Pervious Area
0.061	98	98	5.48% Impervious Area
0.061			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	100	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
1.4	60	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.1	160	Total			

Summary for Subcatchment 3S: Southeast

Runoff = 0.04 cfs @ 12.24 hrs, Volume= 0.003 af, Depth= 0.88"
Routed to Reach 22R : East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

Area (ac)	CN	Description
0.000	98	Unconnected pavement, HSG D
0.015	79	Woods, Fair, HSG D
0.021	80	>75% Grass cover, Good, HSG D
0.036	80	Weighted Average
0.036	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	70	0.0280	0.08		**Sheet Flow,** n= 0.380 P2= 2.86"

Summary for Subcatchment 4S: South

Runoff = 0.60 cfs @ 12.25 hrs, Volume= 0.040 af, Depth= 1.10"
Routed to Reach 4R : Plymouth Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

	Area (ac)	CN	Description
*	0.099	98	
	0.302	80	>75% Grass cover, Good, HSG D
	0.030	79	Woods, Fair, HSG D
	0.431	84	Weighted Average
	0.332	80	77.03% Pervious Area
	0.099	98	22.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	85	0.0420	0.09		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 2.86"

Summary for Subcatchment 5S: West

Runoff = 1.02 cfs @ 12.29 hrs, Volume= 0.074 af, Depth= 1.04"
Routed to Reach 4R : Plymouth Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

	Area (ac)	CN	Description
*	0.177	98	
	0.265	80	>75% Grass cover, Good, HSG D
	0.410	79	Woods, Fair, HSG D
	0.852	83	Weighted Average
	0.675	79	79.23% Pervious Area
	0.177	98	20.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0300	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"
14.4	80	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
0.5	45	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.4	145	Total			

Summary for Subcatchment 10S: Northeast

Runoff = 0.07 cfs @ 12.17 hrs, Volume= 0.004 af, Depth= 0.98"
Routed to Reach 1R : North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

	Area (ac)	CN	Description
*	0.007	98	
	0.041	79	Woods, Fair, HSG D
	0.048	82	Weighted Average
	0.041	79	85.42% Pervious Area
	0.007	98	14.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	90	0.1500	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"

Summary for Subcatchment 11S: North DEP

Runoff = 0.50 cfs @ 12.15 hrs, Volume= 0.024 af, Depth= 0.98"
Routed to Pond 11P : DEP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

	Area (ac)	CN	Description
*	0.035	98	
	0.260	80	>75% Grass cover, Good, HSG D
	0.000	79	Woods/grass comb., Good, HSG D
	0.295	82	Weighted Average
	0.260	80	88.14% Pervious Area
	0.035	98	11.86% Impervious Area

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

Summary for Subcatchment 30S: Southeast

Runoff = 0.79 cfs @ 12.31 hrs, Volume= 0.060 af, Depth= 1.29"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

Area (ac)	CN	Description
0.220	98	Unconnected pavement, HSG D
0.084	79	Woods, Fair, HSG D
0.253	80	>75% Grass cover, Good, HSG D
0.557	87	Weighted Average
0.337	80	60.50% Pervious Area
0.220	98	39.50% Impervious Area
0.220		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0280	0.09		**Sheet Flow,** n= 0.380 P2= 2.86"
1.8	155	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.9	255	Total			

Summary for Subcatchment 40S: Southwest

Runoff = 0.35 cfs @ 12.17 hrs, Volume= 0.019 af, Depth= 1.59"
Routed to Pond 4P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

Area (ac)	CN	Description
0.083	98	Unconnected pavement, HSG D
0.000	79	Woods, Fair, HSG D
0.058	80	>75% Grass cover, Good, HSG D
0.141	91	Weighted Average
0.058	80	41.13% Pervious Area
0.083	98	58.87% Impervious Area
0.083		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	65	0.0280	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"

Summary for Subcatchment 100S: North Pond

Runoff = 1.81 cfs @ 12.26 hrs, Volume= 0.124 af, Depth= 0.98"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

	Area (ac)	CN	Description
*	0.180	98	
	0.924	80	>75% Grass cover, Good, HSG D
	0.404	79	Woods/grass comb., Good, HSG D
*	0.000	98	
*	0.000	80	
	1.508	82	Weighted Average
	1.328	80	88.06% Pervious Area
	0.180	98	11.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	110	0.0350	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"
0.3	81	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.0	641	0.0060	3.51	2.76	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
16.3	832	Total			

Summary for Subcatchment 110S: Pond

Runoff = 10.72 cfs @ 12.22 hrs, Volume= 0.667 af, Depth= 1.23"
Routed to Pond 10P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

	Area (ac)	CN	Description
*	2.320	98	
	1.800	80	>75% Grass cover, Good, HSG D
	2.398	79	Woods/grass comb., Good, HSG D
*	0.000	98	
*	0.000	80	
	6.518	86	Weighted Average
	4.198	79	64.41% Pervious Area
	2.320	98	35.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"
0.9	55	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.4	177	0.0850	2.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.7	332	Total			

Summary for Reach 1R: North

Inflow Area = 9.314 ac, 31.05% Impervious, Inflow Depth = 1.28" for 1-Year event
Inflow = 3.90 cfs @ 12.28 hrs, Volume= 0.997 af
Outflow = 3.90 cfs @ 12.28 hrs, Volume= 0.997 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 31R : Total

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 4R: Plymouth Road

Inflow Area = 1.283 ac, 21.51% Impervious, Inflow Depth = 1.06" for 1-Year event
Inflow = 1.61 cfs @ 12.27 hrs, Volume= 0.113 af
Outflow = 1.61 cfs @ 12.27 hrs, Volume= 0.113 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 31R : Total

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 22R: East

Inflow Area = 1.150 ac, 5.30% Impervious, Inflow Depth = 0.88" for 1-Year event
Inflow = 1.18 cfs @ 12.27 hrs, Volume= 0.084 af
Outflow = 1.18 cfs @ 12.27 hrs, Volume= 0.084 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 31R : Total

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 31R: Total

Inflow Area = 11.747 ac, 27.49% Impervious, Inflow Depth = 1.22" for 1-Year event
Inflow = 6.69 cfs @ 12.27 hrs, Volume= 1.194 af
Outflow = 6.69 cfs @ 12.27 hrs, Volume= 1.194 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Pond 1P:

Inflow Area = 1.508 ac, 11.94% Impervious, Inflow Depth = 0.98" for 1-Year event
Inflow = 1.81 cfs @ 12.26 hrs, Volume= 0.124 af
Outflow = 1.78 cfs @ 12.28 hrs, Volume= 0.124 af, Atten= 2%, Lag= 1.5 min
Primary = 1.78 cfs @ 12.28 hrs, Volume= 0.124 af
Routed to Pond 11P : DEP
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 11P : DEP

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Starting Elev= 978.00' Storage= 0 cf
Peak Elev= 980.18' @ 12.28 hrs Surf.Area= 358 sf Storage= 59 cf

Plug-Flow detention time= 0.4 min calculated for 0.124 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (829.1 - 828.6)

Volume	Invert	Avail.Storage	Storage Description
#1	979.45'	55,825 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
979.45	10	0	0
980.00	68	21	21
981.00	1,700	884	905
982.00	11,370	6,535	7,440
983.00	25,550	18,460	25,900
984.00	34,300	29,925	55,825

Device	Routing	Invert	Outlet Devices
#1	Primary	979.45'	**12.0" Round Culvert** L= 18.0' Ke= 0.500 Inlet / Outlet Invert= 979.45' / 978.80' S= 0.0361 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Primary	979.45'	**0.060 in/hr Exfiltration over Surface area above 978.00'** Excluded Surface area = 0 sf
#3	Secondary	981.50'	**2.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=1.76 cfs @ 12.28 hrs HW=980.17' TW=979.31' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.76 cfs @ 2.89 fps)
└─**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=979.45' TW=978.67' (Dynamic Tailwater)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 1P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
979.45	10	0
979.50	15	1
979.55	21	2
979.60	26	3
979.65	31	4
979.70	36	6
979.75	42	8
979.80	47	10
979.85	52	12
979.90	57	15
979.95	63	18
980.00	68	21
980.05	150	27
980.10	231	36
980.15	313	50
980.20	394	68
980.25	476	89
980.30	558	115
980.35	639	145
980.40	721	179
980.45	802	217
980.50	884	259
980.55	966	306
980.60	1,047	356
980.65	1,129	410
980.70	1,210	469
980.75	1,292	531
980.80	1,374	598
980.85	1,455	669
980.90	1,537	744
980.95	1,618	822
981.00	1,700	905
981.05	2,184	1,003
981.10	2,667	1,124
981.15	3,151	1,269
981.20	3,634	1,439
981.25	4,118	1,633
981.30	4,601	1,851
981.35	5,085	2,093
981.40	5,568	2,359
981.45	6,052	2,650
981.50	6,535	2,964
981.55	7,019	3,303
981.60	7,502	3,666
981.65	7,986	4,053
981.70	8,469	4,465
981.75	8,953	4,900
981.80	9,436	5,360
981.85	9,920	5,844
981.90	10,403	6,352
981.95	10,887	6,884
982.00	11,370	7,440
982.05	12,079	8,027
982.10	12,788	8,648
982.15	13,497	9,305
982.20	14,206	9,998
982.25	14,915	10,726
982.30	15,624	11,490
982.35	16,333	12,288
982.40	17,042	13,123
982.45	17,751	13,993
982.50	18,460	14,898
982.55	19,169	15,839
982.60	19,878	16,815
982.65	20,587	17,826
982.70	21,296	18,874
982.75	22,005	19,956
982.80	22,714	21,074
982.85	23,423	22,227
982.90	24,132	23,416
982.95	24,841	24,641
983.00	25,550	25,900
983.05	25,988	27,189
983.10	26,425	28,499
983.15	26,863	29,831
983.20	27,300	31,185
983.25	27,738	32,561
983.30	28,175	33,959
983.35	28,613	35,379
983.40	29,050	36,820
983.45	29,488	38,284
983.50	29,925	39,769
983.55	30,363	41,276
983.60	30,800	42,805
983.65	31,238	44,356
983.70	31,675	45,929
983.75	32,113	47,524
983.80	32,550	49,140
983.85	32,988	50,779
983.90	33,425	52,439
983.95	33,863	54,121
984.00	**34,300**	**55,825**

Summary for Pond 3P:

Inflow Area = 0.557 ac, 39.50% Impervious, Inflow Depth = 1.29" for 1-Year event
Inflow = 0.79 cfs @ 12.31 hrs, Volume= 0.060 af
Outflow = 0.78 cfs @ 12.32 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.6 min
Discarded = 0.00 cfs @ 12.32 hrs, Volume= 0.000 af
Primary = 0.78 cfs @ 12.32 hrs, Volume= 0.060 af
Routed to Pond 10P :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 22R : East

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Peak Elev= 1,014.22' @ 12.32 hrs Surf.Area= 214 sf Storage= 42 cf

Plug-Flow detention time= 1.6 min calculated for 0.060 af (100% of inflow)
Center-of-Mass det. time= 1.6 min (820.8 - 819.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1,014.00'	779 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,014.00	175	0	0
1,015.00	355	265	265
1,015.50	525	220	485
1,016.00	650	294	779

Device	Routing	Invert	Outlet Devices
#1	Secondary	1,015.00'	**1.2' long x 1.2' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.66 2.69 2.71 2.78 2.89 2.99 3.09 3.20 3.21 3.19 3.30 3.32
#2	Discarded	1,014.00'	**0.060 in/hr Exfiltration over Surface area**
#3	Device 4	1,014.00'	**15.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads
#4	Primary	1,011.00'	**8.0" Round Culvert** L= 117.0' Ke= 0.500 Inlet / Outlet Invert= 1,011.00' / 1,009.71' S= 0.0110 '/' Cc= 0.900 n= 0.015, Flow Area= 0.35 sf

Discarded OutFlow Max=0.00 cfs @ 12.32 hrs HW=1,014.22' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.77 cfs @ 12.32 hrs HW=1,014.22' TW=980.37' (Dynamic Tailwater)
└**4=Culvert** (Passes 0.77 cfs of 1.74 cfs potential flow)
└**3=Orifice/Grate** (Weir Controls 0.77 cfs @ 0.91 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,014.00' TW=0.00' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 3P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
1,014.00	175	0
1,014.02	179	4
1,014.04	182	7
1,014.06	186	11
1,014.08	189	15
1,014.10	193	18
1,014.12	197	22
1,014.14	200	26
1,014.16	204	30
1,014.18	207	34
1,014.20	211	39
1,014.22	215	43
1,014.24	218	47
1,014.26	222	52
1,014.28	225	56
1,014.30	229	61
1,014.32	233	65
1,014.34	236	70
1,014.36	240	75
1,014.38	243	79
1,014.40	247	84
1,014.42	251	89
1,014.44	254	94
1,014.46	258	100
1,014.48	261	105
1,014.50	265	110
1,014.52	269	115
1,014.54	272	121
1,014.56	276	126
1,014.58	279	132
1,014.60	283	137
1,014.62	287	143
1,014.64	290	149
1,014.66	294	155
1,014.68	297	161
1,014.70	301	167
1,014.72	305	173
1,014.74	308	179
1,014.76	312	185
1,014.78	315	191
1,014.80	319	198
1,014.82	323	204
1,014.84	326	211
1,014.86	330	217
1,014.88	333	224
1,014.90	337	230
1,014.92	341	237
1,014.94	344	244
1,014.96	348	251
1,014.98	351	258
1,015.00	355	265
1,015.02	362	272
1,015.04	369	279
1,015.06	375	287
1,015.08	382	294
1,015.10	389	302
1,015.12	396	310
1,015.14	403	318
1,015.16	409	326
1,015.18	416	334
1,015.20	423	343
1,015.22	430	351
1,015.24	437	360
1,015.26	443	369
1,015.28	450	378
1,015.30	457	387
1,015.32	464	396
1,015.34	471	405
1,015.36	477	415
1,015.38	484	424
1,015.40	491	434
1,015.42	498	444
1,015.44	505	454
1,015.46	511	464
1,015.48	518	475
1,015.50	525	485
1,015.52	530	496
1,015.54	535	506
1,015.56	540	517
1,015.58	545	528
1,015.60	550	539
1,015.62	555	550
1,015.64	560	561
1,015.66	565	572
1,015.68	570	584
1,015.70	575	595
1,015.72	580	607
1,015.74	585	618
1,015.76	590	630
1,015.78	595	642
1,015.80	600	654
1,015.82	605	666
1,015.84	610	678
1,015.86	615	690
1,015.88	620	703
1,015.90	625	715
1,015.92	630	728
1,015.94	635	740
1,015.96	640	753
1,015.98	645	766
1,016.00	**650**	**779**

Summary for Pond 4P:

Inflow Area = 0.141 ac, 58.87% Impervious, Inflow Depth = 1.59" for 1-Year event
Inflow = 0.35 cfs @ 12.17 hrs, Volume= 0.019 af
Outflow = 0.34 cfs @ 12.17 hrs, Volume= 0.019 af, Atten= 1%, Lag= 0.5 min
Discarded = 0.00 cfs @ 12.17 hrs, Volume= 0.000 af
Primary = 0.34 cfs @ 12.17 hrs, Volume= 0.019 af
Routed to Pond 10P :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 4R : Plymouth Road

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Peak Elev= 1,020.13' @ 12.17 hrs Surf.Area= 94 sf Storage= 10 cf

Plug-Flow detention time= 0.9 min calculated for 0.019 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (796.9 - 796.0)

Volume	Invert	Avail.Storage	Storage Description
#1	1,020.00'	761 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,020.00	65	0	0
1,021.00	295	180	180
1,021.50	590	221	401
1,022.00	850	360	761

Device	Routing	Invert	Outlet Devices
#1	Secondary	1,021.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	1,020.00'	**0.060 in/hr Exfiltration over Surface area**
#3	Primary	1,020.00'	**15.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 12.17 hrs HW=1,020.12' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.33 cfs @ 12.17 hrs HW=1,020.12' TW=979.91' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Weir Controls 0.33 cfs @ 0.69 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,020.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 4P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
1,020.00	65	0
1,020.02	70	1
1,020.04	74	3
1,020.06	79	4
1,020.08	83	6
1,020.10	88	8
1,020.12	93	9
1,020.14	97	11
1,020.16	102	13
1,020.18	106	15
1,020.20	111	18
1,020.22	116	20
1,020.24	120	22
1,020.26	125	25
1,020.28	129	27
1,020.30	134	30
1,020.32	139	33
1,020.34	143	35
1,020.36	148	38
1,020.38	152	41
1,020.40	157	44
1,020.42	162	48
1,020.44	166	51
1,020.46	171	54
1,020.48	175	58
1,020.50	180	61
1,020.52	185	65
1,020.54	189	69
1,020.56	194	72
1,020.58	198	76
1,020.60	203	80
1,020.62	208	85
1,020.64	212	89
1,020.66	217	93
1,020.68	221	97
1,020.70	226	102
1,020.72	231	106
1,020.74	235	111
1,020.76	240	116
1,020.78	244	121
1,020.80	249	126
1,020.82	254	131
1,020.84	258	136
1,020.86	263	141
1,020.88	267	146
1,020.90	272	152
1,020.92	277	157
1,020.94	281	163
1,020.96	286	168
1,020.98	290	174
1,021.00	295	180
1,021.02	307	186
1,021.04	319	192
1,021.06	330	199
1,021.08	342	205
1,021.10	354	212
1,021.12	366	220
1,021.14	378	227
1,021.16	389	235
1,021.18	401	243
1,021.20	413	251
1,021.22	425	259
1,021.24	437	268
1,021.26	448	277
1,021.28	460	286
1,021.30	472	295
1,021.32	484	305
1,021.34	496	314
1,021.36	507	324
1,021.38	519	335
1,021.40	531	345
1,021.42	543	356
1,021.44	555	367
1,021.46	566	378
1,021.48	578	390
1,021.50	590	401
1,021.52	600	413
1,021.54	611	425
1,021.56	621	438
1,021.58	632	450
1,021.60	642	463
1,021.62	652	476
1,021.64	663	489
1,021.66	673	502
1,021.68	684	516
1,021.70	694	530
1,021.72	704	544
1,021.74	715	558
1,021.76	725	572
1,021.78	736	587
1,021.80	746	602
1,021.82	756	617
1,021.84	767	632
1,021.86	777	647
1,021.88	788	663
1,021.90	798	679
1,021.92	808	695
1,021.94	819	711
1,021.96	829	728
1,021.98	840	744
1,022.00	**850**	**761**

Summary for Pond 10P:

Inflow Area = 7.216 ac, 36.35% Impervious, Inflow Depth = 1.24" for 1-Year event
Inflow = 11.65 cfs @ 12.22 hrs, Volume= 0.745 af
Outflow = 1.89 cfs @ 12.81 hrs, Volume= 0.824 af, Atten= 84%, Lag= 35.1 min
Primary = 1.89 cfs @ 12.81 hrs, Volume= 0.824 af
Routed to Reach 1R : North
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 1P :
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 1P :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Starting Elev= 979.50' Surf.Area= 3,765 sf Storage= 12,596 cf
Peak Elev= 980.72' @ 12.81 hrs Surf.Area= 12,575 sf Storage= 24,542 cf (11,946 cf above start)

Plug-Flow detention time= 257.3 min calculated for 0.535 af (72% of inflow)
Center-of-Mass det. time= 38.3 min (853.4 - 815.2)

Volume	Invert	Avail.Storage	Storage Description
#1	972.00'	79,336 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
972.00	320	0	0
975.00	975	1,943	1,943
977.00	2,225	3,200	5,143
979.00	3,430	5,655	10,798
979.50	3,765	1,799	12,596
980.00	10,595	3,590	16,186
981.00	13,340	11,968	28,154
982.00	15,880	14,610	42,764
983.00	18,360	17,120	59,884
984.00	20,545	19,453	79,336

Device	Routing	Invert	Outlet Devices
#1	Primary	978.28'	**12.0" Round Culvert** L= 175.0' Ke= 0.500 Inlet / Outlet Invert= 978.28' / 977.40' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	980.70'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	981.00'	**48.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads
#4	Device 1	978.50'	**8.0" Round Culvert X 2.00** L= 100.0' Ke= 0.500 Inlet / Outlet Invert= 978.50' / 978.50' S= 0.0000 '/' Cc= 0.900 n= 0.020, Flow Area= 0.35 sf
#5	Secondary	983.60'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#6	Tertiary	981.05'	**12.0" Round Culvert** L= 30.0' Ke= 0.500

			Inlet / Outlet Invert= 981.05' / 980.90' S= 0.0050 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf
#7	Device 6	976.00'	**12.0" Round Culvert** L= 50.0' Ke= 0.500
			Inlet / Outlet Invert= 976.00' / 975.75' S= 0.0050 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf
#8	Device 6	982.50'	**48.0" Horiz. Orifice/Grate X 0.60** C= 0.600

Primary OutFlow Max=1.89 cfs @ 12.81 hrs HW=980.72' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 1.89 cfs of 3.63 cfs potential flow)
  - **2=Sharp-Crested Rectangular Weir** (Weir Controls 0.04 cfs @ 0.48 fps)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **4=Culvert** (Barrel Controls 1.85 cfs @ 2.65 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=979.50' TW=979.45' (Dynamic Tailwater)
- **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=979.50' TW=979.45' (Dynamic Tailwater)
- **6=Culvert** (Controls 0.00 cfs)
  - **7=Culvert** (Controls 0.00 cfs)
  - **8=Orifice/Grate** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 10P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
972.00	320	0
972.20	364	68
972.40	407	145
972.60	451	231
972.80	495	326
973.00	538	429
973.20	582	541
973.40	626	662
973.60	669	791
973.80	713	930
974.00	757	1,077
974.20	800	1,232
974.40	844	1,397
974.60	888	1,570
974.80	931	1,752
975.00	975	1,943
975.20	1,100	2,150
975.40	1,225	2,382
975.60	1,350	2,640
975.80	1,475	2,922
976.00	1,600	3,230
976.20	1,725	3,563
976.40	1,850	3,920
976.60	1,975	4,303
976.80	2,100	4,710
977.00	2,225	5,143
977.20	2,346	5,600
977.40	2,466	6,081
977.60	2,587	6,586
977.80	2,707	7,115
978.00	2,828	7,669
978.20	2,948	8,246
978.40	3,068	8,848
978.60	3,189	9,474
978.80	3,309	10,124
979.00	3,430	10,798
979.20	3,564	11,497
979.40	3,698	12,223
979.60	5,131	13,041
979.80	7,863	14,340
980.00	10,595	16,186
980.20	11,144	18,360
980.40	11,693	20,644
980.60	12,242	23,037
980.80	12,791	25,541
981.00	13,340	28,154
981.20	13,848	30,873
981.40	14,356	33,693
981.60	14,864	36,615
981.80	15,372	39,639
982.00	15,880	42,764
982.20	16,376	45,989
982.40	16,872	49,314
982.60	17,368	52,738
982.80	17,864	56,261
983.00	18,360	59,884
983.20	18,797	63,599
983.40	19,234	67,403
983.60	19,671	71,293
983.80	20,108	75,271
984.00	**20,545**	**79,336**

Summary for Pond 11P: DEP

Inflow Area = 1.803 ac, 11.92% Impervious, Inflow Depth = 0.98" for 1-Year event
Inflow = 2.00 cfs @ 12.26 hrs, Volume= 0.148 af
Outflow = 2.00 cfs @ 12.27 hrs, Volume= 0.148 af, Atten= 0%, Lag= 0.2 min
Primary = 2.00 cfs @ 12.27 hrs, Volume= 0.148 af
Routed to Reach 1R : North

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Peak Elev= 979.32' @ 12.27 hrs Surf.Area= 25 sf Storage= 11 cf

Plug-Flow detention time= 1.3 min calculated for 0.148 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (827.8 - 827.6)

Volume	Invert	Avail.Storage	Storage Description
#1	978.67'	2,228 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
978.67	10	0	0
980.00	40	33	33
981.00	770	405	438
982.00	2,810	1,790	2,228

Device	Routing	Invert	Outlet Devices
#1	Primary	978.67'	**18.0" Round Culvert** L= 9.0' Ke= 0.500 Inlet / Outlet Invert= 978.67' / 978.39' S= 0.0311 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=1.99 cfs @ 12.27 hrs HW=979.32' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 1.99 cfs @ 4.03 fps)

Stage-Area-Storage for Pond 11P: DEP

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
978.67	10	0
978.72	11	1
978.77	12	1
978.82	13	2
978.87	15	2
978.92	16	3
978.97	17	4
979.02	18	5
979.07	19	6
979.12	20	7
979.17	21	8
979.22	22	9
979.27	24	10
979.32	25	11
979.37	26	13
979.42	27	14
979.47	28	15
979.52	29	17
979.57	30	18
979.62	31	20
979.67	33	21
979.72	34	23
979.77	35	25
979.82	36	26
979.87	37	28
979.92	38	30
979.97	39	32
980.02	55	34
980.07	91	38
980.12	128	43
980.17	164	51
980.22	201	60
980.27	237	71
980.32	274	83
980.37	310	98
980.42	347	114
980.47	383	133
980.52	420	153
980.57	456	175
980.62	493	198
980.67	529	224
980.72	566	251
980.77	602	280
980.82	639	311
980.87	675	344
980.92	712	379
980.97	748	415
981.02	811	454
981.07	913	497
981.12	1,015	545
981.17	1,117	599
981.22	1,219	657
981.27	1,321	721
981.32	1,423	789
981.37	1,525	863
981.42	1,627	942
981.47	1,729	1,025
981.52	1,831	1,114
981.57	1,933	1,209
981.62	2,035	1,308
981.67	2,137	1,412
981.72	2,239	1,521
981.77	2,341	1,636
981.82	2,443	1,755
981.87	2,545	1,880
981.92	2,647	2,010
981.97	**2,749**	**2,145**

Summary for Subcatchment 1S: Wetland North

Runoff = 0.86 cfs @ 12.21 hrs, Volume= 0.052 af, Depth= 2.51"
Routed to Reach 1R : North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (ac)	CN	Description
*	0.047	98	
	0.200	79	Woods, Fair, HSG D
	0.247	83	Weighted Average
	0.200	79	80.97% Pervious Area
	0.047	98	19.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"

Summary for Subcatchment 2S: East

Runoff = 3.04 cfs @ 12.26 hrs, Volume= 0.210 af, Depth= 2.26"
Routed to Reach 22R : East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (ac)	CN	Adj	Description
0.061	98		Unconnected roofs, HSG D
0.568	80		>75% Grass cover, Good, HSG D
0.485	79		Woods/grass comb., Good, HSG D
1.114	81	80	Weighted Average, UI Adjusted
1.053	80	80	94.52% Pervious Area
0.061	98	98	5.48% Impervious Area
0.061			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	100	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
1.4	60	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.1	160	Total			

Summary for Subcatchment 3S: Southeast

Runoff = 0.11 cfs @ 12.23 hrs, Volume= 0.007 af, Depth= 2.26"
Routed to Reach 22R : East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (ac)	CN	Description
0.000	98	Unconnected pavement, HSG D
0.015	79	Woods, Fair, HSG D
0.021	80	>75% Grass cover, Good, HSG D
0.036	80	Weighted Average
0.036	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	70	0.0280	0.08		**Sheet Flow,** n= 0.380 P2= 2.86"

Summary for Subcatchment 4S: South

Runoff = 1.43 cfs @ 12.24 hrs, Volume= 0.093 af, Depth= 2.60"
Routed to Reach 4R : Plymouth Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (ac)	CN	Description
*	0.099	98	
	0.302	80	>75% Grass cover, Good, HSG D
	0.030	79	Woods, Fair, HSG D
	0.431	84	Weighted Average
	0.332	80	77.03% Pervious Area
	0.099	98	22.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	85	0.0420	0.09		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 2.86"

Summary for Subcatchment 5S: West

Runoff = 2.50 cfs @ 12.27 hrs, Volume= 0.178 af, Depth= 2.51"
Routed to Reach 4R : Plymouth Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (ac)	CN	Description
*	0.177	98	
	0.265	80	>75% Grass cover, Good, HSG D
	0.410	79	Woods, Fair, HSG D
	0.852	83	Weighted Average
	0.675	79	79.23% Pervious Area
	0.177	98	20.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0300	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"
14.4	80	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
0.5	45	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.4	145	Total			

Summary for Subcatchment 10S: Northeast

Runoff = 0.18 cfs @ 12.17 hrs, Volume= 0.010 af, Depth= 2.43"
Routed to Reach 1R : North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (ac)	CN	Description
*	0.007	98	
	0.041	79	Woods, Fair, HSG D
	0.048	82	Weighted Average
	0.041	79	85.42% Pervious Area
	0.007	98	14.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	90	0.1500	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"

Summary for Subcatchment 11S: North DEP

Runoff = 1.24 cfs @ 12.14 hrs, Volume= 0.060 af, Depth= 2.43"
Routed to Pond 11P : DEP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (ac)	CN	Description
*	0.035	98	
	0.260	80	>75% Grass cover, Good, HSG D
	0.000	79	Woods/grass comb., Good, HSG D
	0.295	82	Weighted Average
	0.260	80	88.14% Pervious Area
	0.035	98	11.86% Impervious Area

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

Summary for Subcatchment 30S: Southeast

Runoff = 1.73 cfs @ 12.31 hrs, Volume= 0.134 af, Depth= 2.88"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (ac)	CN	Description
0.220	98	Unconnected pavement, HSG D
0.084	79	Woods, Fair, HSG D
0.253	80	>75% Grass cover, Good, HSG D
0.557	87	Weighted Average
0.337	80	60.50% Pervious Area
0.220	98	39.50% Impervious Area
0.220		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0280	0.09		**Sheet Flow,** n= 0.380 P2= 2.86"
1.8	155	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.9	255	Total			

Summary for Subcatchment 40S: Southwest

Runoff = 0.69 cfs @ 12.16 hrs, Volume= 0.038 af, Depth= 3.27"
Routed to Pond 4P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (ac)	CN	Description
0.083	98	Unconnected pavement, HSG D
0.000	79	Woods, Fair, HSG D
0.058	80	>75% Grass cover, Good, HSG D
0.141	91	Weighted Average
0.058	80	41.13% Pervious Area
0.083	98	58.87% Impervious Area
0.083		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	65	0.0280	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"

Summary for Subcatchment 100S: North Pond

Runoff = 4.53 cfs @ 12.25 hrs, Volume= 0.305 af, Depth= 2.43"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (ac)	CN	Description
*	0.180	98	
	0.924	80	>75% Grass cover, Good, HSG D
	0.404	79	Woods/grass comb., Good, HSG D
*	0.000	98	
*	0.000	80	
	1.508	82	Weighted Average
	1.328	80	88.06% Pervious Area
	0.180	98	11.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	110	0.0350	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"
0.3	81	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.0	641	0.0060	3.51	2.76	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
16.3	832	Total			

Summary for Subcatchment 110S: Pond

Runoff = 24.04 cfs @ 12.22 hrs, Volume= 1.512 af, Depth= 2.78"
Routed to Pond 10P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (ac)	CN	Description
*	2.320	98	
	1.800	80	>75% Grass cover, Good, HSG D
	2.398	79	Woods/grass comb., Good, HSG D
*	0.000	98	
*	0.000	80	
	6.518	86	Weighted Average
	4.198	79	64.41% Pervious Area
	2.320	98	35.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"
0.9	55	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.4	177	0.0850	2.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.7	332	Total			

Summary for Reach 1R: North

Inflow Area = 9.314 ac, 31.05% Impervious, Inflow Depth = 2.82" for 10-Year event
Inflow = 9.16 cfs @ 12.37 hrs, Volume= 2.188 af
Outflow = 9.16 cfs @ 12.37 hrs, Volume= 2.188 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 31R : Total

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 4R: Plymouth Road

Inflow Area = 1.283 ac, 21.51% Impervious, Inflow Depth = 2.54" for 10-Year event
Inflow = 3.89 cfs @ 12.26 hrs, Volume= 0.272 af
Outflow = 3.89 cfs @ 12.26 hrs, Volume= 0.272 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 31R : Total

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 22R: East

Inflow Area = 1.150 ac, 5.30% Impervious, Inflow Depth = 2.26" for 10-Year event
Inflow = 3.14 cfs @ 12.26 hrs, Volume= 0.216 af
Outflow = 3.14 cfs @ 12.26 hrs, Volume= 0.216 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 31R : Total

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 31R: Total

Inflow Area = 11.747 ac, 27.49% Impervious, Inflow Depth = 2.73" for 10-Year event
Inflow = 16.09 cfs @ 12.27 hrs, Volume= 2.676 af
Outflow = 16.09 cfs @ 12.27 hrs, Volume= 2.676 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Pond 1P:

Inflow Area = 1.508 ac, 11.94% Impervious, Inflow Depth = 3.51" for 10-Year event
Inflow = 4.79 cfs @ 12.30 hrs, Volume= 0.442 af
Outflow = 4.01 cfs @ 12.46 hrs, Volume= 0.442 af, Atten= 16%, Lag= 9.7 min
Primary = 4.01 cfs @ 12.46 hrs, Volume= 0.442 af
Routed to Pond 11P : DEP
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 11P : DEP

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Starting Elev= 978.00' Storage= 0 cf
Peak Elev= 981.07' @ 12.46 hrs Surf.Area= 2,424 sf Storage= 1,060 cf

Plug-Flow detention time= 1.9 min calculated for 0.441 af (100% of inflow)
Center-of-Mass det. time= 1.9 min (800.0 - 798.1)

Volume	Invert	Avail.Storage	Storage Description
#1	979.45'	55,825 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
979.45	10	0	0
980.00	68	21	21
981.00	1,700	884	905
982.00	11,370	6,535	7,440
983.00	25,550	18,460	25,900
984.00	34,300	29,925	55,825

Device	Routing	Invert	Outlet Devices
#1	Primary	979.45'	**12.0" Round Culvert** L= 18.0' Ke= 0.500 Inlet / Outlet Invert= 979.45' / 978.80' S= 0.0361 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Primary	979.45'	**0.060 in/hr Exfiltration over Surface area above 978.00'** Excluded Surface area = 0 sf
#3	Secondary	981.50'	**2.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=4.01 cfs @ 12.46 hrs HW=981.07' TW=979.71' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.01 cfs @ 5.10 fps)
└─**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=979.45' TW=978.67' (Dynamic Tailwater)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 1P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
979.45	10	0
979.50	15	1
979.55	21	2
979.60	26	3
979.65	31	4
979.70	36	6
979.75	42	8
979.80	47	10
979.85	52	12
979.90	57	15
979.95	63	18
980.00	68	21
980.05	150	27
980.10	231	36
980.15	313	50
980.20	394	68
980.25	476	89
980.30	558	115
980.35	639	145
980.40	721	179
980.45	802	217
980.50	884	259
980.55	966	306
980.60	1,047	356
980.65	1,129	410
980.70	1,210	469
980.75	1,292	531
980.80	1,374	598
980.85	1,455	669
980.90	1,537	744
980.95	1,618	822
981.00	1,700	905
981.05	2,184	1,003
981.10	2,667	1,124
981.15	3,151	1,269
981.20	3,634	1,439
981.25	4,118	1,633
981.30	4,601	1,851
981.35	5,085	2,093
981.40	5,568	2,359
981.45	6,052	2,650
981.50	6,535	2,964
981.55	7,019	3,303
981.60	7,502	3,666
981.65	7,986	4,053
981.70	8,469	4,465
981.75	8,953	4,900
981.80	9,436	5,360
981.85	9,920	5,844
981.90	10,403	6,352
981.95	10,887	6,884
982.00	11,370	7,440
982.05	12,079	8,027
982.10	12,788	8,648
982.15	13,497	9,305
982.20	14,206	9,998
982.25	14,915	10,726
982.30	15,624	11,490
982.35	16,333	12,288
982.40	17,042	13,123
982.45	17,751	13,993
982.50	18,460	14,898
982.55	19,169	15,839
982.60	19,878	16,815
982.65	20,587	17,826
982.70	21,296	18,874
982.75	22,005	19,956
982.80	22,714	21,074
982.85	23,423	22,227
982.90	24,132	23,416
982.95	24,841	24,641
983.00	25,550	25,900
983.05	25,988	27,189
983.10	26,425	28,499
983.15	26,863	29,831
983.20	27,300	31,185
983.25	27,738	32,561
983.30	28,175	33,959
983.35	28,613	35,379
983.40	29,050	36,820
983.45	29,488	38,284
983.50	29,925	39,769
983.55	30,363	41,276
983.60	30,800	42,805
983.65	31,238	44,356
983.70	31,675	45,929
983.75	32,113	47,524
983.80	32,550	49,140
983.85	32,988	50,779
983.90	33,425	52,439
983.95	33,863	54,121
984.00	**34,300**	**55,825**

Summary for Pond 3P:

Inflow Area = 0.557 ac, 39.50% Impervious, Inflow Depth = 2.88" for 10-Year event
Inflow = 1.73 cfs @ 12.31 hrs, Volume= 0.134 af
Outflow = 1.73 cfs @ 12.31 hrs, Volume= 0.134 af, Atten= 0%, Lag= 0.6 min
Discarded = 0.00 cfs @ 12.32 hrs, Volume= 0.000 af
Primary = 1.73 cfs @ 12.31 hrs, Volume= 0.133 af
Routed to Pond 10P :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 22R : East

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Peak Elev= 1,014.37' @ 12.32 hrs Surf.Area= 241 sf Storage= 77 cf

Plug-Flow detention time= 1.3 min calculated for 0.133 af (100% of inflow)
Center-of-Mass det. time= 1.3 min (804.5 - 803.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1,014.00'	779 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,014.00	175	0	0
1,015.00	355	265	265
1,015.50	525	220	485
1,016.00	650	294	779

Device	Routing	Invert	Outlet Devices
#1	Secondary	1,015.00'	**1.2' long x 1.2' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.66 2.69 2.71 2.78 2.89 2.99 3.09 3.20 3.21 3.19 3.30 3.32
#2	Discarded	1,014.00'	**0.060 in/hr Exfiltration over Surface area**
#3	Device 4	1,014.00'	**15.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads
#4	Primary	1,011.00'	**8.0" Round Culvert** L= 117.0' Ke= 0.500 Inlet / Outlet Invert= 1,011.00' / 1,009.71' S= 0.0110 '/' Cc= 0.900 n= 0.015, Flow Area= 0.35 sf

Discarded OutFlow Max=0.00 cfs @ 12.32 hrs HW=1,014.37' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.71 cfs @ 12.31 hrs HW=1,014.37' TW=981.54' (Dynamic Tailwater)
└**4=Culvert** (Passes 1.71 cfs of 1.78 cfs potential flow)
└**3=Orifice/Grate** (Weir Controls 1.71 cfs @ 1.19 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,014.00' TW=0.00' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 3P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
1,014.00	175	0
1,014.02	179	4
1,014.04	182	7
1,014.06	186	11
1,014.08	189	15
1,014.10	193	18
1,014.12	197	22
1,014.14	200	26
1,014.16	204	30
1,014.18	207	34
1,014.20	211	39
1,014.22	215	43
1,014.24	218	47
1,014.26	222	52
1,014.28	225	56
1,014.30	229	61
1,014.32	233	65
1,014.34	236	70
1,014.36	240	75
1,014.38	243	79
1,014.40	247	84
1,014.42	251	89
1,014.44	254	94
1,014.46	258	100
1,014.48	261	105
1,014.50	265	110
1,014.52	269	115
1,014.54	272	121
1,014.56	276	126
1,014.58	279	132
1,014.60	283	137
1,014.62	287	143
1,014.64	290	149
1,014.66	294	155
1,014.68	297	161
1,014.70	301	167
1,014.72	305	173
1,014.74	308	179
1,014.76	312	185
1,014.78	315	191
1,014.80	319	198
1,014.82	323	204
1,014.84	326	211
1,014.86	330	217
1,014.88	333	224
1,014.90	337	230
1,014.92	341	237
1,014.94	344	244
1,014.96	348	251
1,014.98	351	258
1,015.00	355	265
1,015.02	362	272
1,015.04	369	279
1,015.06	375	287
1,015.08	382	294
1,015.10	389	302
1,015.12	396	310
1,015.14	403	318
1,015.16	409	326
1,015.18	416	334
1,015.20	423	343
1,015.22	430	351
1,015.24	437	360
1,015.26	443	369
1,015.28	450	378
1,015.30	457	387
1,015.32	464	396
1,015.34	471	405
1,015.36	477	415
1,015.38	484	424
1,015.40	491	434
1,015.42	498	444
1,015.44	505	454
1,015.46	511	464
1,015.48	518	475
1,015.50	525	485
1,015.52	530	496
1,015.54	535	506
1,015.56	540	517
1,015.58	545	528
1,015.60	550	539
1,015.62	555	550
1,015.64	560	561
1,015.66	565	572
1,015.68	570	584
1,015.70	575	595
1,015.72	580	607
1,015.74	585	618
1,015.76	590	630
1,015.78	595	642
1,015.80	600	654
1,015.82	605	666
1,015.84	610	678
1,015.86	615	690
1,015.88	620	703
1,015.90	625	715
1,015.92	630	728
1,015.94	635	740
1,015.96	640	753
1,015.98	645	766
1,016.00	**650**	**779**

Summary for Pond 4P:

Inflow Area = 0.141 ac, 58.87% Impervious, Inflow Depth = 3.27" for 10-Year event
Inflow = 0.69 cfs @ 12.16 hrs, Volume= 0.038 af
Outflow = 0.68 cfs @ 12.17 hrs, Volume= 0.038 af, Atten= 1%, Lag= 0.5 min
Discarded = 0.00 cfs @ 12.17 hrs, Volume= 0.000 af
Primary = 0.68 cfs @ 12.17 hrs, Volume= 0.038 af
Routed to Pond 10P :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 4R : Plymouth Road

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Peak Elev= 1,020.20' @ 12.17 hrs Surf.Area= 111 sf Storage= 17 cf

Plug-Flow detention time= 0.8 min calculated for 0.038 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (782.4 - 781.7)

Volume	Invert	Avail.Storage	Storage Description
#1	1,020.00'	761 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,020.00	65	0	0
1,021.00	295	180	180
1,021.50	590	221	401
1,022.00	850	360	761

Device	Routing	Invert	Outlet Devices
#1	Secondary	1,021.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	1,020.00'	**0.060 in/hr Exfiltration over Surface area**
#3	Primary	1,020.00'	**15.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 12.17 hrs HW=1,020.19' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.66 cfs @ 12.17 hrs HW=1,020.19' TW=980.79' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Weir Controls 0.66 cfs @ 0.87 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,020.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 4P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
1,020.00	65	0
1,020.02	70	1
1,020.04	74	3
1,020.06	79	4
1,020.08	83	6
1,020.10	88	8
1,020.12	93	9
1,020.14	97	11
1,020.16	102	13
1,020.18	106	15
1,020.20	111	18
1,020.22	116	20
1,020.24	120	22
1,020.26	125	25
1,020.28	129	27
1,020.30	134	30
1,020.32	139	33
1,020.34	143	35
1,020.36	148	38
1,020.38	152	41
1,020.40	157	44
1,020.42	162	48
1,020.44	166	51
1,020.46	171	54
1,020.48	175	58
1,020.50	180	61
1,020.52	185	65
1,020.54	189	69
1,020.56	194	72
1,020.58	198	76
1,020.60	203	80
1,020.62	208	85
1,020.64	212	89
1,020.66	217	93
1,020.68	221	97
1,020.70	226	102
1,020.72	231	106
1,020.74	235	111
1,020.76	240	116
1,020.78	244	121
1,020.80	249	126
1,020.82	254	131
1,020.84	258	136
1,020.86	263	141
1,020.88	267	146
1,020.90	272	152
1,020.92	277	157
1,020.94	281	163
1,020.96	286	168
1,020.98	290	174
1,021.00	295	180
1,021.02	307	186
1,021.04	319	192
1,021.06	330	199
1,021.08	342	205
1,021.10	354	212
1,021.12	366	220
1,021.14	378	227
1,021.16	389	235
1,021.18	401	243
1,021.20	413	251
1,021.22	425	259
1,021.24	437	268
1,021.26	448	277
1,021.28	460	286
1,021.30	472	295
1,021.32	484	305
1,021.34	496	314
1,021.36	507	324
1,021.38	519	335
1,021.40	531	345
1,021.42	543	356
1,021.44	555	367
1,021.46	566	378
1,021.48	578	390
1,021.50	590	401
1,021.52	600	413
1,021.54	611	425
1,021.56	621	438
1,021.58	632	450
1,021.60	642	463
1,021.62	652	476
1,021.64	663	489
1,021.66	673	502
1,021.68	684	516
1,021.70	694	530
1,021.72	704	544
1,021.74	715	558
1,021.76	725	572
1,021.78	736	587
1,021.80	746	602
1,021.82	756	617
1,021.84	767	632
1,021.86	777	647
1,021.88	788	663
1,021.90	798	679
1,021.92	808	695
1,021.94	819	711
1,021.96	829	728
1,021.98	840	744
1,022.00	**850**	**761**

Summary for Pond 10P:

Inflow Area = 7.216 ac, 36.35% Impervious, Inflow Depth = 2.80" for 10-Year event
Inflow = 26.08 cfs @ 12.22 hrs, Volume= 1.683 af
Outflow = 6.37 cfs @ 12.62 hrs, Volume= 1.762 af, Atten= 76%, Lag= 24.1 min
Primary = 4.50 cfs @ 12.62 hrs, Volume= 1.625 af
Routed to Reach 1R : North
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 1P :
Tertiary = 1.88 cfs @ 12.62 hrs, Volume= 0.137 af
Routed to Pond 1P :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Starting Elev= 979.50' Surf.Area= 3,765 sf Storage= 12,596 cf
Peak Elev= 981.96' @ 12.62 hrs Surf.Area= 15,780 sf Storage= 42,141 cf (29,545 cf above start)

Plug-Flow detention time= 169.9 min calculated for 1.472 af (87% of inflow)
Center-of-Mass det. time= 62.3 min (861.2 - 798.9)

Volume	Invert	Avail.Storage	Storage Description
#1	972.00'	79,336 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
972.00	320	0	0
975.00	975	1,943	1,943
977.00	2,225	3,200	5,143
979.00	3,430	5,655	10,798
979.50	3,765	1,799	12,596
980.00	10,595	3,590	16,186
981.00	13,340	11,968	28,154
982.00	15,880	14,610	42,764
983.00	18,360	17,120	59,884
984.00	20,545	19,453	79,336

Device	Routing	Invert	Outlet Devices
#1	Primary	978.28'	**12.0" Round Culvert** L= 175.0' Ke= 0.500 Inlet / Outlet Invert= 978.28' / 977.40' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	980.70'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	981.00'	**48.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads
#4	Device 1	978.50'	**8.0" Round Culvert X 2.00** L= 100.0' Ke= 0.500 Inlet / Outlet Invert= 978.50' / 978.50' S= 0.0000 '/' Cc= 0.900 n= 0.020, Flow Area= 0.35 sf
#5	Secondary	983.60'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#6	Tertiary	981.05'	**12.0" Round Culvert** L= 30.0' Ke= 0.500

			Inlet / Outlet Invert= 981.05' / 980.90' S= 0.0050 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf
#7	Device 6	976.00'	**12.0" Round Culvert** L= 50.0' Ke= 0.500
			Inlet / Outlet Invert= 976.00' / 975.75' S= 0.0050 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf
#8	Device 6	982.50'	**48.0" Horiz. Orifice/Grate X 0.60** C= 0.600

Primary OutFlow Max=4.50 cfs @ 12.62 hrs HW=981.96' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 4.50 cfs @ 5.72 fps)
  ├─**2=Sharp-Crested Rectangular Weir** (Passes < 17.32 cfs potential flow)
  ├─**3=Orifice/Grate** (Passes < 23.16 cfs potential flow)
  └─**4=Culvert** (Passes < 2.48 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=979.50' TW=979.45' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Tertiary OutFlow Max=1.87 cfs @ 12.62 hrs HW=981.96' TW=980.97' (Dynamic Tailwater)
└─**6=Culvert** (Barrel Controls 1.87 cfs @ 3.28 fps)
  ├─**7=Culvert** (Passes 1.87 cfs of 3.43 cfs potential flow)
  └─**8=Orifice/Grate** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 10P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
972.00	320	0
972.20	364	68
972.40	407	145
972.60	451	231
972.80	495	326
973.00	538	429
973.20	582	541
973.40	626	662
973.60	669	791
973.80	713	930
974.00	757	1,077
974.20	800	1,232
974.40	844	1,397
974.60	888	1,570
974.80	931	1,752
975.00	975	1,943
975.20	1,100	2,150
975.40	1,225	2,382
975.60	1,350	2,640
975.80	1,475	2,922
976.00	1,600	3,230
976.20	1,725	3,563
976.40	1,850	3,920
976.60	1,975	4,303
976.80	2,100	4,710
977.00	2,225	5,143
977.20	2,346	5,600
977.40	2,466	6,081
977.60	2,587	6,586
977.80	2,707	7,115
978.00	2,828	7,669
978.20	2,948	8,246
978.40	3,068	8,848
978.60	3,189	9,474
978.80	3,309	10,124
979.00	3,430	10,798
979.20	3,564	11,497
979.40	3,698	12,223
979.60	5,131	13,041
979.80	7,863	14,340
980.00	10,595	16,186
980.20	11,144	18,360
980.40	11,693	20,644
980.60	12,242	23,037
980.80	12,791	25,541
981.00	13,340	28,154
981.20	13,848	30,873
981.40	14,356	33,693
981.60	14,864	36,615
981.80	15,372	39,639
982.00	15,880	42,764
982.20	16,376	45,989
982.40	16,872	49,314
982.60	17,368	52,738
982.80	17,864	56,261
983.00	18,360	59,884
983.20	18,797	63,599
983.40	19,234	67,403
983.60	19,671	71,293
983.80	20,108	75,271
984.00	**20,545**	**79,336**

Summary for Pond 11P: DEP

Inflow Area = 1.803 ac, 11.92% Impervious, Inflow Depth = 3.34" for 10-Year event
Inflow = 4.29 cfs @ 12.40 hrs, Volume= 0.501 af
Outflow = 4.30 cfs @ 12.40 hrs, Volume= 0.501 af, Atten= 0%, Lag= 0.1 min
Primary = 4.30 cfs @ 12.40 hrs, Volume= 0.501 af
Routed to Reach 1R : North

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Peak Elev= 979.72' @ 12.40 hrs Surf.Area= 34 sf Storage= 23 cf

Plug-Flow detention time= 0.1 min calculated for 0.501 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (800.3 - 800.2)

Volume	Invert	Avail.Storage	Storage Description
#1	978.67'	2,228 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
978.67	10	0	0
980.00	40	33	33
981.00	770	405	438
982.00	2,810	1,790	2,228

Device	Routing	Invert	Outlet Devices
#1	Primary	978.67'	**18.0" Round Culvert** L= 9.0' Ke= 0.500 Inlet / Outlet Invert= 978.67' / 978.39' S= 0.0311 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=4.30 cfs @ 12.40 hrs HW=979.72' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 4.30 cfs @ 4.59 fps)

Stage-Area-Storage for Pond 11P: DEP

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
978.67	10	0
978.72	11	1
978.77	12	1
978.82	13	2
978.87	15	2
978.92	16	3
978.97	17	4
979.02	18	5
979.07	19	6
979.12	20	7
979.17	21	8
979.22	22	9
979.27	24	10
979.32	25	11
979.37	26	13
979.42	27	14
979.47	28	15
979.52	29	17
979.57	30	18
979.62	31	20
979.67	33	21
979.72	34	23
979.77	35	25
979.82	36	26
979.87	37	28
979.92	38	30
979.97	39	32
980.02	55	34
980.07	91	38
980.12	128	43
980.17	164	51
980.22	201	60
980.27	237	71
980.32	274	83
980.37	310	98
980.42	347	114
980.47	383	133
980.52	420	153
980.57	456	175
980.62	493	198
980.67	529	224
980.72	566	251
980.77	602	280
980.82	639	311
980.87	675	344
980.92	712	379
980.97	748	415
981.02	811	454
981.07	913	497
981.12	1,015	545
981.17	1,117	599
981.22	1,219	657
981.27	1,321	721
981.32	1,423	789
981.37	1,525	863
981.42	1,627	942
981.47	1,729	1,025
981.52	1,831	1,114
981.57	1,933	1,209
981.62	2,035	1,308
981.67	2,137	1,412
981.72	2,239	1,521
981.77	2,341	1,636
981.82	2,443	1,755
981.87	2,545	1,880
981.92	2,647	2,010
981.97	**2,749**	**2,145**

Summary for Subcatchment 1S: Wetland North

Runoff = 1.77 cfs @ 12.21 hrs, Volume= 0.110 af, Depth= 5.33"
Routed to Reach 1R : North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

	Area (ac)	CN	Description
*	0.047	98	
	0.200	79	Woods, Fair, HSG D
	0.247	83	Weighted Average
	0.200	79	80.97% Pervious Area
	0.047	98	19.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"

Summary for Subcatchment 2S: East

Runoff = 6.62 cfs @ 12.26 hrs, Volume= 0.463 af, Depth= 4.99"
Routed to Reach 22R : East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

Area (ac)	CN	Adj	Description
0.061	98		Unconnected roofs, HSG D
0.568	80		>75% Grass cover, Good, HSG D
0.485	79		Woods/grass comb., Good, HSG D
1.114	81	80	Weighted Average, UI Adjusted
1.053	80	80	94.52% Pervious Area
0.061	98	98	5.48% Impervious Area
0.061			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	100	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
1.4	60	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.1	160	Total			

Summary for Subcatchment 3S: Southeast

Runoff = 0.23 cfs @ 12.22 hrs, Volume= 0.015 af, Depth= 4.99"
Routed to Reach 22R : East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

Area (ac)	CN	Description
0.000	98	Unconnected pavement, HSG D
0.015	79	Woods, Fair, HSG D
0.021	80	>75% Grass cover, Good, HSG D
0.036	80	Weighted Average
0.036	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	70	0.0280	0.08		**Sheet Flow,** n= 0.380 P2= 2.86"

Summary for Subcatchment 4S: South

Runoff = 2.91 cfs @ 12.23 hrs, Volume= 0.196 af, Depth= 5.44"
Routed to Reach 4R : Plymouth Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

	Area (ac)	CN	Description
*	0.099	98	
	0.302	80	>75% Grass cover, Good, HSG D
	0.030	79	Woods, Fair, HSG D
	0.431	84	Weighted Average
	0.332	80	77.03% Pervious Area
	0.099	98	22.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	85	0.0420	0.09		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 2.86"

Summary for Subcatchment 5S: West

Runoff = 5.19 cfs @ 12.27 hrs, Volume= 0.378 af, Depth= 5.33"
Routed to Reach 4R : Plymouth Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

	Area (ac)	CN	Description
*	0.177	98	
	0.265	80	>75% Grass cover, Good, HSG D
	0.410	79	Woods, Fair, HSG D
	0.852	83	Weighted Average
	0.675	79	79.23% Pervious Area
	0.177	98	20.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0300	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"
14.4	80	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
0.5	45	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.4	145	Total			

Summary for Subcatchment 10S: Northeast

Runoff = 0.38 cfs @ 12.16 hrs, Volume= 0.021 af, Depth= 5.22"
Routed to Reach 1R : North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

	Area (ac)	CN	Description
*	0.007	98	
	0.041	79	Woods, Fair, HSG D
	0.048	82	Weighted Average
	0.041	79	85.42% Pervious Area
	0.007	98	14.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	90	0.1500	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"

Summary for Subcatchment 11S: North DEP

Runoff = 2.57 cfs @ 12.14 hrs, Volume= 0.128 af, Depth= 5.22"
Routed to Pond 11P : DEP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

	Area (ac)	CN	Description
*	0.035	98	
	0.260	80	>75% Grass cover, Good, HSG D
	0.000	79	Woods/grass comb., Good, HSG D
	0.295	82	Weighted Average
	0.260	80	88.14% Pervious Area
	0.035	98	11.86% Impervious Area

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

Summary for Subcatchment 30S: Southeast

Runoff = 3.38 cfs @ 12.30 hrs, Volume= 0.269 af, Depth= 5.79"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

Area (ac)	CN	Description
0.220	98	Unconnected pavement, HSG D
0.084	79	Woods, Fair, HSG D
0.253	80	>75% Grass cover, Good, HSG D
0.557	87	Weighted Average
0.337	80	60.50% Pervious Area
0.220	98	39.50% Impervious Area
0.220		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0280	0.09		**Sheet Flow,** n= 0.380 P2= 2.86"
1.8	155	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.9	255	Total			

Summary for Subcatchment 40S: Southwest

Runoff = 1.27 cfs @ 12.16 hrs, Volume= 0.073 af, Depth= 6.25"
Routed to Pond 4P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

Area (ac)	CN	Description
0.083	98	Unconnected pavement, HSG D
0.000	79	Woods, Fair, HSG D
0.058	80	>75% Grass cover, Good, HSG D
0.141	91	Weighted Average
0.058	80	41.13% Pervious Area
0.083	98	58.87% Impervious Area
0.083		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	65	0.0280	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"

Summary for Subcatchment 100S: North Pond

Runoff = 9.55 cfs @ 12.25 hrs, Volume= 0.656 af, Depth= 5.22"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

	Area (ac)	CN	Description
*	0.180	98	
	0.924	80	>75% Grass cover, Good, HSG D
	0.404	79	Woods/grass comb., Good, HSG D
*	0.000	98	
*	0.000	80	
	1.508	82	Weighted Average
	1.328	80	88.06% Pervious Area
	0.180	98	11.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	110	0.0350	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"
0.3	81	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.0	641	0.0060	3.51	2.76	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
16.3	832	Total			

Summary for Subcatchment 110S: Pond

Runoff = 47.52 cfs @ 12.21 hrs, Volume= 3.082 af, Depth= 5.67"
Routed to Pond 10P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year base Rainfall=7.32"

	Area (ac)	CN	Description
*	2.320	98	
	1.800	80	>75% Grass cover, Good, HSG D
	2.398	79	Woods/grass comb., Good, HSG D
*	0.000	98	
*	0.000	80	
	6.518	86	Weighted Average
	4.198	79	64.41% Pervious Area
	2.320	98	35.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"
0.9	55	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.4	177	0.0850	2.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.7	332	Total			

Summary for Reach 1R: North

Inflow Area = 9.314 ac, 31.05% Impervious, Inflow Depth = 5.66" for 100-Year base event
Inflow = 14.21 cfs @ 12.62 hrs, Volume= 4.395 af
Outflow = 14.21 cfs @ 12.62 hrs, Volume= 4.395 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 31R : Total

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 4R: Plymouth Road

Inflow Area = 1.283 ac, 21.51% Impervious, Inflow Depth = 5.37" for 100-Year base event
Inflow = 8.03 cfs @ 12.26 hrs, Volume= 0.574 af
Outflow = 8.03 cfs @ 12.26 hrs, Volume= 0.574 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 31R : Total

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 22R: East

Inflow Area = 1.150 ac, 5.30% Impervious, Inflow Depth = 5.22" for 100-Year base event
Inflow = 7.63 cfs @ 12.29 hrs, Volume= 0.500 af
Outflow = 7.63 cfs @ 12.29 hrs, Volume= 0.500 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 31R : Total

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 31R: Total

Inflow Area = 11.747 ac, 27.49% Impervious, Inflow Depth = 5.59" for 100-Year base event
Inflow = 28.88 cfs @ 12.28 hrs, Volume= 5.469 af
Outflow = 28.88 cfs @ 12.28 hrs, Volume= 5.469 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Pond 1P:

Inflow Area = 1.508 ac, 11.94% Impervious, Inflow Depth = 12.20" for 100-Year base event
Inflow = 13.64 cfs @ 12.27 hrs, Volume= 1.533 af
Outflow = 8.07 cfs @ 12.72 hrs, Volume= 1.533 af, Atten= 41%, Lag= 27.1 min
Primary = 5.15 cfs @ 12.51 hrs, Volume= 1.285 af
Routed to Pond 11P : DEP
Secondary = 2.96 cfs @ 12.74 hrs, Volume= 0.248 af
Routed to Pond 11P : DEP

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Starting Elev= 978.00' Storage= 0 cf
Peak Elev= 982.19' @ 12.74 hrs Surf.Area= 14,001 sf Storage= 9,794 cf

Plug-Flow detention time= 12.7 min calculated for 1.532 af (100% of inflow)
Center-of-Mass det. time= 12.7 min (808.0 - 795.3)

Volume	Invert	Avail.Storage	Storage Description
#1	979.45'	55,825 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
979.45	10	0	0
980.00	68	21	21
981.00	1,700	884	905
982.00	11,370	6,535	7,440
983.00	25,550	18,460	25,900
984.00	34,300	29,925	55,825

Device	Routing	Invert	Outlet Devices
#1	Primary	979.45'	**12.0" Round Culvert** L= 18.0' Ke= 0.500 Inlet / Outlet Invert= 979.45' / 978.80' S= 0.0361 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Primary	979.45'	**0.060 in/hr Exfiltration over Surface area above 978.00'** Excluded Surface area = 0 sf
#3	Secondary	981.50'	**2.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=5.10 cfs @ 12.51 hrs HW=982.11' TW=980.30' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 5.08 cfs @ 6.47 fps)
└─**2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Secondary OutFlow Max=2.95 cfs @ 12.74 hrs HW=982.18' TW=980.37' (Dynamic Tailwater)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 2.95 cfs @ 2.16 fps)

Stage-Area-Storage for Pond 1P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
979.45	10	0
979.50	15	1
979.55	21	2
979.60	26	3
979.65	31	4
979.70	36	6
979.75	42	8
979.80	47	10
979.85	52	12
979.90	57	15
979.95	63	18
980.00	68	21
980.05	150	27
980.10	231	36
980.15	313	50
980.20	394	68
980.25	476	89
980.30	558	115
980.35	639	145
980.40	721	179
980.45	802	217
980.50	884	259
980.55	966	306
980.60	1,047	356
980.65	1,129	410
980.70	1,210	469
980.75	1,292	531
980.80	1,374	598
980.85	1,455	669
980.90	1,537	744
980.95	1,618	822
981.00	1,700	905
981.05	2,184	1,003
981.10	2,667	1,124
981.15	3,151	1,269
981.20	3,634	1,439
981.25	4,118	1,633
981.30	4,601	1,851
981.35	5,085	2,093
981.40	5,568	2,359
981.45	6,052	2,650
981.50	6,535	2,964
981.55	7,019	3,303
981.60	7,502	3,666
981.65	7,986	4,053
981.70	8,469	4,465
981.75	8,953	4,900
981.80	9,436	5,360
981.85	9,920	5,844
981.90	10,403	6,352
981.95	10,887	6,884
982.00	11,370	7,440
982.05	12,079	8,027
982.10	12,788	8,648
982.15	13,497	9,305
982.20	14,206	9,998
982.25	14,915	10,726
982.30	15,624	11,490
982.35	16,333	12,288
982.40	17,042	13,123
982.45	17,751	13,993
982.50	18,460	14,898
982.55	19,169	15,839
982.60	19,878	16,815
982.65	20,587	17,826
982.70	21,296	18,874
982.75	22,005	19,956
982.80	22,714	21,074
982.85	23,423	22,227
982.90	24,132	23,416
982.95	24,841	24,641
983.00	25,550	25,900
983.05	25,988	27,189
983.10	26,425	28,499
983.15	26,863	29,831
983.20	27,300	31,185
983.25	27,738	32,561
983.30	28,175	33,959
983.35	28,613	35,379
983.40	29,050	36,820
983.45	29,488	38,284
983.50	29,925	39,769
983.55	30,363	41,276
983.60	30,800	42,805
983.65	31,238	44,356
983.70	31,675	45,929
983.75	32,113	47,524
983.80	32,550	49,140
983.85	32,988	50,779
983.90	33,425	52,439
983.95	33,863	54,121
984.00	**34,300**	**55,825**

Summary for Pond 3P:

Inflow Area = 0.557 ac, 39.50% Impervious, Inflow Depth = 5.79" for 100-Year base event
Inflow = 3.38 cfs @ 12.30 hrs, Volume= 0.269 af
Outflow = 3.26 cfs @ 12.35 hrs, Volume= 0.269 af, Atten= 4%, Lag= 3.1 min
Discarded = 0.00 cfs @ 12.35 hrs, Volume= 0.000 af
Primary = 2.02 cfs @ 12.35 hrs, Volume= 0.246 af
Routed to Pond 10P :
Secondary = 1.24 cfs @ 12.35 hrs, Volume= 0.022 af
Routed to Reach 22R : East

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Peak Elev= 1,015.53' @ 12.35 hrs Surf.Area= 531 sf Storage= 499 cf

Plug-Flow detention time= 1.8 min calculated for 0.269 af (100% of inflow)
Center-of-Mass det. time= 1.8 min (791.1 - 789.3)

Volume	Invert	Avail.Storage	Storage Description
#1	1,014.00'	779 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,014.00	175	0	0
1,015.00	355	265	265
1,015.50	525	220	485
1,016.00	650	294	779

Device	Routing	Invert	Outlet Devices
#1	Secondary	1,015.00'	**1.2' long x 1.2' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.66 2.69 2.71 2.78 2.89 2.99 3.09 3.20 3.21 3.19 3.30 3.32
#2	Discarded	1,014.00'	**0.060 in/hr Exfiltration over Surface area**
#3	Device 4	1,014.00'	**15.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads
#4	Primary	1,011.00'	**8.0" Round Culvert** L= 117.0' Ke= 0.500 Inlet / Outlet Invert= 1,011.00' / 1,009.71' S= 0.0110 '/' Cc= 0.900 n= 0.015, Flow Area= 0.35 sf

Discarded OutFlow Max=0.00 cfs @ 12.35 hrs HW=1,015.52' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=2.02 cfs @ 12.35 hrs HW=1,015.52' TW=983.44' (Dynamic Tailwater)
└**4=Culvert** (Barrel Controls 2.02 cfs @ 5.79 fps)
└**3=Orifice/Grate** (Passes 2.02 cfs of 4.38 cfs potential flow)

Secondary OutFlow Max=1.23 cfs @ 12.35 hrs HW=1,015.52' TW=0.00' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 1.23 cfs @ 1.96 fps)

Stage-Area-Storage for Pond 3P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
1,014.00	175	0
1,014.02	179	4
1,014.04	182	7
1,014.06	186	11
1,014.08	189	15
1,014.10	193	18
1,014.12	197	22
1,014.14	200	26
1,014.16	204	30
1,014.18	207	34
1,014.20	211	39
1,014.22	215	43
1,014.24	218	47
1,014.26	222	52
1,014.28	225	56
1,014.30	229	61
1,014.32	233	65
1,014.34	236	70
1,014.36	240	75
1,014.38	243	79
1,014.40	247	84
1,014.42	251	89
1,014.44	254	94
1,014.46	258	100
1,014.48	261	105
1,014.50	265	110
1,014.52	269	115
1,014.54	272	121
1,014.56	276	126
1,014.58	279	132
1,014.60	283	137
1,014.62	287	143
1,014.64	290	149
1,014.66	294	155
1,014.68	297	161
1,014.70	301	167
1,014.72	305	173
1,014.74	308	179
1,014.76	312	185
1,014.78	315	191
1,014.80	319	198
1,014.82	323	204
1,014.84	326	211
1,014.86	330	217
1,014.88	333	224
1,014.90	337	230
1,014.92	341	237
1,014.94	344	244
1,014.96	348	251
1,014.98	351	258
1,015.00	355	265
1,015.02	362	272
1,015.04	369	279
1,015.06	375	287
1,015.08	382	294
1,015.10	389	302
1,015.12	396	310
1,015.14	403	318
1,015.16	409	326
1,015.18	416	334
1,015.20	423	343
1,015.22	430	351
1,015.24	437	360
1,015.26	443	369
1,015.28	450	378
1,015.30	457	387
1,015.32	464	396
1,015.34	471	405
1,015.36	477	415
1,015.38	484	424
1,015.40	491	434
1,015.42	498	444
1,015.44	505	454
1,015.46	511	464
1,015.48	518	475
1,015.50	525	485
1,015.52	530	496
1,015.54	535	506
1,015.56	540	517
1,015.58	545	528
1,015.60	550	539
1,015.62	555	550
1,015.64	560	561
1,015.66	565	572
1,015.68	570	584
1,015.70	575	595
1,015.72	580	607
1,015.74	585	618
1,015.76	590	630
1,015.78	595	642
1,015.80	600	654
1,015.82	605	666
1,015.84	610	678
1,015.86	615	690
1,015.88	620	703
1,015.90	625	715
1,015.92	630	728
1,015.94	635	740
1,015.96	640	753
1,015.98	645	766
1,016.00	**650**	**779**

Summary for Pond 4P:

Inflow Area = 0.141 ac, 58.87% Impervious, Inflow Depth = 6.25" for 100-Year base event
Inflow = 1.27 cfs @ 12.16 hrs, Volume= 0.073 af
Outflow = 1.25 cfs @ 12.17 hrs, Volume= 0.073 af, Atten= 1%, Lag= 0.4 min
Discarded = 0.00 cfs @ 12.17 hrs, Volume= 0.000 af
Primary = 1.25 cfs @ 12.17 hrs, Volume= 0.073 af
Routed to Pond 10P :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 4R : Plymouth Road

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Peak Elev= 1,020.30' @ 12.17 hrs Surf.Area= 134 sf Storage= 30 cf

Plug-Flow detention time= 0.7 min calculated for 0.073 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (769.8 - 769.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1,020.00'	761 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,020.00	65	0	0
1,021.00	295	180	180
1,021.50	590	221	401
1,022.00	850	360	761

Device	Routing	Invert	Outlet Devices
#1	Secondary	1,021.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	1,020.00'	**0.060 in/hr Exfiltration over Surface area**
#3	Primary	1,020.00'	**15.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 12.17 hrs HW=1,020.29' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.22 cfs @ 12.17 hrs HW=1,020.29' TW=982.15' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Weir Controls 1.22 cfs @ 1.06 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,020.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 4P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
1,020.00	65	0
1,020.02	70	1
1,020.04	74	3
1,020.06	79	4
1,020.08	83	6
1,020.10	88	8
1,020.12	93	9
1,020.14	97	11
1,020.16	102	13
1,020.18	106	15
1,020.20	111	18
1,020.22	116	20
1,020.24	120	22
1,020.26	125	25
1,020.28	129	27
1,020.30	134	30
1,020.32	139	33
1,020.34	143	35
1,020.36	148	38
1,020.38	152	41
1,020.40	157	44
1,020.42	162	48
1,020.44	166	51
1,020.46	171	54
1,020.48	175	58
1,020.50	180	61
1,020.52	185	65
1,020.54	189	69
1,020.56	194	72
1,020.58	198	76
1,020.60	203	80
1,020.62	208	85
1,020.64	212	89
1,020.66	217	93
1,020.68	221	97
1,020.70	226	102
1,020.72	231	106
1,020.74	235	111
1,020.76	240	116
1,020.78	244	121
1,020.80	249	126
1,020.82	254	131
1,020.84	258	136
1,020.86	263	141
1,020.88	267	146
1,020.90	272	152
1,020.92	277	157
1,020.94	281	163
1,020.96	286	168
1,020.98	290	174
1,021.00	295	180
1,021.02	307	186
1,021.04	319	192
1,021.06	330	199
1,021.08	342	205
1,021.10	354	212
1,021.12	366	220
1,021.14	378	227
1,021.16	389	235
1,021.18	401	243
1,021.20	413	251
1,021.22	425	259
1,021.24	437	268
1,021.26	448	277
1,021.28	460	286
1,021.30	472	295
1,021.32	484	305
1,021.34	496	314
1,021.36	507	324
1,021.38	519	335
1,021.40	531	345
1,021.42	543	356
1,021.44	555	367
1,021.46	566	378
1,021.48	578	390
1,021.50	590	401
1,021.52	600	413
1,021.54	611	425
1,021.56	621	438
1,021.58	632	450
1,021.60	642	463
1,021.62	652	476
1,021.64	663	489
1,021.66	673	502
1,021.68	684	516
1,021.70	694	530
1,021.72	704	544
1,021.74	715	558
1,021.76	725	572
1,021.78	736	587
1,021.80	746	602
1,021.82	756	617
1,021.84	767	632
1,021.86	777	647
1,021.88	788	663
1,021.90	798	679
1,021.92	808	695
1,021.94	819	711
1,021.96	829	728
1,021.98	840	744
1,022.00	**850**	**761**

Summary for Pond 10P:

Inflow Area = 7.216 ac, 36.35% Impervious, Inflow Depth = 5.66" for 100-Year base event
Inflow = 50.58 cfs @ 12.21 hrs, Volume= 3.402 af
Outflow = 12.22 cfs @ 12.62 hrs, Volume= 3.481 af, Atten= 76%, Lag= 24.2 min
Primary = 5.57 cfs @ 12.63 hrs, Volume= 2.604 af
Routed to Reach 1R : North
Secondary = 1.67 cfs @ 12.63 hrs, Volume= 0.048 af
Routed to Pond 1P :
Tertiary = 5.01 cfs @ 12.53 hrs, Volume= 0.829 af
Routed to Pond 1P :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Starting Elev= 979.50' Surf.Area= 3,765 sf Storage= 12,596 cf
Peak Elev= 983.87' @ 12.63 hrs Surf.Area= 20,259 sf Storage= 76,668 cf (64,071 cf above start)

Plug-Flow detention time= 141.8 min calculated for 3.191 af (94% of inflow)
Center-of-Mass det. time= 78.1 min (863.3 - 785.1)

Volume	Invert	Avail.Storage	Storage Description
#1	972.00'	79,336 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
972.00	320	0	0
975.00	975	1,943	1,943
977.00	2,225	3,200	5,143
979.00	3,430	5,655	10,798
979.50	3,765	1,799	12,596
980.00	10,595	3,590	16,186
981.00	13,340	11,968	28,154
982.00	15,880	14,610	42,764
983.00	18,360	17,120	59,884
984.00	20,545	19,453	79,336

Device	Routing	Invert	Outlet Devices
#1	Primary	978.28'	**12.0" Round Culvert** L= 175.0' Ke= 0.500 Inlet / Outlet Invert= 978.28' / 977.40' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	980.70'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	981.00'	**48.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads
#4	Device 1	978.50'	**8.0" Round Culvert X 2.00** L= 100.0' Ke= 0.500 Inlet / Outlet Invert= 978.50' / 978.50' S= 0.0000 '/' Cc= 0.900 n= 0.020, Flow Area= 0.35 sf
#5	Secondary	983.60'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#6	Tertiary	981.05'	**12.0" Round Culvert** L= 30.0' Ke= 0.500

			Inlet / Outlet Invert= 981.05' / 980.90' S= 0.0050 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf
#7	Device 6	976.00'	**12.0" Round Culvert** L= 50.0' Ke= 0.500
			Inlet / Outlet Invert= 976.00' / 975.75' S= 0.0050 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf
#8	Device 6	982.50'	**48.0" Horiz. Orifice/Grate X 0.60** C= 0.600

Primary OutFlow Max=5.57 cfs @ 12.63 hrs HW=983.87' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 5.57 cfs @ 7.09 fps)
  ├─**2=Sharp-Crested Rectangular Weir** (Passes < 62.05 cfs potential flow)
  ├─**3=Orifice/Grate** (Passes < 61.47 cfs potential flow)
  └─**4=Culvert** (Passes < 3.22 cfs potential flow)

Secondary OutFlow Max=1.65 cfs @ 12.63 hrs HW=983.87' TW=982.17' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Weir Controls 1.65 cfs @ 1.24 fps)

Tertiary OutFlow Max=4.95 cfs @ 12.53 hrs HW=983.83' TW=982.12' (Dynamic Tailwater)
└─**6=Culvert** (Inlet Controls 4.95 cfs @ 6.30 fps)
  ├─**7=Culvert** (Passes < 4.71 cfs potential flow)
  └─**8=Orifice/Grate** (Passes < 41.84 cfs potential flow)

Stage-Area-Storage for Pond 10P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
972.00	320	0
972.20	364	68
972.40	407	145
972.60	451	231
972.80	495	326
973.00	538	429
973.20	582	541
973.40	626	662
973.60	669	791
973.80	713	930
974.00	757	1,077
974.20	800	1,232
974.40	844	1,397
974.60	888	1,570
974.80	931	1,752
975.00	975	1,943
975.20	1,100	2,150
975.40	1,225	2,382
975.60	1,350	2,640
975.80	1,475	2,922
976.00	1,600	3,230
976.20	1,725	3,563
976.40	1,850	3,920
976.60	1,975	4,303
976.80	2,100	4,710
977.00	2,225	5,143
977.20	2,346	5,600
977.40	2,466	6,081
977.60	2,587	6,586
977.80	2,707	7,115
978.00	2,828	7,669
978.20	2,948	8,246
978.40	3,068	8,848
978.60	3,189	9,474
978.80	3,309	10,124
979.00	3,430	10,798
979.20	3,564	11,497
979.40	3,698	12,223
979.60	5,131	13,041
979.80	7,863	14,340
980.00	10,595	16,186
980.20	11,144	18,360
980.40	11,693	20,644
980.60	12,242	23,037
980.80	12,791	25,541
981.00	13,340	28,154
981.20	13,848	30,873
981.40	14,356	33,693
981.60	14,864	36,615
981.80	15,372	39,639
982.00	15,880	42,764
982.20	16,376	45,989
982.40	16,872	49,314
982.60	17,368	52,738
982.80	17,864	56,261
983.00	18,360	59,884
983.20	18,797	63,599
983.40	19,234	67,403
983.60	19,671	71,293
983.80	20,108	75,271
984.00	**20,545**	**79,336**

Summary for Pond 11P: DEP

Inflow Area = 1.803 ac, 11.92% Impervious, Inflow Depth = 11.05" for 100-Year base event
Inflow = 8.32 cfs @ 12.71 hrs, Volume= 1.661 af
Outflow = 8.31 cfs @ 12.73 hrs, Volume= 1.661 af, Atten= 0%, Lag= 1.2 min
Primary = 8.31 cfs @ 12.73 hrs, Volume= 1.661 af
Routed to Reach 1R : North

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Peak Elev= 980.37' @ 12.73 hrs Surf.Area= 314 sf Storage= 100 cf

Plug-Flow detention time= 0.1 min calculated for 1.660 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (806.4 - 806.3)

Volume	Invert	Avail.Storage	Storage Description
#1	978.67'	2,228 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
978.67	10	0	0
980.00	40	33	33
981.00	770	405	438
982.00	2,810	1,790	2,228

Device	Routing	Invert	Outlet Devices
#1	Primary	978.67'	**18.0" Round Culvert** L= 9.0' Ke= 0.500 Inlet / Outlet Invert= 978.67' / 978.39' S= 0.0311 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=8.31 cfs @ 12.73 hrs HW=980.37' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 8.31 cfs @ 4.70 fps)

Stage-Area-Storage for Pond 11P: DEP

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
978.67	10	0
978.72	11	1
978.77	12	1
978.82	13	2
978.87	15	2
978.92	16	3
978.97	17	4
979.02	18	5
979.07	19	6
979.12	20	7
979.17	21	8
979.22	22	9
979.27	24	10
979.32	25	11
979.37	26	13
979.42	27	14
979.47	28	15
979.52	29	17
979.57	30	18
979.62	31	20
979.67	33	21
979.72	34	23
979.77	35	25
979.82	36	26
979.87	37	28
979.92	38	30
979.97	39	32
980.02	55	34
980.07	91	38
980.12	128	43
980.17	164	51
980.22	201	60
980.27	237	71
980.32	274	83
980.37	310	98
980.42	347	114
980.47	383	133
980.52	420	153
980.57	456	175
980.62	493	198
980.67	529	224
980.72	566	251
980.77	602	280
980.82	639	311
980.87	675	344
980.92	712	379
980.97	748	415
981.02	811	454
981.07	913	497
981.12	1,015	545
981.17	1,117	599
981.22	1,219	657
981.27	1,321	721
981.32	1,423	789
981.37	1,525	863
981.42	1,627	942
981.47	1,729	1,025
981.52	1,831	1,114
981.57	1,933	1,209
981.62	2,035	1,308
981.67	2,137	1,412
981.72	2,239	1,521
981.77	2,341	1,636
981.82	2,443	1,755
981.87	2,545	1,880
981.92	2,647	2,010
981.97	**2,749**	**2,145**

Summary for Subcatchment 1S: Wetland North

Runoff = 1.56 cfs @ 48.13 hrs, Volume= 0.133 af, Depth= 6.47"
Routed to Reach 1R : North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

	Area (ac)	CN	Description
*	0.047	98	
	0.200	79	Woods, Fair, HSG D
	0.247	83	Weighted Average
	0.200	79	80.97% Pervious Area
	0.047	98	19.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"

Summary for Subcatchment 2S: East

Runoff = 5.95 cfs @ 48.19 hrs, Volume= 0.567 af, Depth= 6.10"
Routed to Reach 22R : East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

Area (ac)	CN	Adj	Description
0.061	98		Unconnected roofs, HSG D
0.568	80		>75% Grass cover, Good, HSG D
0.485	79		Woods/grass comb., Good, HSG D
1.114	81	80	Weighted Average, UI Adjusted
1.053	80	80	94.52% Pervious Area
0.061	98	98	5.48% Impervious Area
0.061			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	100	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
1.4	60	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.1	160	Total			

Summary for Subcatchment 3S: Southeast

Runoff = 0.21 cfs @ 48.15 hrs, Volume= 0.018 af, Depth= 6.10"
Routed to Reach 22R : East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

Area (ac)	CN	Description
0.000	98	Unconnected pavement, HSG D
0.015	79	Woods, Fair, HSG D
0.021	80	>75% Grass cover, Good, HSG D
0.036	80	Weighted Average
0.036	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	70	0.0280	0.08		**Sheet Flow,** n= 0.380 P2= 2.86"

Summary for Subcatchment 4S: South

Runoff = 2.59 cfs @ 48.16 hrs, Volume= 0.237 af, Depth= 6.59"
Routed to Reach 4R : Plymouth Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

	Area (ac)	CN	Description
*	0.099	98	
	0.302	80	>75% Grass cover, Good, HSG D
	0.030	79	Woods, Fair, HSG D
	0.431	84	Weighted Average
	0.332	80	77.03% Pervious Area
	0.099	98	22.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	85	0.0420	0.09		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 2.86"

Summary for Subcatchment 5S: West

Runoff = 4.64 cfs @ 48.20 hrs, Volume= 0.459 af, Depth= 6.47"
Routed to Reach 4R : Plymouth Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

	Area (ac)	CN	Description
*	0.177	98	
	0.265	80	>75% Grass cover, Good, HSG D
	0.410	79	Woods, Fair, HSG D
	0.852	83	Weighted Average
	0.675	79	79.23% Pervious Area
	0.177	98	20.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0300	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"
14.4	80	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"
0.5	45	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.4	145	Total			

Summary for Subcatchment 10S: Northeast

Runoff = 0.33 cfs @ 48.08 hrs, Volume= 0.025 af, Depth= 6.35"
Routed to Reach 1R : North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

	Area (ac)	CN	Description
*	0.007	98	
	0.041	79	Woods, Fair, HSG D
	0.048	82	Weighted Average
	0.041	79	85.42% Pervious Area
	0.007	98	14.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	90	0.1500	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.86"

Summary for Subcatchment 11S: North DEP

Runoff = 2.30 cfs @ 48.05 hrs, Volume= 0.156 af, Depth= 6.35"
Routed to Pond 11P : DEP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

	Area (ac)	CN	Description
*	0.035	98	
	0.260	80	>75% Grass cover, Good, HSG D
	0.000	79	Woods/grass comb., Good, HSG D
	0.295	82	Weighted Average
	0.260	80	88.14% Pervious Area
	0.035	98	11.86% Impervious Area

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

Summary for Subcatchment 30S: Southeast

Runoff = 3.02 cfs @ 48.24 hrs, Volume= 0.322 af, Depth= 6.95"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

Area (ac)	CN	Description
0.220	98	Unconnected pavement, HSG D
0.084	79	Woods, Fair, HSG D
0.253	80	>75% Grass cover, Good, HSG D
0.557	87	Weighted Average
0.337	80	60.50% Pervious Area
0.220	98	39.50% Impervious Area
0.220		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0280	0.09		**Sheet Flow,** n= 0.380 P2= 2.86"
1.8	155	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.9	255	Total			

Summary for Subcatchment 40S: Southwest

Runoff = 1.10 cfs @ 48.08 hrs, Volume= 0.087 af, Depth= 7.43"
Routed to Pond 4P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

Area (ac)	CN	Description
0.083	98	Unconnected pavement, HSG D
0.000	79	Woods, Fair, HSG D
0.058	80	>75% Grass cover, Good, HSG D
0.141	91	Weighted Average
0.058	80	41.13% Pervious Area
0.083	98	58.87% Impervious Area
0.083		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	65	0.0280	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"

Summary for Subcatchment 100S: North Pond

Runoff = 8.53 cfs @ 48.17 hrs, Volume= 0.797 af, Depth= 6.35"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

	Area (ac)	CN	Description
*	0.180	98	
	0.924	80	>75% Grass cover, Good, HSG D
	0.404	79	Woods/grass comb., Good, HSG D
*	0.000	98	
*	0.000	80	
	1.508	82	Weighted Average
	1.328	80	88.06% Pervious Area
	0.180	98	11.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	110	0.0350	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"
0.3	81	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.0	641	0.0060	3.51	2.76	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
16.3	832	Total			

Summary for Subcatchment 110S: Pond

Runoff = 41.85 cfs @ 48.14 hrs, Volume= 3.708 af, Depth= 6.83"
Routed to Pond 10P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
PF_Depth_English_PDS 96-hr S1 100-yr 100-yr 96hr Rainfall=8.51"

	Area (ac)	CN	Description
*	2.320	98	
	1.800	80	>75% Grass cover, Good, HSG D
	2.398	79	Woods/grass comb., Good, HSG D
*	0.000	98	
*	0.000	80	
	6.518	86	Weighted Average
	4.198	79	64.41% Pervious Area
	2.320	98	35.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.86"
0.9	55	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.4	177	0.0850	2.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.7	332	Total			

Summary for Reach 1R: North

Inflow Area = 9.314 ac, 31.05% Impervious, Inflow Depth > 6.81" for 100-yr 96hr event
Inflow = 14.21 cfs @ 48.58 hrs, Volume= 5.288 af
Outflow = 14.21 cfs @ 48.58 hrs, Volume= 5.288 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 31R : Total

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 4R: Plymouth Road

Inflow Area = 1.283 ac, 21.51% Impervious, Inflow Depth = 6.51" for 100-yr 96hr event
Inflow = 7.14 cfs @ 48.19 hrs, Volume= 0.696 af
Outflow = 7.14 cfs @ 48.19 hrs, Volume= 0.696 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 31R : Total

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 22R: East

Inflow Area = 1.150 ac, 5.30% Impervious, Inflow Depth = 6.27" for 100-yr 96hr event
Inflow = 6.56 cfs @ 48.23 hrs, Volume= 0.600 af
Outflow = 6.56 cfs @ 48.23 hrs, Volume= 0.600 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 31R : Total

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Reach 31R: Total

Inflow Area = 11.747 ac, 27.49% Impervious, Inflow Depth = 6.73" for 100-yr 96hr event
Inflow = 26.41 cfs @ 48.22 hrs, Volume= 6.584 af
Outflow = 26.41 cfs @ 48.22 hrs, Volume= 6.584 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs

Summary for Pond 1P:

Inflow Area = 1.508 ac, 11.94% Impervious, Inflow Depth = 13.11" for 100-yr 96hr event
Inflow = 12.27 cfs @ 48.21 hrs, Volume= 1.647 af
Outflow = 8.02 cfs @ 48.74 hrs, Volume= 1.647 af, Atten= 35%, Lag= 31.7 min
Primary = 5.14 cfs @ 48.70 hrs, Volume= 1.417 af
Routed to Pond 11P : DEP
Secondary = 2.89 cfs @ 48.75 hrs, Volume= 0.230 af
Routed to Pond 11P : DEP

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Starting Elev= 978.00' Storage= 0 cf
Peak Elev= 982.17' @ 48.75 hrs Surf.Area= 13,851 sf Storage= 9,647 cf

Plug-Flow detention time= 11.3 min calculated for 1.646 af (100% of inflow)
Center-of-Mass det. time= 11.3 min (3,018.7 - 3,007.4)

Volume	Invert	Avail.Storage	Storage Description
#1	979.45'	55,825 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
979.45	10	0	0
980.00	68	21	21
981.00	1,700	884	905
982.00	11,370	6,535	7,440
983.00	25,550	18,460	25,900
984.00	34,300	29,925	55,825

Device	Routing	Invert	Outlet Devices
#1	Primary	979.45'	**12.0" Round Culvert** L= 18.0' Ke= 0.500 Inlet / Outlet Invert= 979.45' / 978.80' S= 0.0361 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Primary	979.45'	**0.060 in/hr Exfiltration over Surface area above 978.00'** Excluded Surface area = 0 sf
#3	Secondary	981.50'	**2.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=5.13 cfs @ 48.70 hrs HW=982.17' TW=980.35' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 5.11 cfs @ 6.50 fps)
└─**2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Secondary OutFlow Max=2.89 cfs @ 48.75 hrs HW=982.17' TW=980.35' (Dynamic Tailwater)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 2.89 cfs @ 2.14 fps)

Stage-Area-Storage for Pond 1P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
979.45	10	0
979.50	15	1
979.55	21	2
979.60	26	3
979.65	31	4
979.70	36	6
979.75	42	8
979.80	47	10
979.85	52	12
979.90	57	15
979.95	63	18
980.00	68	21
980.05	150	27
980.10	231	36
980.15	313	50
980.20	394	68
980.25	476	89
980.30	558	115
980.35	639	145
980.40	721	179
980.45	802	217
980.50	884	259
980.55	966	306
980.60	1,047	356
980.65	1,129	410
980.70	1,210	469
980.75	1,292	531
980.80	1,374	598
980.85	1,455	669
980.90	1,537	744
980.95	1,618	822
981.00	1,700	905
981.05	2,184	1,003
981.10	2,667	1,124
981.15	3,151	1,269
981.20	3,634	1,439
981.25	4,118	1,633
981.30	4,601	1,851
981.35	5,085	2,093
981.40	5,568	2,359
981.45	6,052	2,650
981.50	6,535	2,964
981.55	7,019	3,303
981.60	7,502	3,666
981.65	7,986	4,053
981.70	8,469	4,465
981.75	8,953	4,900
981.80	9,436	5,360
981.85	9,920	5,844
981.90	10,403	6,352
981.95	10,887	6,884
982.00	11,370	7,440
982.05	12,079	8,027
982.10	12,788	8,648
982.15	13,497	9,305
982.20	14,206	9,998
982.25	14,915	10,726
982.30	15,624	11,490
982.35	16,333	12,288
982.40	17,042	13,123
982.45	17,751	13,993
982.50	18,460	14,898
982.55	19,169	15,839
982.60	19,878	16,815
982.65	20,587	17,826
982.70	21,296	18,874
982.75	22,005	19,956
982.80	22,714	21,074
982.85	23,423	22,227
982.90	24,132	23,416
982.95	24,841	24,641
983.00	25,550	25,900
983.05	25,988	27,189
983.10	26,425	28,499
983.15	26,863	29,831
983.20	27,300	31,185
983.25	27,738	32,561
983.30	28,175	33,959
983.35	28,613	35,379
983.40	29,050	36,820
983.45	29,488	38,284
983.50	29,925	39,769
983.55	30,363	41,276
983.60	30,800	42,805
983.65	31,238	44,356
983.70	31,675	45,929
983.75	32,113	47,524
983.80	32,550	49,140
983.85	32,988	50,779
983.90	33,425	52,439
983.95	33,863	54,121
984.00	**34,300**	**55,825**

Summary for Pond 3P:

Inflow Area = 0.557 ac, 39.50% Impervious, Inflow Depth = 6.95" for 100-yr 96hr event
Inflow = 3.02 cfs @ 48.24 hrs, Volume= 0.322 af
Outflow = 2.90 cfs @ 48.30 hrs, Volume= 0.322 af, Atten= 4%, Lag= 3.6 min
Discarded = 0.00 cfs @ 48.30 hrs, Volume= 0.001 af
Primary = 2.00 cfs @ 48.30 hrs, Volume= 0.306 af
Routed to Pond 10P :
Secondary = 0.90 cfs @ 48.30 hrs, Volume= 0.015 af
Routed to Reach 22R : East

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Peak Elev= 1,015.43' @ 48.30 hrs Surf.Area= 500 sf Storage= 447 cf

Plug-Flow detention time= 1.9 min calculated for 0.322 af (100% of inflow)
Center-of-Mass det. time= 1.9 min (3,047.4 - 3,045.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,014.00'	779 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,014.00	175	0	0
1,015.00	355	265	265
1,015.50	525	220	485
1,016.00	650	294	779

Device	Routing	Invert	Outlet Devices
#1	Secondary	1,015.00'	**1.2' long x 1.2' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.66 2.69 2.71 2.78 2.89 2.99 3.09 3.20 3.21 3.19 3.30 3.32
#2	Discarded	1,014.00'	**0.060 in/hr Exfiltration over Surface area**
#3	Device 4	1,014.00'	**15.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads
#4	Primary	1,011.00'	**8.0" Round Culvert** L= 117.0' Ke= 0.500 Inlet / Outlet Invert= 1,011.00' / 1,009.71' S= 0.0110 '/' Cc= 0.900 n= 0.015, Flow Area= 0.35 sf

Discarded OutFlow Max=0.00 cfs @ 48.30 hrs HW=1,015.42' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=2.00 cfs @ 48.30 hrs HW=1,015.42' TW=983.28' (Dynamic Tailwater)
└**4=Culvert** (Barrel Controls 2.00 cfs @ 5.73 fps)
└**3=Orifice/Grate** (Passes 2.00 cfs of 4.23 cfs potential flow)

Secondary OutFlow Max=0.89 cfs @ 48.30 hrs HW=1,015.42' TW=0.00' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.89 cfs @ 1.75 fps)

Stage-Area-Storage for Pond 3P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
1,014.00	175	0
1,014.02	179	4
1,014.04	182	7
1,014.06	186	11
1,014.08	189	15
1,014.10	193	18
1,014.12	197	22
1,014.14	200	26
1,014.16	204	30
1,014.18	207	34
1,014.20	211	39
1,014.22	215	43
1,014.24	218	47
1,014.26	222	52
1,014.28	225	56
1,014.30	229	61
1,014.32	233	65
1,014.34	236	70
1,014.36	240	75
1,014.38	243	79
1,014.40	247	84
1,014.42	251	89
1,014.44	254	94
1,014.46	258	100
1,014.48	261	105
1,014.50	265	110
1,014.52	269	115
1,014.54	272	121
1,014.56	276	126
1,014.58	279	132
1,014.60	283	137
1,014.62	287	143
1,014.64	290	149
1,014.66	294	155
1,014.68	297	161
1,014.70	301	167
1,014.72	305	173
1,014.74	308	179
1,014.76	312	185
1,014.78	315	191
1,014.80	319	198
1,014.82	323	204
1,014.84	326	211
1,014.86	330	217
1,014.88	333	224
1,014.90	337	230
1,014.92	341	237
1,014.94	344	244
1,014.96	348	251
1,014.98	351	258
1,015.00	355	265
1,015.02	362	272
1,015.04	369	279
1,015.06	375	287
1,015.08	382	294
1,015.10	389	302
1,015.12	396	310
1,015.14	403	318
1,015.16	409	326
1,015.18	416	334
1,015.20	423	343
1,015.22	430	351
1,015.24	437	360
1,015.26	443	369
1,015.28	450	378
1,015.30	457	387
1,015.32	464	396
1,015.34	471	405
1,015.36	477	415
1,015.38	484	424
1,015.40	491	434
1,015.42	498	444
1,015.44	505	454
1,015.46	511	464
1,015.48	518	475
1,015.50	525	485
1,015.52	530	496
1,015.54	535	506
1,015.56	540	517
1,015.58	545	528
1,015.60	550	539
1,015.62	555	550
1,015.64	560	561
1,015.66	565	572
1,015.68	570	584
1,015.70	575	595
1,015.72	580	607
1,015.74	585	618
1,015.76	590	630
1,015.78	595	642
1,015.80	600	654
1,015.82	605	666
1,015.84	610	678
1,015.86	615	690
1,015.88	620	703
1,015.90	625	715
1,015.92	630	728
1,015.94	635	740
1,015.96	640	753
1,015.98	645	766
1,016.00	**650**	**779**

Summary for Pond 4P:

Inflow Area = 0.141 ac, 58.87% Impervious, Inflow Depth = 7.43" for 100-yr 96hr event
Inflow = 1.10 cfs @ 48.08 hrs, Volume= 0.087 af
Outflow = 1.10 cfs @ 48.09 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.5 min
Discarded = 0.00 cfs @ 48.09 hrs, Volume= 0.001 af
Primary = 1.10 cfs @ 48.09 hrs, Volume= 0.087 af
Routed to Pond 10P :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 4R : Plymouth Road

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Peak Elev= 1,020.27' @ 48.09 hrs Surf.Area= 128 sf Storage= 26 cf

Plug-Flow detention time= 0.8 min calculated for 0.087 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (3,010.3 - 3,009.5)

Volume	Invert	Avail.Storage	Storage Description
#1	1,020.00'	761 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,020.00	65	0	0
1,021.00	295	180	180
1,021.50	590	221	401
1,022.00	850	360	761

Device	Routing	Invert	Outlet Devices
#1	Secondary	1,021.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	1,020.00'	**0.060 in/hr Exfiltration over Surface area**
#3	Primary	1,020.00'	**15.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 48.09 hrs HW=1,020.27' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.08 cfs @ 48.09 hrs HW=1,020.27' TW=981.97' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Weir Controls 1.08 cfs @ 1.02 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,020.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 4P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
1,020.00	65	0
1,020.02	70	1
1,020.04	74	3
1,020.06	79	4
1,020.08	83	6
1,020.10	88	8
1,020.12	93	9
1,020.14	97	11
1,020.16	102	13
1,020.18	106	15
1,020.20	111	18
1,020.22	116	20
1,020.24	120	22
1,020.26	125	25
1,020.28	129	27
1,020.30	134	30
1,020.32	139	33
1,020.34	143	35
1,020.36	148	38
1,020.38	152	41
1,020.40	157	44
1,020.42	162	48
1,020.44	166	51
1,020.46	171	54
1,020.48	175	58
1,020.50	180	61
1,020.52	185	65
1,020.54	189	69
1,020.56	194	72
1,020.58	198	76
1,020.60	203	80
1,020.62	208	85
1,020.64	212	89
1,020.66	217	93
1,020.68	221	97
1,020.70	226	102
1,020.72	231	106
1,020.74	235	111
1,020.76	240	116
1,020.78	244	121
1,020.80	249	126
1,020.82	254	131
1,020.84	258	136
1,020.86	263	141
1,020.88	267	146
1,020.90	272	152
1,020.92	277	157
1,020.94	281	163
1,020.96	286	168
1,020.98	290	174
1,021.00	295	180
1,021.02	307	186
1,021.04	319	192
1,021.06	330	199
1,021.08	342	205
1,021.10	354	212
1,021.12	366	220
1,021.14	378	227
1,021.16	389	235
1,021.18	401	243
1,021.20	413	251
1,021.22	425	259
1,021.24	437	268
1,021.26	448	277
1,021.28	460	286
1,021.30	472	295
1,021.32	484	305
1,021.34	496	314
1,021.36	507	324
1,021.38	519	335
1,021.40	531	345
1,021.42	543	356
1,021.44	555	367
1,021.46	566	378
1,021.48	578	390
1,021.50	590	401
1,021.52	600	413
1,021.54	611	425
1,021.56	621	438
1,021.58	632	450
1,021.60	642	463
1,021.62	652	476
1,021.64	663	489
1,021.66	673	502
1,021.68	684	516
1,021.70	694	530
1,021.72	704	544
1,021.74	715	558
1,021.76	725	572
1,021.78	736	587
1,021.80	746	602
1,021.82	756	617
1,021.84	767	632
1,021.86	777	647
1,021.88	788	663
1,021.90	798	679
1,021.92	808	695
1,021.94	819	711
1,021.96	829	728
1,021.98	840	744
1,022.00	**850**	**761**

Summary for Pond 10P:

Inflow Area = 7.216 ac, 36.35% Impervious, Inflow Depth = 6.82" for 100-yr 96hr event
Inflow = 44.67 cfs @ 48.14 hrs, Volume= 4.100 af
Outflow = 12.14 cfs @ 48.65 hrs, Volume= 4.176 af, Atten= 73%, Lag= 30.8 min
Primary = 5.57 cfs @ 48.66 hrs, Volume= 3.326 af
Routed to Reach 1R : North
Secondary = 1.61 cfs @ 48.66 hrs, Volume= 0.042 af
Routed to Pond 1P :
Tertiary = 4.99 cfs @ 48.59 hrs, Volume= 0.808 af
Routed to Pond 1P :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Starting Elev= 979.50' Surf.Area= 3,765 sf Storage= 12,596 cf
Peak Elev= 983.86' @ 48.66 hrs Surf.Area= 20,244 sf Storage= 76,530 cf (63,934 cf above start)

Plug-Flow detention time= 224.0 min calculated for 3.885 af (95% of inflow)
Center-of-Mass det. time= 37.6 min (3,081.6 - 3,044.1)

Volume	Invert	Avail.Storage	Storage Description
#1	972.00'	79,336 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
972.00	320	0	0
975.00	975	1,943	1,943
977.00	2,225	3,200	5,143
979.00	3,430	5,655	10,798
979.50	3,765	1,799	12,596
980.00	10,595	3,590	16,186
981.00	13,340	11,968	28,154
982.00	15,880	14,610	42,764
983.00	18,360	17,120	59,884
984.00	20,545	19,453	79,336

Device	Routing	Invert	Outlet Devices
#1	Primary	978.28'	**12.0" Round Culvert** L= 175.0' Ke= 0.500 Inlet / Outlet Invert= 978.28' / 977.40' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	980.70'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	981.00'	**48.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads
#4	Device 1	978.50'	**8.0" Round Culvert X 2.00** L= 100.0' Ke= 0.500 Inlet / Outlet Invert= 978.50' / 978.50' S= 0.0000 '/' Cc= 0.900 n= 0.020, Flow Area= 0.35 sf
#5	Secondary	983.60'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#6	Tertiary	981.05'	**12.0" Round Culvert** L= 30.0' Ke= 0.500

			Inlet / Outlet Invert= 981.05' / 980.90' S= 0.0050 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf
#7	Device 6	976.00'	**12.0" Round Culvert** L= 50.0' Ke= 0.500
			Inlet / Outlet Invert= 976.00' / 975.75' S= 0.0050 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf
#8	Device 6	982.50'	**48.0" Horiz. Orifice/Grate X 0.60** C= 0.600

Primary OutFlow Max=5.57 cfs @ 48.66 hrs HW=983.86' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 5.57 cfs @ 7.09 fps)
  ├─**2=Sharp-Crested Rectangular Weir** (Passes < 61.88 cfs potential flow)
  ├─**3=Orifice/Grate** (Passes < 61.40 cfs potential flow)
  └─**4=Culvert** (Passes < 3.21 cfs potential flow)

Secondary OutFlow Max=1.59 cfs @ 48.66 hrs HW=983.86' TW=982.16' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Weir Controls 1.59 cfs @ 1.22 fps)

Tertiary OutFlow Max=4.95 cfs @ 48.59 hrs HW=983.84' TW=982.13' (Dynamic Tailwater)
└─**6=Culvert** (Inlet Controls 4.95 cfs @ 6.30 fps)
  ├─**7=Culvert** (Passes < 4.71 cfs potential flow)
  └─**8=Orifice/Grate** (Passes < 42.02 cfs potential flow)

Stage-Area-Storage for Pond 10P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
972.00	320	0
972.20	364	68
972.40	407	145
972.60	451	231
972.80	495	326
973.00	538	429
973.20	582	541
973.40	626	662
973.60	669	791
973.80	713	930
974.00	757	1,077
974.20	800	1,232
974.40	844	1,397
974.60	888	1,570
974.80	931	1,752
975.00	975	1,943
975.20	1,100	2,150
975.40	1,225	2,382
975.60	1,350	2,640
975.80	1,475	2,922
976.00	1,600	3,230
976.20	1,725	3,563
976.40	1,850	3,920
976.60	1,975	4,303
976.80	2,100	4,710
977.00	2,225	5,143
977.20	2,346	5,600
977.40	2,466	6,081
977.60	2,587	6,586
977.80	2,707	7,115
978.00	2,828	7,669
978.20	2,948	8,246
978.40	3,068	8,848
978.60	3,189	9,474
978.80	3,309	10,124
979.00	3,430	10,798
979.20	3,564	11,497
979.40	3,698	12,223
979.60	5,131	13,041
979.80	7,863	14,340
980.00	10,595	16,186
980.20	11,144	18,360
980.40	11,693	20,644
980.60	12,242	23,037
980.80	12,791	25,541
981.00	13,340	28,154
981.20	13,848	30,873
981.40	14,356	33,693
981.60	14,864	36,615
981.80	15,372	39,639
982.00	15,880	42,764
982.20	16,376	45,989
982.40	16,872	49,314
982.60	17,368	52,738
982.80	17,864	56,261
983.00	18,360	59,884
983.20	18,797	63,599
983.40	19,234	67,403
983.60	19,671	71,293
983.80	20,108	75,271
984.00	**20,545**	**79,336**

Summary for Pond 11P: DEP

Inflow Area = 1.803 ac, 11.92% Impervious, Inflow Depth = 12.00" for 100-yr 96hr event
Inflow = 8.22 cfs @ 48.72 hrs, Volume= 1.803 af
Outflow = 8.21 cfs @ 48.74 hrs, Volume= 1.803 af, Atten= 0%, Lag= 1.2 min
Primary = 8.21 cfs @ 48.74 hrs, Volume= 1.803 af
Routed to Reach 1R : North

Routing by Dyn-Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.05 hrs
Peak Elev= 980.35' @ 48.74 hrs Surf.Area= 297 sf Storage= 93 cf

Plug-Flow detention time= 0.1 min calculated for 1.802 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (3,022.3 - 3,022.1)

Volume	Invert	Avail.Storage	Storage Description
#1	978.67'	2,228 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
978.67	10	0	0
980.00	40	33	33
981.00	770	405	438
982.00	2,810	1,790	2,228

Device	Routing	Invert	Outlet Devices
#1	Primary	978.67'	**18.0" Round Culvert** L= 9.0' Ke= 0.500 Inlet / Outlet Invert= 978.67' / 978.39' S= 0.0311 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=8.21 cfs @ 48.74 hrs HW=980.35' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 8.21 cfs @ 4.65 fps)

Stage-Area-Storage for Pond 11P: DEP

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
978.67	10	0
978.72	11	1
978.77	12	1
978.82	13	2
978.87	15	2
978.92	16	3
978.97	17	4
979.02	18	5
979.07	19	6
979.12	20	7
979.17	21	8
979.22	22	9
979.27	24	10
979.32	25	11
979.37	26	13
979.42	27	14
979.47	28	15
979.52	29	17
979.57	30	18
979.62	31	20
979.67	33	21
979.72	34	23
979.77	35	25
979.82	36	26
979.87	37	28
979.92	38	30
979.97	39	32
980.02	55	34
980.07	91	38
980.12	128	43
980.17	164	51
980.22	201	60
980.27	237	71
980.32	274	83
980.37	310	98
980.42	347	114
980.47	383	133
980.52	420	153
980.57	456	175
980.62	493	198
980.67	529	224
980.72	566	251
980.77	602	280
980.82	639	311
980.87	675	344
980.92	712	379
980.97	748	415
981.02	811	454
981.07	913	497
981.12	1,015	545
981.17	1,117	599
981.22	1,219	657
981.27	1,321	721
981.32	1,423	789
981.37	1,525	863
981.42	1,627	942
981.47	1,729	1,025
981.52	1,831	1,114
981.57	1,933	1,209
981.62	2,035	1,308
981.67	2,137	1,412
981.72	2,239	1,521
981.77	2,341	1,636
981.82	2,443	1,755
981.87	2,545	1,880
981.92	2,647	2,010
981.97	**2,749**	**2,145**

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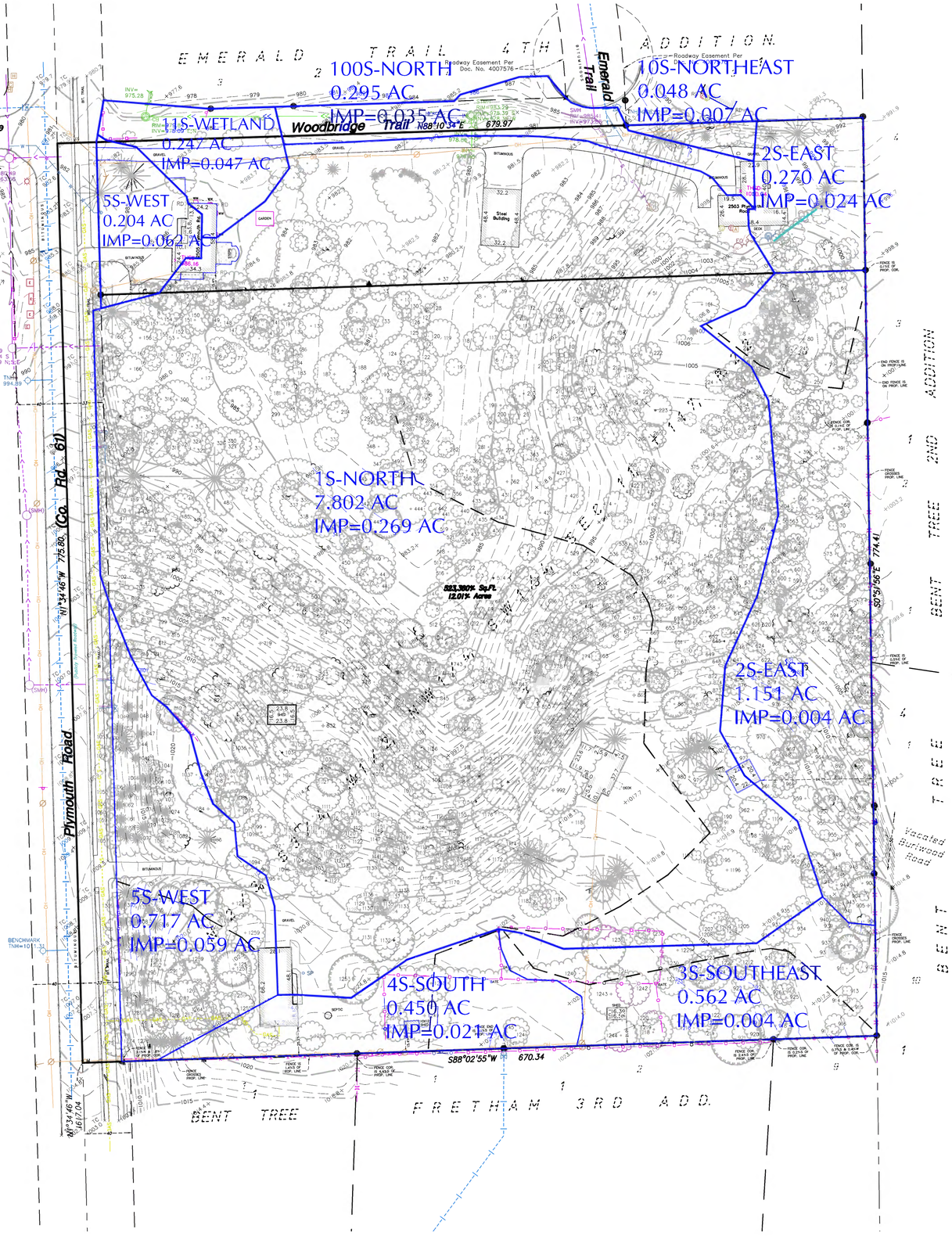
100-Year base Event

100-yr 96hr Event

Figures

Existing Drainage Exhibit
Proposed Drainage Exhibit
MIDS Results
SHSAM Results
Soil Borings



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DUDYCHA PROPERTY

2511 & 2615 Plymouth Road
Minnetonka, MN 55305

LAKE WEST DEVELOPMENT, LLC

14525 Highway 7, Suite 265
Minnetonka, MN 55345

LOUCKS

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LANDSCAPE ARCHITECTURE
ENVIRONMENTAL

7200 Hemlock Lane, Suite 300
Maple Grove, MN 55369
763.424.5505
www.loucksinc.com

CADD QUALIFICATION

SUBMITTAL/REVISIONS

.

PROFESSIONAL SIGNATURE

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Landscape Architect under the laws of the State of Minnesota.

Chad E. Feigum - LA
License No. 46508
Date

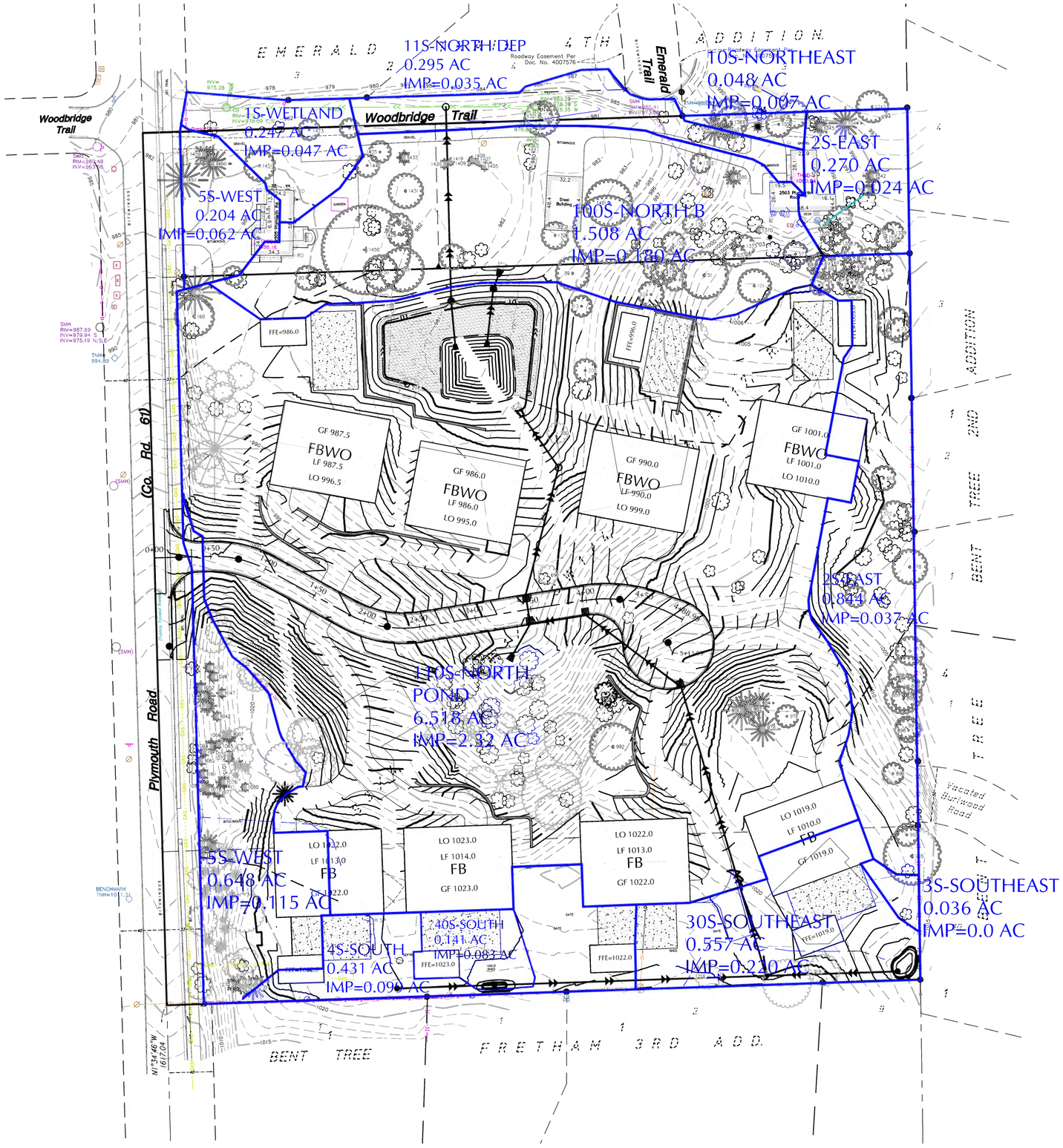
QUALITY CONTROL

Loucks Project No.	21509.0
Project Lead	CEF
Drawn By	CEF
Checked By	TJG/CEF
Review Date	

.

EXISTING DRAINAGE PLAN

H1-1



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Chad E. Feigum - LA

License No. 46508
Date

QUALITY CONTROL

Loucks Project No.	21509.0
Project Lead	CEF
Drawn By	CEF
Checked By	TJG/CEF
Review Date	

SHEET INDEX

.

PROPOSED DRAINAGE PLAN

H2-1

Plotted: 03 /05 / 2024 7:28 PM W:\2021\21509\HYDROLOGY\CAD\H2-1-8 Lot

Project Information

Calculator Version:	Version 4: July 2020
Project Name:	
User Name / Company Name:	
Date:	
Project Description:	
Construction Permit?:	No

Site Information

Retention Requirement (inches):	1.
Site's Zip Code:	55305
Annual Rainfall (inches):	30.4
Phosphorus EMC (mg/l):	0.3
TSS EMC (mg/l):	54.5

Total Site Area

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land				0	0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed			0	0	0
				Impervious Area (acres)	2.873
				Total Area (acres)	2.873

Site Areas Routed to BMPs

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed					0
				Impervious Area (acres)	2.873
				Total Area (acres)	2.873

Summary Information

Performance Goal Requirement

Performance goal volume retention requirement:	10429	ft3
Volume removed by BMPs towards performance goal:	10429	ft^3
Percent volume removed towards performance goal	**100**	**%**

Annual Volume and Pollutant Load Reductions

Post development annual runoff volume	6.2229	acre-ft
Annual runoff volume removed by BMPs:	5.5777	acre-ft
Percent annual runoff volume removed:	**90**	**%**
Post development annual particulate P load:	2.7928	lbs
Annual particulate P removed by BMPs:	2.503	lbs
Post development annual dissolved P load:	2.285	lbs
Annual dissolved P removed by BMPs:	2.048	lbs
Total P removed by BMPs	4.551	lbs
Percent annual total phosphorus removed:	**90**	**%**
Post development annual TSS load:	922.5	lbs
Annual TSS removed by BMPs:	826.8	lbs
Percent annual TSS removed:	**90**	**%**

BMP Summary

Performance Goal Summary

BMP Name	BMP Volume Capacity (ft3)	Volume Recieved (ft3)	Volume Retained (ft3)	Volume Outflow (ft3)	Percent Retained (%)
1 - Infiltration basin/Infiltration trench (abc	10429	10429	10429	0	100

Annual Volume Summary

BMP Name	Volume From Direct Watershed (acre-ft)	Volume From Upstream BMPs (acre-ft)	Volume Retained (acre-ft)	Volume outflow (acre-ft)	Percent Retained (%)
1 - Infiltration basin/Infiltration trench (abc	6.2229	0	5.5777	0.6452	90

Particulate Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Infiltration basin/Infiltration trench (abc	2.7928	0	2.5032	0.2896	90

Dissolved Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Infiltration basin/Infiltration trench (abc	2.2851	0	2.0482	0.2369	90

Total Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Infiltration basin/Infiltration trench (abc	5.0779	0	4.5514	0.5265	90

TSS Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Infiltration basin/Infiltration trench (abc	922.49	0	826.84	95.65	90

BMP Schematic

1 - Infiltration basin/
Infiltration trench

Project Information

Calculator Version:	Version 4: July 2020
Project Name:	
User Name / Company Name:	
Date:	
Project Description:	
Construction Permit?:	No

Site Information

Retention Requirement (inches):	1.1
Site's Zip Code:	55305
Annual Rainfall (inches):	30.4
Phosphorus EMC (mg/l):	0.3
TSS EMC (mg/l):	54.5

Total Site Area

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land				2.6	2.6
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed			0	4.04	4.04
				Impervious Area (acres)	2.874
				Total Area (acres)	9.514

Site Areas Routed to BMPs

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land				2.599	2.599
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed				4.04	4.04
				Impervious Area (acres)	2.874
				Total Area (acres)	9.513

Summary Information

Performance Goal Requirement

Performance goal volume retention requirement:	11476	ft3
Volume removed by BMPs towards performance goal:	4350	ft^3
Percent volume removed towards performance goal	**38**	**%**

Annual Volume and Pollutant Load Reductions

Post development annual runoff volume	8.8243	acre-ft
Annual runoff volume removed by BMPs:	1.7738	acre-ft
Percent annual runoff volume removed:	**20**	**%**
Post development annual particulate P load:	3.9603	lbs
Annual particulate P removed by BMPs:	3.439	lbs
Post development annual dissolved P load:	3.24	lbs
Annual dissolved P removed by BMPs:	1.132	lbs
Total P removed by BMPs	4.571	lbs
Percent annual total phosphorus removed:	**63**	**%**
Post development annual TSS load:	1308.1	lbs
Annual TSS removed by BMPs:	1248	lbs
Percent annual TSS removed:	**95**	**%**

BMP Summary

Performance Goal Summary

BMP Name	BMP Volume Capacity (ft3)	Volume Recieved (ft3)	Volume Retained (ft3)	Volume Outflow (ft3)	Percent Retained (%)
1 - Bioretention basin (with underdrain)	2470	9371	2470	6900	26
1 - Stormwater disconnection (Impervious	777	1002	777	225	78
0 - Stormwater disconnection (Impervious	1103	4181	1103	3078	26
1 - Constructed stormwater pond	0	9371	0	9371	0
SAFL Baffle	0	6293	0	6293	0

Annual Volume Summary

BMP Name	Volume From Direct Watershed (acre-ft)	Volume From Upstream BMPs (acre-ft)	Volume Retained (acre-ft)	Volume outflow (acre-ft)	Percent Retained (%)
1 - Bioretention basin (with underdrain)	0	7.2539	1.2466	6.0073	17
1 - Stormwater disconnection (Impervious	1.2248	0	0.1817	1.0431	15
0 - Stormwater disconnection (Impervious	2.9809	0	0.3455	2.6354	12
1 - Constructed stormwater pond	0	7.2539	0	7.2539	0
SAFL Baffle	4.6185	0	0	4.6185	0

Particulate Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Bioretention basin (with underdrain)	0	0.3219	0.2686	0.0533	83
1 - Stormwater disconnection (Impervious	0.5497	0	0.0815	0.4682	15
0 - Stormwater disconnection (Impervious	1.3378	0	0.155	1.1828	12
1 - Constructed stormwater pond	0	2.0119	1.69	0.3219	84
SAFL Baffle	2.0728	0	1.2437	0.8291	60

Dissolved Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Bioretention basin (with underdrain)	0	2.4505	0.7255	1.725	30
1 - Stormwater disconnection (Impervious	0.4498	0	0.0667	0.3831	15
0 - Stormwater disconnection (Impervious	1.0946	0	0.1269	0.9677	12
1 - Constructed stormwater pond	0	2.6636	0.2131	2.4505	8
SAFL Baffle	1.6959	0	0	1.6959	0

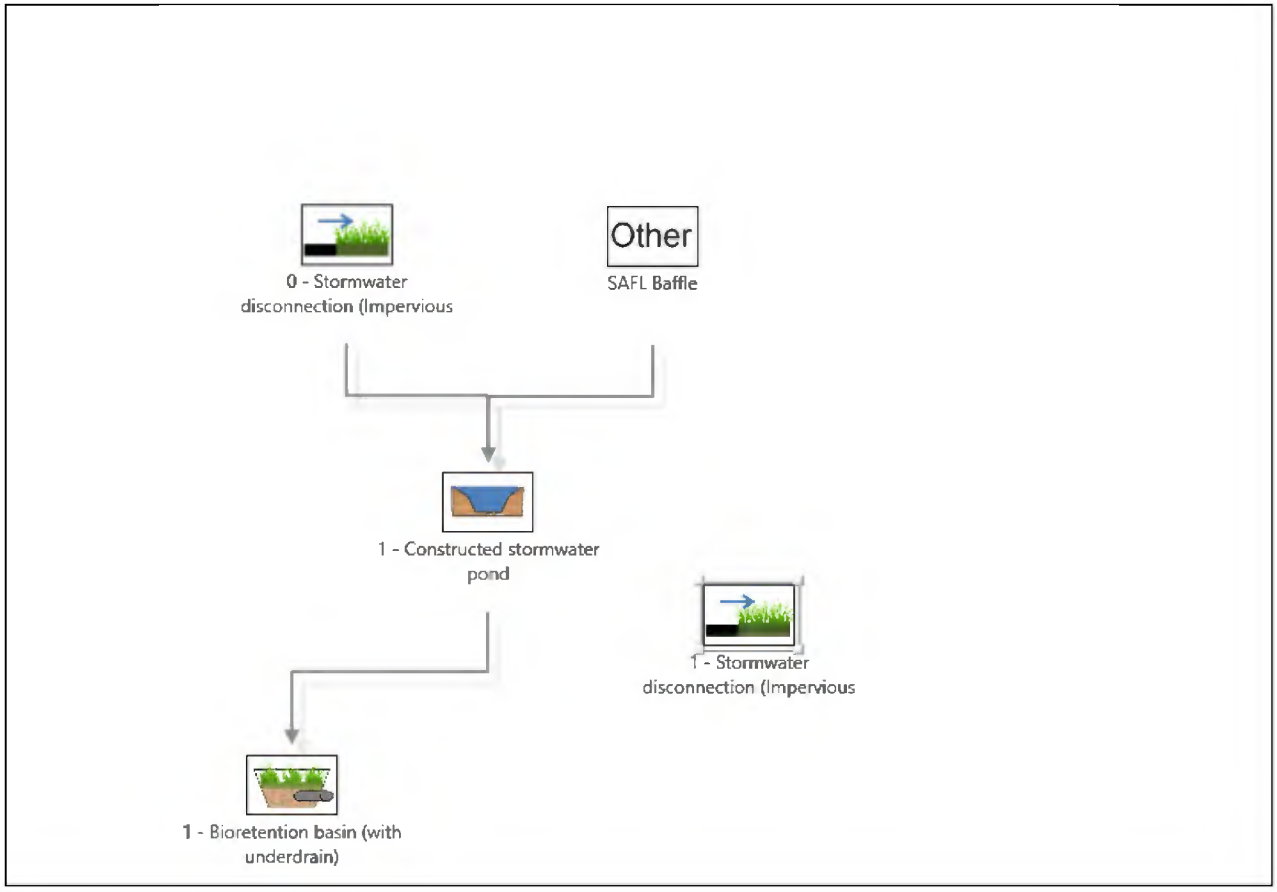
Total Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Bioretention basin (with underdrain)	0	2.7724	0.9941	1.7783	56
1 - Stormwater disconnection (Impervious	0.9995	0	0.1482	0.8513	15
0 - Stormwater disconnection (Impervious	2.4324	0	0.2819	2.1505	12
1 - Constructed stormwater pond	0	4.6755	1.9031	2.7724	46
SAFL Baffle	3.7687	0	1.2437	2.525	30

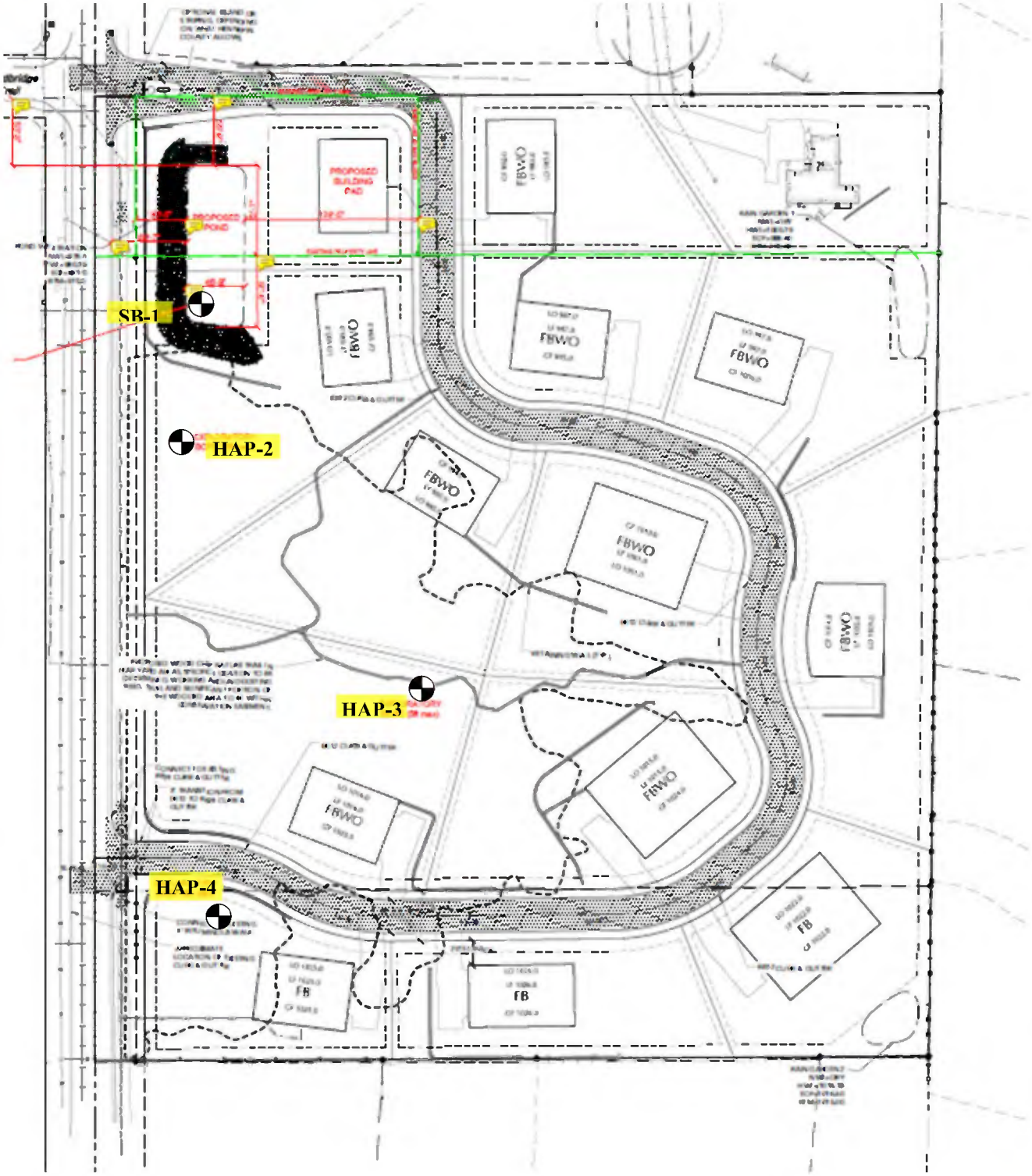
TSS Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Bioretention basin (with underdrain)	0	63.82	53.25	10.57	83
1 - Stormwater disconnection (Impervious	181.57	0	132.09	49.48	73
0 - Stormwater disconnection (Impervious	441.88	0	316.87	125.01	72
1 - Constructed stormwater pond	0	398.87	335.05	63.82	84
SAFL Baffle	684.64	0	410.78	273.86	60

BMP Schematic



Name	Model	Total Load (lbs)	Total Load Removed (lbs)	Removal Efficiency (%)	Model Height (ft)	Model Diameter (ft)	Pipe Diameter (inches)
SAFLBaffle	42	10852	1772	16.3	2	4	15
SAFLBaffle	44	10852	3703	34.1	4	4	15
SAFLBaffle	55	10852	6322	58.3	5	5	18
SAFLBaffle	63	10852	7045	64.9	3	6	24
SAFLBaffle	66	10852	8205	75.6	6	6	24
SAFLBaffle	86	10852	9180	84.6	6	8	30
SAFLBaffle	106	10852	9797	90.3	6	10	36



Legend

Approximate Soil Boring Location

Disclaimer: Map and parcel data are believed to be accurate, but accuracy is not guaranteed.
This is not a legal document and should not be substituted for a title search, appraisal, survey, or for zoning verification.

N W E S

Haugo GeoTechnical Services, LLC 2825 Cedar Avenue S. Minneapolis, MN 55407	Soil Boring Location Sketch Fretham 31st Addition Minnetonka, Minnesota	Figure #: 1 Drawn By: AH Date: 10-25-2023 Scale: None Project #: 23-0817

Haugo GeoTechnical Services
2825 Cedar Ave South
Minneapolis, MN, 55407
Telephone: 612-729-2959
Fax: 763-445-2238

BORING NUMBER SB-1

CLIENT Lake West Deveopment
PROJECT NAME Fretham 31st Addition
PROJECT NUMBER 23-0817
PROJECT LOCATION Minnetonka, MN
DATE STARTED 10/25/23 **COMPLETED** 10/25/23
GROUND ELEVATION _____ **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS- 45
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING --- Not Encountered
LOGGED BY NC **CHECKED BY** PG
AT END OF DRILLING --- Not Encountered
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)
0		Clayey Sand, trace Roots, dark brown to black, moist (Topsoil)				
		(CL) Lean Clay, brown w/ Rust Staining, dry to about 10 ft then moist, rather stiff to very stiff (Glacial Till)	AU 1			
			SS 2		2-4-9 (13)	
5			SS 3		7-20-14 (34)	
			SS 4		7-10-13 (23)	
10			SS 5		5-10-14 (24)	
			SS 6		4-6-9 (15)	
15			SS 7		3-5-7 (12)	
20			SS 8		4-7-8 (15)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 21.0 feet.

Haugo GeoTechnical Services
2825 Cedar Ave South
Minneapolis, MN, 55407
Telephone: 612-729-2959
Fax: 763-445-2238

BORING NUMBER HAP-2

CLIENT Lake West Deveopment
PROJECT NAME Fretham 31st Addition
PROJECT NUMBER 23-0817
PROJECT LOCATION Minnetonka, MN
DATE STARTED 10/25/23 **COMPLETED** 10/25/23
GROUND ELEVATION _____ **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS- 45
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger
AT TIME OF DRILLING --- Not Encountered
LOGGED BY NC **CHECKED BY** PG
AT END OF DRILLING --- Not Encountered
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)
0		Lean Clay, trace Roots, dark brown to black, wet (Topsoil)	AU 6			
		(CL) Lean Clay, dark brown to brown, wet (Glacial Till)	AU 7			
			AU 8			

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 4.3 feet.

Haugo GeoTechnical Services
2825 Cedar Ave South
Minneapolis, MN, 55407
Telephone: 612-729-2959
Fax: 763-445-2238

BORING NUMBER HAP-3

CLIENT Lake West Deveopment
PROJECT NAME Fretham 31st Addition
PROJECT NUMBER 23-0817
PROJECT LOCATION Minnetonka, MN
DATE STARTED 10/25/23 **COMPLETED** 10/25/23
GROUND ELEVATION _____ **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS- 45
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger
AT TIME OF DRILLING --- Not Encountered
LOGGED BY NC **CHECKED BY** PG
AT END OF DRILLING --- Not Encountered
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)
0		Lean Clay w/ Sand, trace Roots, black, wet (Topsoil)	AU 4			
		(CL) Lean Clay w/ Sand, dark brown to brown, wet (Glacial Till)	AU 5			

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 4.3 feet.

Haugo GeoTechnical Services
2825 Cedar Ave South
Minneapolis, MN, 55407
Telephone: 612-729-2959
Fax: 763-445-2238

BORING NUMBER HAP-4

CLIENT Lake West Deveopment
PROJECT NAME Fretham 31st Addition
PROJECT NUMBER 23-0817
PROJECT LOCATION Minnetonka, MN
DATE STARTED 10/25/23 **COMPLETED** 10/25/23
GROUND ELEVATION _____ **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS- 45
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger
AT TIME OF DRILLING --- Not Encountered
LOGGED BY NC **CHECKED BY** PG
AT END OF DRILLING --- Not Encountered
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Lean Clay w/ Sand, trace Roots, dark brown to black, wet (Topsoil)	AU 1				
		(SC) Clayey Sand, trace Gravel, brown, moist to wet (Glacial Till)	AU 2				
		(CL) Sandy Lean Clay, trace Gravel, brown, moist to wet (Glacial Till)	AU 3				

Bottom of borehole at 4.7 feet.

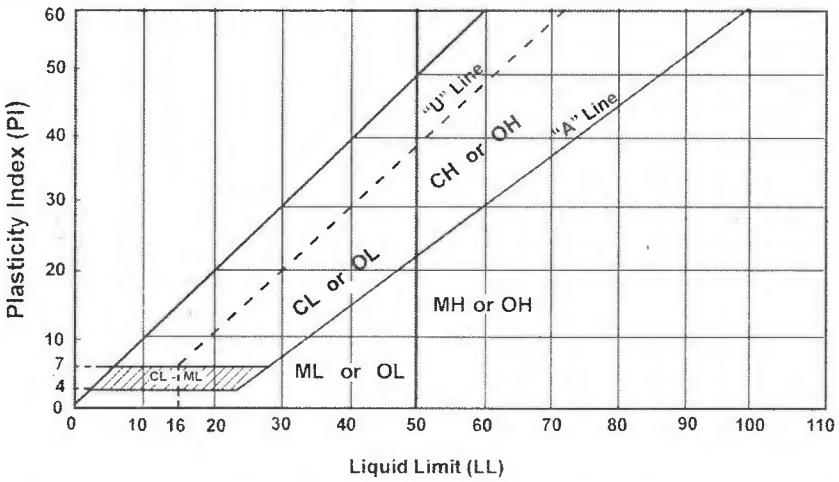
HAUGO GEOTECHNICAL SERVICES

Descriptive Terminology of Soil

Standard D 2487 - 00
Classification of Soils for Engineering Purposes
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [a]				Soils Classification	
				Group Symbol	Group Name [b]
Coarse-grained Soils more than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels 5% or less fines [e]	$C_u \geq 4$ and $1 \leq C_c \leq 3$ [c]	GW	Well-graded gravel [d]
			$C_u < 4$ and/or $1 > C_c > 3$ [c]	GP	Poorly graded gravel [d]
		Gravels with Fines More than 12% fines [e]	Fines classify as ML or MH	GM	Silty gravel [d f g]
			Fines classify as CL or CH	GC	Clayey gravel [d f g]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands 5% or less fines [f]	$C_u \geq 6$ and $1 \leq C_c \leq 3$ [c]	SW	Well-graded sand [h]
			$C_u < 6$ and/or $1 > C_c > 3$ [c]	SP	Poorly graded sand [h]
		Sands with Fines More than 12% [i]	Fines classify as ML or MH	SM	Silty sand [f g h]
			Fines classify as CL or CH	SC	Clayey sand [f g h]
Fine-grained Soils 50% or more passed the No. 200 sieve	Silts and Clays Liquid limit less than 50	Inorganic	PI > 7 and plots on or above "A" line [j]	CL	Lean clay [k l m]
			PI < 4 or plots below "A" line [j]	ML	Silt [k l m]
		Organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic clay [k l m n]
				OL	Organic silt [k l m o]
	Silts and clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay [k l m]
			PI plots below "A" line	MH	Elastic silt [k l m]
		Organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic clay [k l m p]
				OH	Organic silt [k l m q]
Highly Organic Soils		Primarily organic matter, dark in color and organic odor		PT	Peat

a. Based on the material passing the 3-in (75mm) sieve.
b. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders or both" to group name.
c. $C_u = D_{60} / D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
d. If soil contains ≥15% sand, add "with sand" to group name.
e. Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
f. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
g. If fines are organic, add "with organic fines" to group name.
h. If soil contains ≥ 15% gravel, add "with gravel" to group name.
i. Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay
j. If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.
k. If soil contains 10 to 29% plus No. 200, add "with sand" or "with gravel" whichever is predominant.
l. If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
m. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
n. PI ≥ 4 and plots on or above "A" line.
o. PI < 4 or plots below "A" line.
p. PI plots on or above "A" line.
q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	OC	Organic content, %
WD	Wet density, pcf	S	Percent of saturation, %
MC	Natural moisture content, %	SG	Specific gravity
LL	Liquid limit, %	C	Cohesion, psf
PL	Plastic limit, %	∅	Angle of internal friction
PI	Plasticity index, %	qu	Unconfined compressive strength, psf
P200	% passing 200 sieve	qp	Pocket penetrometer strength, tsf

Particle Size Identification

Boulders	over 12"
Cobbles	3" to 12"
Gravel	
Coarse	3/4" to 3"
Fine	No. 4 to 3/4"
Sand	
Coarse	No. 4 to No. 10
Medium	No. 10 to No. 40
Fine	No. 40 to No. 200
Silt	< No. 200, PI < 4 or below "A" line
Clay	< No. 200, PI ≥ 4 and on or above "A" line

Relative Density of Cohesionless Soils

Very loose	0 to 4 BPF
Loose	5 to 10 BPF
Medium dense	11 to 30 BPF
Dense	31 to 50 BPF
Very dense	over 50 BPF

Consistency of Cohesive Soils

Very soft	0 to 1 BPF
Soft	2 to 3 BPF
Rather soft	4 to 5 BPF
Medium	6 to 8 BPF
Rather stiff	9 to 12 BPF
Stiff	13 to 16 BPF
Very stiff	17 to 30 BPF
Hard	over 30 BPF

Drilling Notes

Standard penetration test borings were advanced by 3 1/4" or 6 1/4" ID hollow-stem augers unless noted otherwise, Jetting water was used to clean out auger prior to sampling only where indicated on logs. Standard penetration test borings are designated by the prefix "ST" (Split Tube). All samples were taken with the standard 2" OD split-tube sampler, except where noted.

Power auger borings were advanced by 4" or 6" diameter continuous-flight, solid-stem augers. Soil classifications and strata depths were inferred from disturbed samples augered to the surface and are, therefore, somewhat approximate. Power auger borings are designated by the prefix "B."

Hand auger borings were advanced manually with a 1 1/2" or 3 1/4" diameter auger and were limited to the depth from which the auger could be manually withdrawn. Hand auger borings are indicated by the prefix "H."

BPF: Numbers indicate blows per foot recorded in standard penetration test, also known as "N" value. The sampler was set 6" into undisturbed soil below the hollow-stem auger. Driving resistances were then counted for second and third 6" increments and added to get BPF. Where they differed significantly, they are reported in the following form: 2/12 for the second and third 6" increments, respectively.

WH: WH indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WR: WR indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

TW indicates thin-walled (undisturbed) tube sample.

Note: All tests were run in general accordance with applicable ASTM standards.