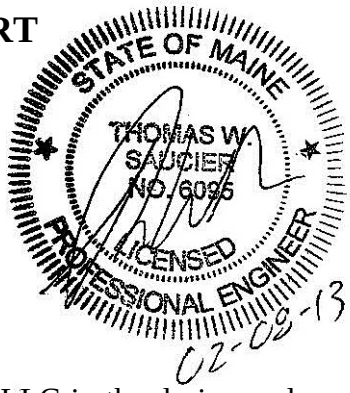
STORMWATER MANAGEMENT REPORT

OLD BARN ESTATES SUBDIVISION
ICE POND DRIVE
PORTLAND, MAINE
JANUARY 2013
Rev. 1 – February 8, 2013



Introduction

Land Design Solutions (LDS) was retained to assist the TPO Properties, LLC in the design and permitting of a 14 lot residential subdivision located on the southerly side of Ledgewood Drive, across from the intersection of Slocum Drive in Falmouth, Maine. Although, the entrance to the site is located in Falmouth, the majority of the site is located within the City of Portland. The proposed subdivision includes the construction of a 760-foot local street (Ice Pond Drive) and associated stormwater and landscaping amenities to access 12 approximately 0.5 acre single family residential lots. It is anticipated that, upon final construction, each lot will include approximately 5,000 square feet of impervious area and 10,000 square feet of lawn area.

Lot 13 is an existing residential lot that abuts Ice Pond Drive, but is accessed by an existing driveway from Ledgewood Drive. Development of this lot will be minimal and there will be no increase in impervious area. Therefore, stormwater runoff quantity and quality from this lot will not change from the pre development to post development conditions.

One additional non-adjacent lot (Lot 14) is included in the subdivision, but is located at the intersection of Ocean Avenue and Ledgewood Drive. The lot is currently developed with 5,105 square feet of impervious area. The proposed development of the site will reduce the total impervious area by 546 square feet to 4,559 square feet. The reduction in impervious area will result in a decrease in runoff from the site and will improve the quality of stormwater runoff from the site.

This Stormwater Management Report assesses both pre-development and post-development peak runoff rates to establish appropriate control of stormwater runoff to reduce and minimize significant impact on the local environs in accordance with the City of Portland and Town of Falmouth ordinances.

Methodology

The stormwater runoff analysis has been undertaken utilizing the HydroCAD Stormwater Modeling System software (Version 9.10) developed by the Applied Microcomputer Systems of Chocorua, New Hampshire. The program is based upon the TR-20 computer program and the TR-55 tabular method, both of which are based upon techniques developed by the USDA Soil Conservation Service. The analysis was undertaken for the 2-, 10-, 25- and 100-year frequencies (3.0, 4.7, 5.5 and 6.7 inches, respectively). Twenty-four hour storms with a Type III distribution were the basis for the analysis.

All storm drainage piping and detention basins have been sized for the 100-year, 24-hour storm utilizing the HydroCAD program.

Pre-Development Conditions

The site of the proposed subdivision is located on Ledgewood Drive in Falmouth, across from the intersection of Slocum Drive.

The parcel consists of three parcels totaling approximately 10.5 acres of forested area. The site topography is irregular, generally in a mound and depression configuration, with shallow soil over ledge. Wetlands are located on the northern and southern portions of the site. An intermittent stream is located on the southern portion of the property, which feeds into one of the southerly wetlands. As taken from the website of the "*Natural Resources Conservation Service, United States Department of Agriculture, Web Soil Survey,"* the predominant soil types in the development area are Hollis Fine Sandy Loam (HrB) and Hollis Very Rocky Fine Sandy Loam (HsB), which are both classified as hydrologic soil group (HSG) C/D. The southern portion of the site contains Scantic Silt Loam (Sn), which is classified as HSG D. The soil boundaries are shown on drawings D-100 Pre-development Drainage Plan, and D-102 Post-development Drainage Plan.

The northern portion of the site (SC1) drains from south to north towards a very large wetland that borders the northern side of the site, which ultimately drains to a 5-foot diameter culvert under Ledgewood Drive. A large offsite drainage area (OS1) also contributes to the wetland, which is shown on drawing D-101 Off-Site Subcatchment Plan. A small portion of the site near the proposed entrance (SC2) drains east toward Ledgewood Drive, where it leaves the site via a 15" culvert under Ledgewood Drive. The southern portion of the site and some additional off-site area (SC3) drains to a large wetland on the southern portion of the site (pond P3), which outlets to a large, well defined channel on the south side of the wetland. A section of the southerly portion of the site (SC4) drains directly to the well-defined channel south of the large wetland. A small offsite area (OS2) also drains toward the southerly wetland through two parallel 15" diameter culverts under Ledgewood Drive, and is routed around the wetland by a channel (reach R3.2).

Runoff from the site was analyzed at the large wetland on the north side of the site (AP1), the 15" culvert under Ledgewood Drive (AP2), and the large wetland on the southern portion of the site (AP3). Pre-development HydroCAD calculations and a drainage plan can be found in Appendix A. Pre-development peak flow rates at each of the analysis points are summarized in Table 1, for the 2-, 10-, 25-, and 100-year storm events.

Post-Development Conditions

The project includes the construction of a 760' local street with associated landscaping, the construction of a 12' wide 300-foot driveway to access Lot 2, the construction of two grassed underdrained soil filters, and the use of vegetated buffers for stormwater treatment. The stormwater analysis was performed assuming full buildout of the subdivision, which includes an assumed 5,000 square feet of impervious area and 10,000 square feet of lawn area per lot. The

lot allowances are in addition to the impervious and landscaped areas associated with the street and stormwater pond construction.

Post-development stormwater runoff from the site and tributary area was analyzed by routing stormwater flows from the various developed subcatchments through proposed conveyance and treatment measures. Post-development HydroCAD calculations and drainage plan can be found in Appendix B. Post-development peak flow rates at each of the analysis points are summarized in Table 1, for the 2-, 10-, 25-, and 100-year storm events.

Stormwater Quantity

Stormwater quantity at AP1 is partially controlled through detention in the grassed underdrained soil filter (pond T1) located on the northern corner of Lot 9. Flow from pond T1 is released through a level spreader directly to the large wetland north of the site. Calculations indicate that the peak flow from the wetland is essentially not impacted as result of the development. The peak runoff from the site reaches the wetland well before the peak rate from the large offsite subcatchment reaches the wetland. Therefore, we anticipate there will be no impact on capacities of downstream drainage systems, including the 5' diameter culvert under Ledgwood Drive.

Stormwater quantity at AP2 is controlled by detention in the underdrained soil filter (pond T2) located in the open space on the south side of the site entrance. Pond T2 is oversized to allow for detention of stormwater prior to being discharged to the 15" culvert.

Stormwater quantity at AP3 is controlled by natural detention upstream of a proposed 36" culvert under the proposed Lot 2 driveway and by detention and attenuation in the large wetland on the south side of the site.

The detention systems were sized and analyzed through an iterative process using HydroCAD, in order to provide attenuation of post-development peak flow rates to remain at or below pre-development peak flow rates at the analysis points.

Table 1 – Comparison of Pre and Post -Development Runoff Rates

Runoff rates in cubic feet per second (c.f.s.)

Peak Flow Rate Table				
	Storm			
AP1	**2 yr**	**10 yr**	**25 yr**	**100 yr**
PRE	122.0	270.8	346.1	462.4
POST	122.2	271.0	346.3	462.6
	Storm			
AP2	**2 yr**	**10 yr**	**25 yr**	**100 yr**
PRE	1.3	3.2	4.0	5.1
POST	0.7	2.3	3.7	5.1
	Storm			
AP3	**2 yr**	**10 yr**	**25 yr**	**100 yr**
PRE	3.5	7.9	10.2	13.7
POST	3.5	7.9	10.2	13.7

As shown in the Table 1, the peak runoff rates at analysis points AP2 and AP3 under the post-development conditions will remain essentially at or below the peak pre-development runoff rates for the 2-, 10-, 25- and 100-year storm events. The slight increases (0.2 cfs) at AP1 during the 2, 10, 25, and 100 years storms are considered negligible considering the size of the contributing subcatchments and the size of the receiving wetland. Based on this analysis, we do not anticipate any impact on downgradient drainage systems due to the proposed development.

Stormwater Quality

A number of Best Management Practices (BMPs) will be employed to manage stormwater quantity and quality associated with the proposed subdivision. The BMPs have been designed in accordance with the Maine DEP Chapter 500 rules. These measures, incorporated into the site development, will attenuate stormwater runoff rates to at or below pre-development rates and will provide water quality enhancement per Maine DEP, City of Portland, and Town of Falmouth rules and regulations.

Runoff from the road from approximately station 3+50 to the end, lots 7, 8, 9, and portions of lots 5 and 6 will be treated in pond T1. Runoff from the road, lots 5, 6, 7, and 8 is diverted by the interceptor swale on the western side of the site and directed through the culvert under the proposed trail to the pond T1. Based on the subcatchment boundaries, it is assumed that only the front portion of lots 5 and 6 will drain to pond T1. The houses from lots 7, 8, and 9 will be fitted with underdrained dripline filters to treat runoff from the roofs, thus reducing the required size of pond T1.

Runoff from the beginning of the road to station 3+50 and the front portions of lots 1, 3, and 4 will be treated in pond T2. Pond T2 is oversized to provide additional detention of stormwater runoff. As such, an area equal to 5% of the impervious area and 2% of the landscaped area draining to pond will be fitted with filter media.

Runoff from lots 10, 11, 12 and the rear portions of 3, 4, 5, and 6 will be treated via buffers adjacent to residential lots.

Runoff from approximately 200 feet of the lot 2 driveway will be treated in a ditch turnout buffer with a level lip spreader.

Test pit information associated with ponds T1 and T2 are included in Appendix C.

The total required treatment area was calculated based on treating 75% of impervious area and 50% of developed area from linear portions of the site (road/driveway) and 95% of impervious area and 80% of developed area from the remainder of the site. See Table T-1 in Appendix C for treatment area calculations and pond sizing calculations.

Erosion Control

BMPs such as silt fence and/or filter berms of erosion control mix, ditch check dams, riprap pipe inlet and outlet protection, temporary catch basin inlet protection, mulch, and permanent seeding will be used to prevent erosion and downstream migration of sediment during construction. The locations of temporary and permanent erosion control measures are shown on Drawing C-201 Grading, Drainage and Erosion Control Plan. Erosion and sedimentation control notes and details can be found on Drawing C-300.

Inspection & Maintenance

TPO Properties, LLC will be responsible for maintaining the stormwater facilities for the project until the homeowner's association takes over. An Inspection and Maintenance Plan is included as Appendix D.

Conclusions

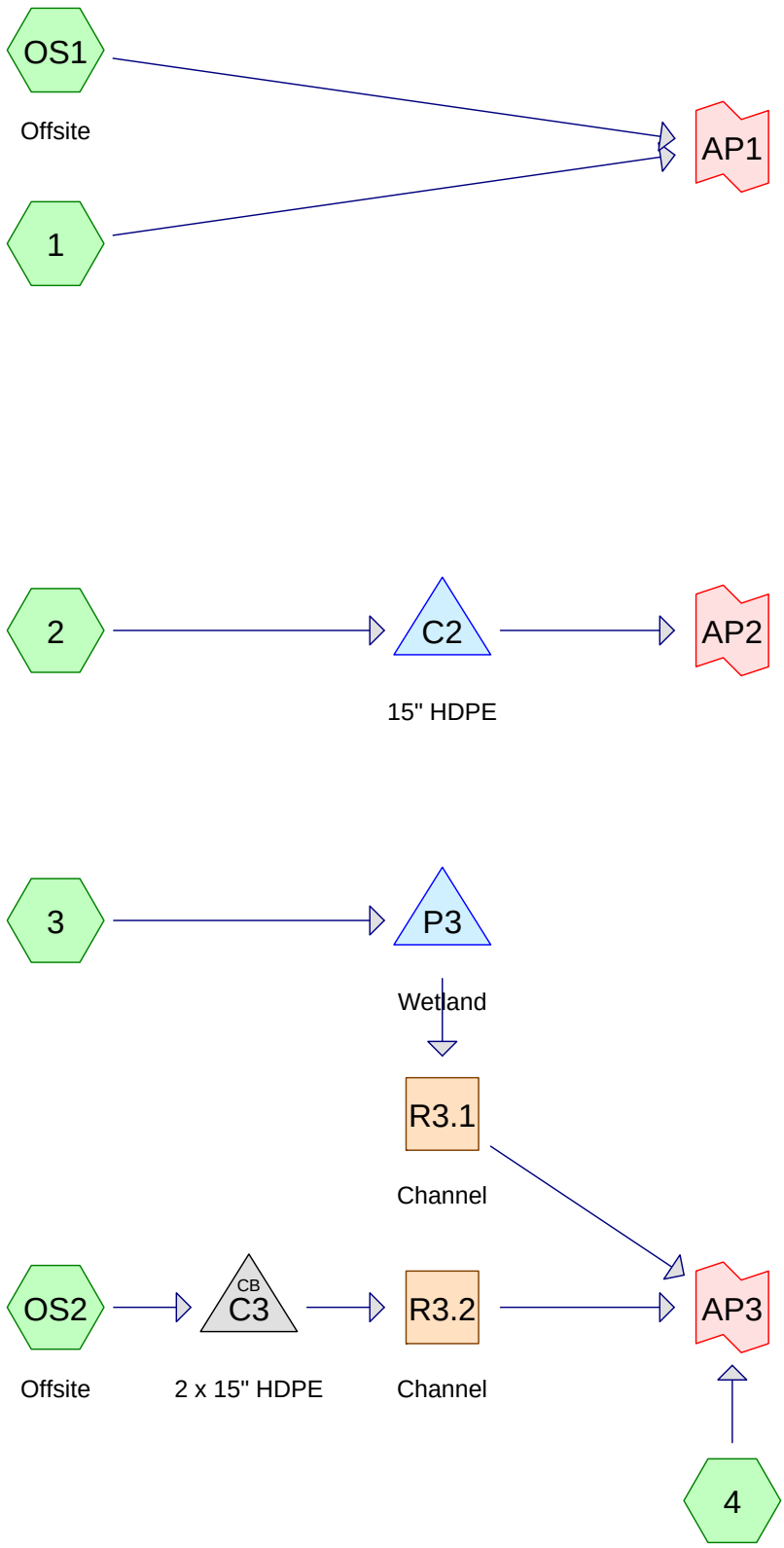
The stormwater management for this project includes a variety of BMPs to control both the quantity and quality of stormwater runoff. The HydroCAD calculations show that the peak runoff rates at the analysis points under post-development conditions are estimated to be equal to or less than the peak pre-development runoff rates for the 2-, 10-, 25- and 100-year storm events. This meets the stormwater detention requirements of the City of Portland and Town of Falmouth ordinances. The proposed stormwater management BMPs are also designed to meet the Chapter 500 Basic and General standards to provide water quality enhancement.

SUPPORTING DATA AND CALCULATIONS

The following material presents calculations and copies of source material used during the analysis for this study.

Appendix A: Pre-Development HydroCAD Calculations
Appendix B: Post-Development HydroCAD Calculations
Appendix C: Stormwater BMP Treatment Calculations and Test Pit Information
Appendix D: Inspection & Maintenance Plan
Appendix E: Drainage Plans
D-100 – Pre Development Drainage Plan
D-101 – Off-Site Drainage Plan
D-102 – Post Development Drainage Plan

Appendix A:
Pre-Development HydroCAD Calculations



Subcat Reach Pond Link

Drainage Diagram for Pre Development
Prepared by Land Design Solutions, Printed 2/8/2013
HydroCAD® 9.10 s/n 01350 © 2010 HydroCAD Software Solutions LLC

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Runoff Area=238,223 sf 2.04% Impervious Runoff Depth>0.75"
Flow Length=620' Tc=37.4 min CN=71 Runoff=2.21 cfs 0.343 af

Subcatchment 2: Runoff Area=88,355 sf 9.11% Impervious Runoff Depth>0.90"
Flow Length=300' Tc=22.1 min CN=74 Runoff=1.29 cfs 0.153 af

Subcatchment 3: Runoff Area=625,250 sf 4.35% Impervious Runoff Depth>0.89"
Flow Length=1,188' Tc=54.9 min CN=74 Runoff=5.86 cfs 1.069 af

Subcatchment 4: Runoff Area=95,669 sf 6.65% Impervious Runoff Depth>1.12"
Flow Length=165' Tc=20.2 min CN=78 Runoff=1.88 cfs 0.206 af

Subcatchment OS1: Offsite Runoff Area=397.000 ac 22.17% Impervious Runoff Depth>1.14"
Flow Length=8,561' Slope=0.0110 '/' Tc=135.5 min CN=79 Runoff=121.49 cfs 37.834 af

Subcatchment OS2: Offsite Runoff Area=83,865 sf 6.20% Impervious Runoff Depth>1.12"
Flow Length=150' Slope=0.0100 '/' Tc=16.5 min CN=78 Runoff=1.79 cfs 0.180 af

Reach R3.1: Channel Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.050 L=190.0' S=0.0205 '/' Capacity=342.91 cfs Outflow=0.00 cfs 0.000 af

Reach R3.2: Channel Avg. Flow Depth=0.16' Max Vel=1.02 fps Inflow=1.79 cfs 0.180 af
n=0.022 L=460.0' S=0.0043 '/' Capacity=358.68 cfs Outflow=1.58 cfs 0.179 af

Pond C2: 15" HDPE Peak Elev=73.73' Storage=95 cf Inflow=1.29 cfs 0.153 af
15.0" Round Culvert n=0.013 L=46.0' S=0.0185 '/' Outflow=1.29 cfs 0.152 af

Pond C3: 2 x 15" HDPE Peak Elev=60.41' Inflow=1.79 cfs 0.180 af
15.0" Round Culvert x 2.00 n=0.013 L=50.0' S=0.0080 '/' Outflow=1.79 cfs 0.180 af

Pond P3: Wetland Peak Elev=61.99' Storage=46,560 cf Inflow=5.86 cfs 1.069 af
Outflow=0.00 cfs 0.000 af

Link AP1: Inflow=122.03 cfs 38.177 af
Primary=122.03 cfs 38.177 af

Link AP2: Inflow=1.29 cfs 0.152 af
Primary=1.29 cfs 0.152 af

Link AP3: Inflow=3.45 cfs 0.385 af
Primary=3.45 cfs 0.385 af

Total Runoff Area = 422.972 ac Runoff Volume = 39.785 af Average Runoff Depth = 1.13"
78.91% Pervious = 333.786 ac 21.09% Impervious = 89.186 ac

Summary for Subcatchment 1:

Runoff = 2.21 cfs @ 12.59 hrs, Volume= 0.343 af, Depth> 0.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.00"

Area (sf)	CN	Description
19,462	80	1/2 acre lots, 25% imp, HSG C
218,761	70	Woods, Good, HSG C
238,223	71	Weighted Average
233,358		97.96% Pervious Area
4,866		2.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	150	0.0260	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
9.4	360	0.0652	0.64		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.4	110	0.0110	5.06	141.56	**Trap/Vee/Rect Channel Flow, CD** Bot.W=10.00' D=2.00' Z= 2.0 '/' Top.W=18.00' n= 0.040 Winding stream, pools & shoals
37.4	620	Total			

Summary for Subcatchment 2:

Runoff = 1.29 cfs @ 12.34 hrs, Volume= 0.153 af, Depth> 0.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.00"

Area (sf)	CN	Description
32,188	80	1/2 acre lots, 25% imp, HSG C
56,167	70	Woods, Good, HSG C
88,355	74	Weighted Average
80,308		90.89% Pervious Area
8,047		9.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	150	0.0733	0.14		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	60	0.0250	0.40		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
1.4	90	0.0250	1.11		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
22.1	300	Total			

Summary for Subcatchment 3:

Runoff = 5.86 cfs @ 12.81 hrs, Volume= 1.069 af, Depth> 0.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.00"

	Area (sf)	CN	Description
	47,802	80	1/2 acre lots, 25% imp, HSG C
*	15,248	98	Impervious
	265,068	70	Woods, Good, HSG C
	154,981	77	Woods, Good, HSG D
	111,025	71	Meadow, non-grazed, HSG C
	31,126	78	Meadow, non-grazed, HSG D
	625,250	74	Weighted Average
	598,052		95.65% Pervious Area
	27,199		4.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.4	150	0.0150	0.07		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
17.2	298	0.0134	0.29		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.4	300	0.0230	11.98	251.57	**Trap/Vee/Rect Channel Flow, CD** Bot.W=4.00' D=3.00' Z= 2.0 & 0.0 '/' Top.W=10.00' n= 0.025 Earth, clean & winding
2.9	440	0.0200	2.53	135.18	**Parabolic Channel, DE** W=40.00' D=2.00' Area=53.3 sf Perim=40.3' n= 0.100 Very weedy reaches w/pools
54.9	1,188	Total			

Summary for Subcatchment 4:

Runoff = 1.88 cfs @ 12.30 hrs, Volume= 0.206 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.00"

Area (sf)	CN	Description
70,233	77	Woods, Good, HSG D
25,436	80	1/2 acre lots, 25% imp, HSG C
95,669	78	Weighted Average
89,310		93.35% Pervious Area
6,359		6.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0350	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	65	0.0310	0.44		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
20.2	165	Total			

Summary for Subcatchment OS1: Offsite

Runoff = 121.49 cfs @ 13.87 hrs, Volume= 37.834 af, Depth> 1.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.00"

Area (ac)	CN	Description
200.000	83	1/4 acre lots, 38% imp, HSG C
60.000	79	1 acre lots, 20% imp, HSG C
137.000	72	Woods/grass comb., Good, HSG C
397.000	79	Weighted Average
309.000		77.83% Pervious Area
88.000		22.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
67.8	150	0.0110	0.04		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
21.6	340	0.0110	0.26		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
6.2	272	0.0110	0.73		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
16.6	733	0.0110	0.73		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
23.3	7,066	0.0110	5.06	141.56	**Trap/Vee/Rect Channel Flow, EF** Bot.W=10.00' D=2.00' Z= 2.0 '/' Top.W=18.00' n= 0.040 Winding stream, pools & shoals
135.5	8,561	Total			

Summary for Subcatchment OS2: Offsite

Runoff = 1.79 cfs @ 12.24 hrs, Volume= 0.180 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.00"

Area (sf)	CN	Description
20,802	80	1/2 acre lots, 25% imp, HSG C
63,063	78	Meadow, non-grazed, HSG D
83,865	78	Weighted Average
78,665		93.80% Pervious Area
5,201		6.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	150	0.0100	0.15		**Sheet Flow, AB** Range n= 0.130 P2= 3.00"

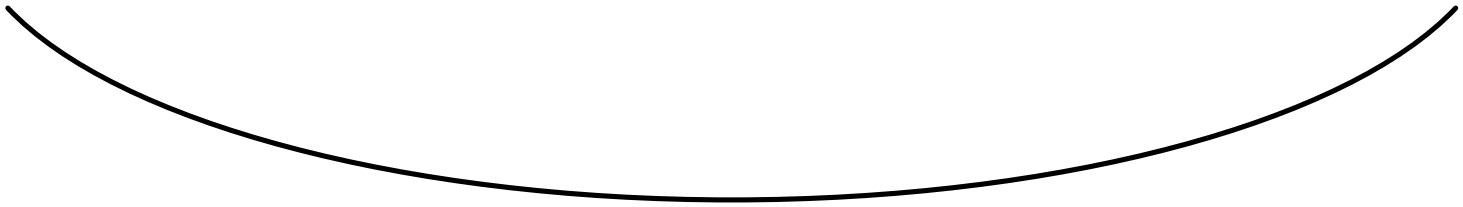
Summary for Reach R3.1: Channel

Inflow Area = 14.354 ac, 4.35% Impervious, Inflow Depth = 0.00" for 2 Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 342.91 cfs

50.00' x 2.00' deep Parabolic Channel, n= 0.050 Scattered brush, heavy weeds
Length= 190.0' Slope= 0.0205 '/'
Inlet Invert= 63.00', Outlet Invert= 59.10'



‡

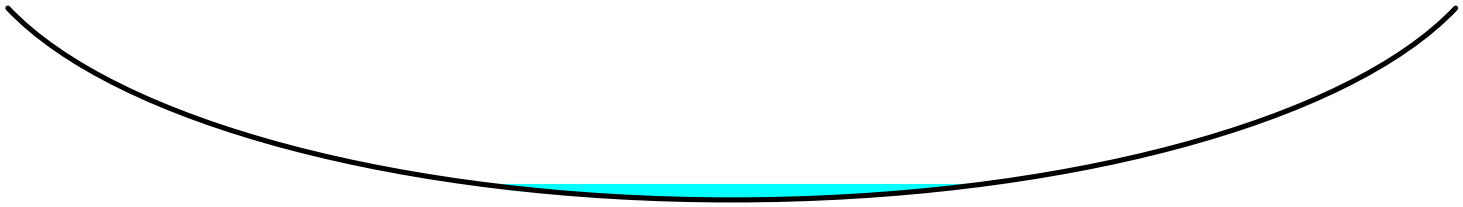
Summary for Reach R3.2: Channel

Inflow Area = 1.925 ac, 6.20% Impervious, Inflow Depth > 1.12" for 2 Year event
Inflow = 1.79 cfs @ 12.24 hrs, Volume= 0.180 af
Outflow = 1.58 cfs @ 12.34 hrs, Volume= 0.179 af, Atten= 11%, Lag= 5.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.02 fps, Min. Travel Time= 7.5 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 17.3 min

Peak Storage= 717 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 358.68 cfs

50.00' x 2.00' deep Parabolic Channel, n= 0.022 Earth, clean & straight
Length= 460.0' Slope= 0.0043 '/'
Inlet Invert= 59.00', Outlet Invert= 57.00'



‡

Summary for Pond C2: 15" HDPE

Inflow Area = 2.028 ac, 9.11% Impervious, Inflow Depth > 0.90" for 2 Year event
Inflow = 1.29 cfs @ 12.34 hrs, Volume= 0.153 af
Outflow = 1.29 cfs @ 12.36 hrs, Volume= 0.152 af, Atten= 0%, Lag= 1.4 min
Primary = 1.29 cfs @ 12.36 hrs, Volume= 0.152 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 73.73' @ 12.36 hrs Surf.Area= 304 sf Storage= 95 cf
Flood Elev= 74.40' Surf.Area= 983 sf Storage= 494 cf

Plug-Flow detention time= 1.7 min calculated for 0.152 af (100% of inflow)
Center-of-Mass det. time= 1.1 min (879.0 - 877.9)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	1,372 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
73.00	16	14.0	0	0	16
74.00	501	134.0	202	202	1,431
75.00	2,007	244.0	1,170	1,372	4,745

Device	Routing	Invert	Outlet Devices
#1	Primary	73.11'	**15.0" Round Culvert** L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 73.11' / 72.26' S= 0.0185 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.28 cfs @ 12.36 hrs HW=73.73' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.28 cfs @ 2.11 fps)

Summary for Pond C3: 2 x 15" HDPE

Inflow Area = 1.925 ac, 6.20% Impervious, Inflow Depth > 1.12" for 2 Year event
Inflow = 1.79 cfs @ 12.24 hrs, Volume= 0.180 af
Outflow = 1.79 cfs @ 12.24 hrs, Volume= 0.180 af, Atten= 0%, Lag= 0.0 min
Primary = 1.79 cfs @ 12.24 hrs, Volume= 0.180 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 60.41' @ 12.24 hrs
Flood Elev= 61.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	59.90'	**15.0" Round Culvert X 2.00** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.90' / 59.50' S= 0.0080 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.78 cfs @ 12.24 hrs HW=60.41' TW=59.15' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.78 cfs @ 1.91 fps)

Summary for Pond P3: Wetland

Inflow Area = 14.354 ac, 4.35% Impervious, Inflow Depth > 0.89" for 2 Year event
Inflow = 5.86 cfs @ 12.81 hrs, Volume= 1.069 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 61.99' @ 24.00 hrs Surf.Area= 24,820 sf Storage= 46,560 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	115,705 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
60.00	22,018	689.0	0	0	22,018
62.00	24,835	718.0	46,825	46,825	25,557
64.00	27,769	747.0	52,577	99,401	29,241
64.50	37,697	836.0	16,303	115,705	40,460

Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=60.00' TW=63.00' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link AP1:

Inflow Area = 402.469 ac, 21.89% Impervious, Inflow Depth > 1.14" for 2 Year event
Inflow = 122.03 cfs @ 13.87 hrs, Volume= 38.177 af
Primary = 122.03 cfs @ 13.87 hrs, Volume= 38.177 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP2:

Inflow Area = 2.028 ac, 9.11% Impervious, Inflow Depth > 0.90" for 2 Year event
Inflow = 1.29 cfs @ 12.36 hrs, Volume= 0.152 af
Primary = 1.29 cfs @ 12.36 hrs, Volume= 0.152 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP3:

Inflow Area = 18.475 ac, 4.82% Impervious, Inflow Depth > 0.25" for 2 Year event
Inflow = 3.45 cfs @ 12.32 hrs, Volume= 0.385 af
Primary = 3.45 cfs @ 12.32 hrs, Volume= 0.385 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Runoff Area=238,223 sf 2.04% Impervious Runoff Depth>1.88"
Flow Length=620' Tc=37.4 min CN=71 Runoff=6.03 cfs 0.855 af

Subcatchment 2: Runoff Area=88,355 sf 9.11% Impervious Runoff Depth>2.12"
Flow Length=300' Tc=22.1 min CN=74 Runoff=3.23 cfs 0.358 af

Subcatchment 3: Runoff Area=625,250 sf 4.35% Impervious Runoff Depth>2.10"
Flow Length=1,188' Tc=54.9 min CN=74 Runoff=14.68 cfs 2.512 af

Subcatchment 4: Runoff Area=95,669 sf 6.65% Impervious Runoff Depth>2.45"
Flow Length=165' Tc=20.2 min CN=78 Runoff=4.23 cfs 0.448 af

Subcatchment OS1: Offsite Runoff Area=397.000 ac 22.17% Impervious Runoff Depth>2.46"
Flow Length=8,561' Slope=0.0110 '/' Tc=135.5 min CN=79 Runoff=269.51 cfs 81.499 af

Subcatchment OS2: Offsite Runoff Area=83,865 sf 6.20% Impervious Runoff Depth>2.45"
Flow Length=150' Slope=0.0100 '/' Tc=16.5 min CN=78 Runoff=4.01 cfs 0.393 af

Reach R3.1: Channel Avg. Flow Depth=0.11' Max Vel=0.76 fps Inflow=0.67 cfs 0.206 af
n=0.050 L=190.0' S=0.0205 '/' Capacity=342.91 cfs Outflow=0.67 cfs 0.203 af

Reach R3.2: Channel Avg. Flow Depth=0.24' Max Vel=1.32 fps Inflow=4.01 cfs 0.393 af
n=0.022 L=460.0' S=0.0043 '/' Capacity=358.68 cfs Outflow=3.72 cfs 0.391 af

Pond C2: 15" HDPE Peak Elev=74.19' Storage=318 cf Inflow=3.23 cfs 0.358 af
15.0" Round Culvert n=0.013 L=46.0' S=0.0185 '/' Outflow=3.16 cfs 0.358 af

Pond C3: 2 x 15" HDPE Peak Elev=60.70' Inflow=4.01 cfs 0.393 af
15.0" Round Culvert x 2.00 n=0.013 L=50.0' S=0.0080 '/' Outflow=4.01 cfs 0.393 af

Pond P3: Wetland Peak Elev=64.04' Storage=100,622 cf Inflow=14.68 cfs 2.512 af
Outflow=0.67 cfs 0.206 af

Link AP1: Inflow=270.77 cfs 82.354 af
Primary=270.77 cfs 82.354 af

Link AP2: Inflow=3.16 cfs 0.358 af
Primary=3.16 cfs 0.358 af

Link AP3: Inflow=7.93 cfs 1.043 af
Primary=7.93 cfs 1.043 af

Total Runoff Area = 422.972 ac Runoff Volume = 86.065 af Average Runoff Depth = 2.44"
78.91% Pervious = 333.786 ac 21.09% Impervious = 89.186 ac

Summary for Subcatchment 1:

Runoff = 6.03 cfs @ 12.54 hrs, Volume= 0.855 af, Depth> 1.88"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

Area (sf)	CN	Description
19,462	80	1/2 acre lots, 25% imp, HSG C
218,761	70	Woods, Good, HSG C
238,223	71	Weighted Average
233,358		97.96% Pervious Area
4,866		2.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	150	0.0260	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
9.4	360	0.0652	0.64		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.4	110	0.0110	5.06	141.56	**Trap/Vee/Rect Channel Flow, CD** Bot.W=10.00' D=2.00' Z= 2.0 '/' Top.W=18.00' n= 0.040 Winding stream, pools & shoals
37.4	620	Total			

Summary for Subcatchment 2:

Runoff = 3.23 cfs @ 12.32 hrs, Volume= 0.358 af, Depth> 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

Area (sf)	CN	Description
32,188	80	1/2 acre lots, 25% imp, HSG C
56,167	70	Woods, Good, HSG C
88,355	74	Weighted Average
80,308		90.89% Pervious Area
8,047		9.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	150	0.0733	0.14		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	60	0.0250	0.40		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
1.4	90	0.0250	1.11		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
22.1	300	Total			

Summary for Subcatchment 3:

Runoff = 14.68 cfs @ 12.76 hrs, Volume= 2.512 af, Depth> 2.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

	Area (sf)	CN	Description
	47,802	80	1/2 acre lots, 25% imp, HSG C
*	15,248	98	Impervious
	265,068	70	Woods, Good, HSG C
	154,981	77	Woods, Good, HSG D
	111,025	71	Meadow, non-grazed, HSG C
	31,126	78	Meadow, non-grazed, HSG D
	625,250	74	Weighted Average
	598,052		95.65% Pervious Area
	27,199		4.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.4	150	0.0150	0.07		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
17.2	298	0.0134	0.29		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.4	300	0.0230	11.98	251.57	**Trap/Vee/Rect Channel Flow, CD** Bot.W=4.00' D=3.00' Z= 2.0 & 0.0 '/' Top.W=10.00' n= 0.025 Earth, clean & winding
2.9	440	0.0200	2.53	135.18	**Parabolic Channel, DE** W=40.00' D=2.00' Area=53.3 sf Perim=40.3' n= 0.100 Very weedy reaches w/pools
54.9	1,188	Total			

Summary for Subcatchment 4:

Runoff = 4.23 cfs @ 12.28 hrs, Volume= 0.448 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

Area (sf)	CN	Description
70,233	77	Woods, Good, HSG D
25,436	80	1/2 acre lots, 25% imp, HSG C
95,669	78	Weighted Average
89,310		93.35% Pervious Area
6,359		6.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0350	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	65	0.0310	0.44		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
20.2	165	Total			

Summary for Subcatchment OS1: Offsite

Runoff = 269.51 cfs @ 13.77 hrs, Volume= 81.499 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

Area (ac)	CN	Description
200.000	83	1/4 acre lots, 38% imp, HSG C
60.000	79	1 acre lots, 20% imp, HSG C
137.000	72	Woods/grass comb., Good, HSG C
397.000	79	Weighted Average
309.000		77.83% Pervious Area
88.000		22.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
67.8	150	0.0110	0.04		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
21.6	340	0.0110	0.26		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
6.2	272	0.0110	0.73		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
16.6	733	0.0110	0.73		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
23.3	7,066	0.0110	5.06	141.56	**Trap/Vee/Rect Channel Flow, EF** Bot.W=10.00' D=2.00' Z= 2.0 '/' Top.W=18.00' n= 0.040 Winding stream, pools & shoals
135.5	8,561	Total			

Summary for Subcatchment OS2: Offsite

Runoff = 4.01 cfs @ 12.23 hrs, Volume= 0.393 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

Area (sf)	CN	Description
20,802	80	1/2 acre lots, 25% imp, HSG C
63,063	78	Meadow, non-grazed, HSG D
83,865	78	Weighted Average
78,665		93.80% Pervious Area
5,201		6.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	150	0.0100	0.15		**Sheet Flow, AB** Range n= 0.130 P2= 3.00"

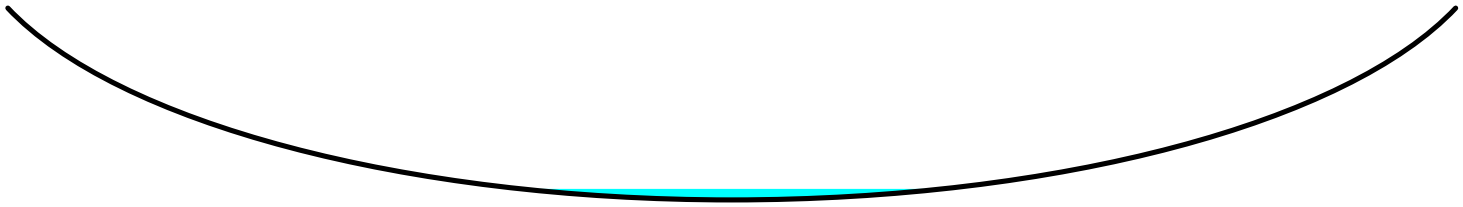
Summary for Reach R3.1: Channel

Inflow Area = 14.354 ac, 4.35% Impervious, Inflow Depth > 0.17" for 10 Year event
Inflow = 0.67 cfs @ 21.00 hrs, Volume= 0.206 af
Outflow = 0.67 cfs @ 21.05 hrs, Volume= 0.203 af, Atten= 0%, Lag= 3.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.76 fps, Min. Travel Time= 4.2 min
Avg. Velocity = 0.70 fps, Avg. Travel Time= 4.5 min

Peak Storage= 168 cf @ 21.05 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 342.91 cfs

50.00' x 2.00' deep Parabolic Channel, n= 0.050 Scattered brush, heavy weeds
Length= 190.0' Slope= 0.0205 '/'
Inlet Invert= 63.00', Outlet Invert= 59.10'



‡

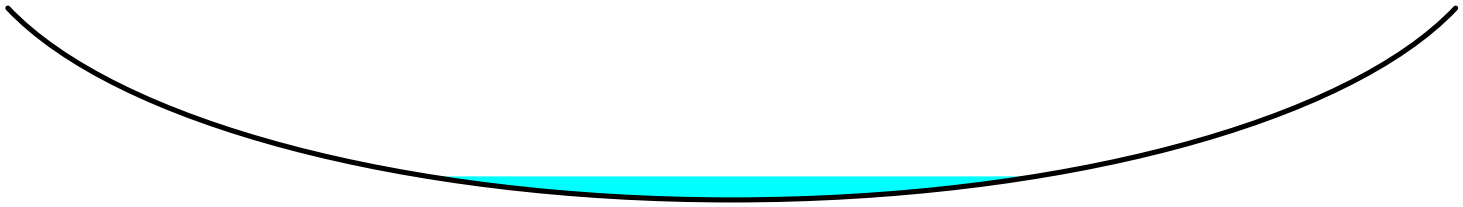
Summary for Reach R3.2: Channel

Inflow Area = 1.925 ac, 6.20% Impervious, Inflow Depth > 2.45" for 10 Year event
Inflow = 4.01 cfs @ 12.23 hrs, Volume= 0.393 af
Outflow = 3.72 cfs @ 12.30 hrs, Volume= 0.391 af, Atten= 7%, Lag= 4.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.32 fps, Min. Travel Time= 5.8 min
Avg. Velocity = 0.52 fps, Avg. Travel Time= 14.6 min

Peak Storage= 1,294 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 358.68 cfs

50.00' x 2.00' deep Parabolic Channel, n= 0.022 Earth, clean & straight
Length= 460.0' Slope= 0.0043 '/'
Inlet Invert= 59.00', Outlet Invert= 57.00'



‡

Summary for Pond C2: 15" HDPE

Inflow Area = 2.028 ac, 9.11% Impervious, Inflow Depth > 2.12" for 10 Year event
Inflow = 3.23 cfs @ 12.32 hrs, Volume= 0.358 af
Outflow = 3.16 cfs @ 12.36 hrs, Volume= 0.358 af, Atten= 2%, Lag= 2.8 min
Primary = 3.16 cfs @ 12.36 hrs, Volume= 0.358 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 74.19' @ 12.36 hrs Surf.Area= 712 sf Storage= 318 cf
Flood Elev= 74.40' Surf.Area= 983 sf Storage= 494 cf

Plug-Flow detention time= 1.5 min calculated for 0.357 af (100% of inflow)
Center-of-Mass det. time= 1.2 min (853.7 - 852.6)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	1,372 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
73.00	16	14.0	0	0	16
74.00	501	134.0	202	202	1,431
75.00	2,007	244.0	1,170	1,372	4,745

Device	Routing	Invert	Outlet Devices
#1	Primary	73.11'	**15.0" Round Culvert** L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 73.11' / 72.26' S= 0.0185 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.14 cfs @ 12.36 hrs HW=74.19' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.14 cfs @ 2.79 fps)

Summary for Pond C3: 2 x 15" HDPE

Inflow Area = 1.925 ac, 6.20% Impervious, Inflow Depth > 2.45" for 10 Year event
Inflow = 4.01 cfs @ 12.23 hrs, Volume= 0.393 af
Outflow = 4.01 cfs @ 12.23 hrs, Volume= 0.393 af, Atten= 0%, Lag= 0.0 min
Primary = 4.01 cfs @ 12.23 hrs, Volume= 0.393 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 60.70' @ 12.23 hrs
Flood Elev= 61.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	59.90'	**15.0" Round Culvert X 2.00** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.90' / 59.50' S= 0.0080 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.98 cfs @ 12.23 hrs HW=60.70' TW=59.23' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.98 cfs @ 2.40 fps)

Summary for Pond P3: Wetland

Inflow Area = 14.354 ac, 4.35% Impervious, Inflow Depth > 2.10" for 10 Year event
Inflow = 14.68 cfs @ 12.76 hrs, Volume= 2.512 af
Outflow = 0.67 cfs @ 21.00 hrs, Volume= 0.206 af, Atten= 95%, Lag= 494.1 min
Primary = 0.67 cfs @ 21.00 hrs, Volume= 0.206 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 64.04' @ 21.00 hrs Surf.Area= 28,569 sf Storage= 100,622 cf

Plug-Flow detention time= 604.9 min calculated for 0.206 af (8% of inflow)
Center-of-Mass det. time= 436.7 min (1,314.9 - 878.2)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	115,705 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
60.00	22,018	689.0	0	0	22,018
62.00	24,835	718.0	46,825	46,825	25,557
64.00	27,769	747.0	52,577	99,401	29,241
64.50	37,697	836.0	16,303	115,705	40,460

Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.67 cfs @ 21.00 hrs HW=64.04' TW=63.11' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 0.67 cfs @ 0.52 fps)

Summary for Link AP1:

Inflow Area = 402.469 ac, 21.89% Impervious, Inflow Depth > 2.46" for 10 Year event
Inflow = 270.77 cfs @ 13.76 hrs, Volume= 82.354 af
Primary = 270.77 cfs @ 13.76 hrs, Volume= 82.354 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP2:

Inflow Area = 2.028 ac, 9.11% Impervious, Inflow Depth > 2.12" for 10 Year event
Inflow = 3.16 cfs @ 12.36 hrs, Volume= 0.358 af
Primary = 3.16 cfs @ 12.36 hrs, Volume= 0.358 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP3:

Inflow Area = 18.475 ac, 4.82% Impervious, Inflow Depth > 0.68" for 10 Year event
Inflow = 7.93 cfs @ 12.29 hrs, Volume= 1.043 af
Primary = 7.93 cfs @ 12.29 hrs, Volume= 1.043 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Runoff Area=238,223 sf 2.04% Impervious Runoff Depth>2.48"
Flow Length=620' Tc=37.4 min CN=71 Runoff=8.07 cfs 1.130 af

Subcatchment 2: Runoff Area=88,355 sf 9.11% Impervious Runoff Depth>2.76"
Flow Length=300' Tc=22.1 min CN=74 Runoff=4.24 cfs 0.466 af

Subcatchment 3: Runoff Area=625,250 sf 4.35% Impervious Runoff Depth>2.74"
Flow Length=1,188' Tc=54.9 min CN=74 Runoff=19.26 cfs 3.272 af

Subcatchment 4: Runoff Area=95,669 sf 6.65% Impervious Runoff Depth>3.13"
Flow Length=165' Tc=20.2 min CN=78 Runoff=5.41 cfs 0.573 af

Subcatchment OS1: Offsite Runoff Area=397.000 ac 22.17% Impervious Runoff Depth>3.14"
Flow Length=8,561' Slope=0.0110 '/' Tc=135.5 min CN=79 Runoff=344.44 cfs 103.799 af

Subcatchment OS2: Offsite Runoff Area=83,865 sf 6.20% Impervious Runoff Depth>3.13"
Flow Length=150' Slope=0.0100 '/' Tc=16.5 min CN=78 Runoff=5.14 cfs 0.502 af

Reach R3.1: Channel Avg. Flow Depth=0.21' Max Vel=1.15 fps Inflow=2.60 cfs 0.963 af
n=0.050 L=190.0' S=0.0205 '/' Capacity=342.91 cfs Outflow=2.59 cfs 0.959 af

Reach R3.2: Channel Avg. Flow Depth=0.27' Max Vel=1.43 fps Inflow=5.14 cfs 0.502 af
n=0.022 L=460.0' S=0.0043 '/' Capacity=358.68 cfs Outflow=4.80 cfs 0.500 af

Pond C2: 15" HDPE Peak Elev=74.46' Storage=560 cf Inflow=4.24 cfs 0.466 af
15.0" Round Culvert n=0.013 L=46.0' S=0.0185 '/' Outflow=3.98 cfs 0.466 af

Pond C3: 2 x 15" HDPE Peak Elev=60.84' Inflow=5.14 cfs 0.502 af
15.0" Round Culvert x 2.00 n=0.013 L=50.0' S=0.0080 '/' Outflow=5.14 cfs 0.502 af

Pond P3: Wetland Peak Elev=64.11' Storage=102,463 cf Inflow=19.26 cfs 3.272 af
Outflow=2.60 cfs 0.963 af

Link AP1: Inflow=346.08 cfs 104.929 af
Primary=346.08 cfs 104.929 af

Link AP2: Inflow=3.98 cfs 0.466 af
Primary=3.98 cfs 0.466 af

Link AP3: Inflow=10.20 cfs 2.032 af
Primary=10.20 cfs 2.032 af

Total Runoff Area = 422.972 ac Runoff Volume = 109.742 af Average Runoff Depth = 3.11"
78.91% Pervious = 333.786 ac 21.09% Impervious = 89.186 ac

Summary for Subcatchment 1:

Runoff = 8.07 cfs @ 12.53 hrs, Volume= 1.130 af, Depth> 2.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.50"

Area (sf)	CN	Description
19,462	80	1/2 acre lots, 25% imp, HSG C
218,761	70	Woods, Good, HSG C
238,223	71	Weighted Average
233,358		97.96% Pervious Area
4,866		2.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	150	0.0260	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
9.4	360	0.0652	0.64		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.4	110	0.0110	5.06	141.56	**Trap/Vee/Rect Channel Flow, CD** Bot.W=10.00' D=2.00' Z= 2.0 '/' Top.W=18.00' n= 0.040 Winding stream, pools & shoals
37.4	620	Total			

Summary for Subcatchment 2:

Runoff = 4.24 cfs @ 12.31 hrs, Volume= 0.466 af, Depth> 2.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.50"

Area (sf)	CN	Description
32,188	80	1/2 acre lots, 25% imp, HSG C
56,167	70	Woods, Good, HSG C
88,355	74	Weighted Average
80,308		90.89% Pervious Area
8,047		9.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	150	0.0733	0.14		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	60	0.0250	0.40		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
1.4	90	0.0250	1.11		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
22.1	300	Total			

Summary for Subcatchment 3:

Runoff = 19.26 cfs @ 12.76 hrs, Volume= 3.272 af, Depth> 2.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.50"

	Area (sf)	CN	Description
	47,802	80	1/2 acre lots, 25% imp, HSG C
*	15,248	98	Impervious
	265,068	70	Woods, Good, HSG C
	154,981	77	Woods, Good, HSG D
	111,025	71	Meadow, non-grazed, HSG C
	31,126	78	Meadow, non-grazed, HSG D
	625,250	74	Weighted Average
	598,052		95.65% Pervious Area
	27,199		4.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.4	150	0.0150	0.07		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
17.2	298	0.0134	0.29		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.4	300	0.0230	11.98	251.57	**Trap/Vee/Rect Channel Flow, CD** Bot.W=4.00' D=3.00' Z= 2.0 & 0.0 '/' Top.W=10.00' n= 0.025 Earth, clean & winding
2.9	440	0.0200	2.53	135.18	**Parabolic Channel, DE** W=40.00' D=2.00' Area=53.3 sf Perim=40.3' n= 0.100 Very weedy reaches w/pools
54.9	1,188	Total			

Summary for Subcatchment 4:

Runoff = 5.41 cfs @ 12.28 hrs, Volume= 0.573 af, Depth> 3.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.50"

Area (sf)	CN	Description
70,233	77	Woods, Good, HSG D
25,436	80	1/2 acre lots, 25% imp, HSG C
95,669	78	Weighted Average
89,310		93.35% Pervious Area
6,359		6.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0350	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	65	0.0310	0.44		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
20.2	165	Total			

Summary for Subcatchment OS1: Offsite

Runoff = 344.44 cfs @ 13.74 hrs, Volume= 103.799 af, Depth> 3.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.50"

Area (ac)	CN	Description
200.000	83	1/4 acre lots, 38% imp, HSG C
60.000	79	1 acre lots, 20% imp, HSG C
137.000	72	Woods/grass comb., Good, HSG C
397.000	79	Weighted Average
309.000		77.83% Pervious Area
88.000		22.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
67.8	150	0.0110	0.04		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
21.6	340	0.0110	0.26		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
6.2	272	0.0110	0.73		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
16.6	733	0.0110	0.73		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
23.3	7,066	0.0110	5.06	141.56	**Trap/Vee/Rect Channel Flow, EF** Bot.W=10.00' D=2.00' Z= 2.0 '/' Top.W=18.00' n= 0.040 Winding stream, pools & shoals
135.5	8,561	Total			

Summary for Subcatchment OS2: Offsite

Runoff = 5.14 cfs @ 12.23 hrs, Volume= 0.502 af, Depth> 3.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.50"

Area (sf)	CN	Description
20,802	80	1/2 acre lots, 25% imp, HSG C
63,063	78	Meadow, non-grazed, HSG D
83,865	78	Weighted Average
78,665		93.80% Pervious Area
5,201		6.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	150	0.0100	0.15		**Sheet Flow, AB** Range n= 0.130 P2= 3.00"

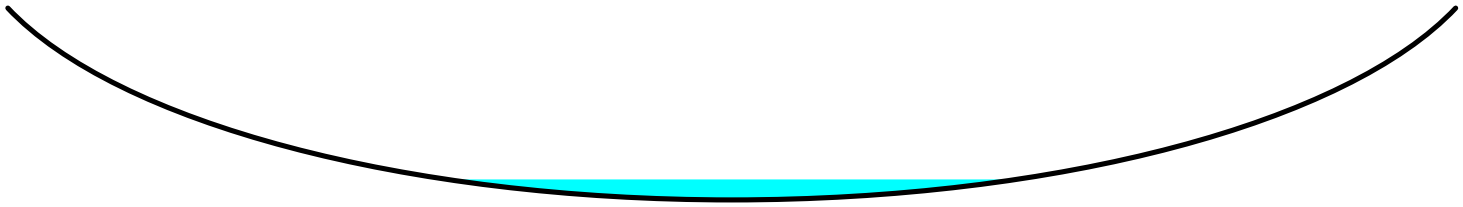
Summary for Reach R3.1: Channel

Inflow Area = 14.354 ac, 4.35% Impervious, Inflow Depth > 0.81" for 25 Year event
Inflow = 2.60 cfs @ 15.49 hrs, Volume= 0.963 af
Outflow = 2.59 cfs @ 15.52 hrs, Volume= 0.959 af, Atten= 0%, Lag= 2.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.15 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 0.89 fps, Avg. Travel Time= 3.5 min

Peak Storage= 429 cf @ 15.52 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 342.91 cfs

50.00' x 2.00' deep Parabolic Channel, n= 0.050 Scattered brush, heavy weeds
Length= 190.0' Slope= 0.0205 '/'
Inlet Invert= 63.00', Outlet Invert= 59.10'



‡

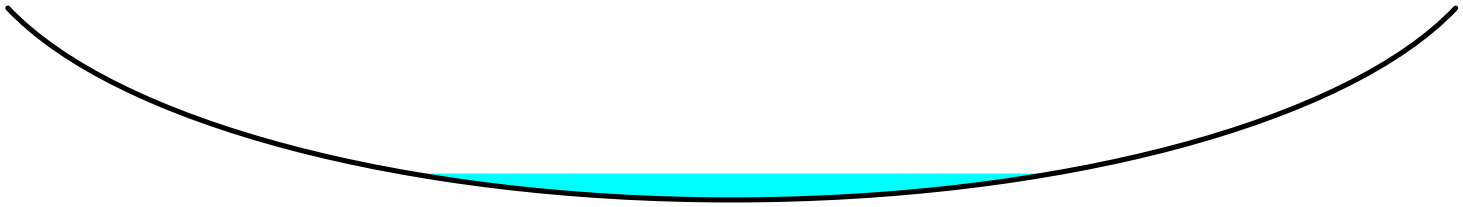
Summary for Reach R3.2: Channel

Inflow Area = 1.925 ac, 6.20% Impervious, Inflow Depth > 3.13" for 25 Year event
Inflow = 5.14 cfs @ 12.23 hrs, Volume= 0.502 af
Outflow = 4.80 cfs @ 12.30 hrs, Volume= 0.500 af, Atten= 7%, Lag= 4.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.43 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 0.55 fps, Avg. Travel Time= 13.8 min

Peak Storage= 1,544 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 358.68 cfs

50.00' x 2.00' deep Parabolic Channel, n= 0.022 Earth, clean & straight
Length= 460.0' Slope= 0.0043 '/'
Inlet Invert= 59.00', Outlet Invert= 57.00'



‡

Summary for Pond C2: 15" HDPE

Inflow Area = 2.028 ac, 9.11% Impervious, Inflow Depth > 2.76" for 25 Year event
Inflow = 4.24 cfs @ 12.31 hrs, Volume= 0.466 af
Outflow = 3.98 cfs @ 12.39 hrs, Volume= 0.466 af, Atten= 6%, Lag= 4.7 min
Primary = 3.98 cfs @ 12.39 hrs, Volume= 0.466 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 74.46' @ 12.39 hrs Surf.Area= 1,076 sf Storage= 560 cf
Flood Elev= 74.40' Surf.Area= 983 sf Storage= 494 cf

Plug-Flow detention time= 1.6 min calculated for 0.465 af (100% of inflow)
Center-of-Mass det. time= 1.3 min (846.3 - 845.0)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	1,372 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
73.00	16	14.0	0	0	16
74.00	501	134.0	202	202	1,431
75.00	2,007	244.0	1,170	1,372	4,745

Device	Routing	Invert	Outlet Devices
#1	Primary	73.11'	**15.0" Round Culvert** L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 73.11' / 72.26' S= 0.0185 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.98 cfs @ 12.39 hrs HW=74.46' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.98 cfs @ 3.24 fps)

Summary for Pond C3: 2 x 15" HDPE

Inflow Area = 1.925 ac, 6.20% Impervious, Inflow Depth > 3.13" for 25 Year event
Inflow = 5.14 cfs @ 12.23 hrs, Volume= 0.502 af
Outflow = 5.14 cfs @ 12.23 hrs, Volume= 0.502 af, Atten= 0%, Lag= 0.0 min
Primary = 5.14 cfs @ 12.23 hrs, Volume= 0.502 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 60.84' @ 12.23 hrs
Flood Elev= 61.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	59.90'	**15.0" Round Culvert X 2.00** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.90' / 59.50' S= 0.0080 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=5.09 cfs @ 12.23 hrs HW=60.83' TW=59.26' (Dynamic Tailwater)
1=Culvert (Inlet Controls 5.09 cfs @ 2.59 fps)

Summary for Pond P3: Wetland

Inflow Area = 14.354 ac, 4.35% Impervious, Inflow Depth > 2.74" for 25 Year event
Inflow = 19.26 cfs @ 12.76 hrs, Volume= 3.272 af
Outflow = 2.60 cfs @ 15.49 hrs, Volume= 0.963 af, Atten= 87%, Lag= 163.8 min
Primary = 2.60 cfs @ 15.49 hrs, Volume= 0.963 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 64.11' @ 15.49 hrs Surf.Area= 29,756 sf Storage= 102,463 cf

Plug-Flow detention time= 361.6 min calculated for 0.963 af (29% of inflow)
Center-of-Mass det. time= 228.2 min (1,099.1 - 870.9)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	115,705 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
60.00	22,018	689.0	0	0	22,018
62.00	24,835	718.0	46,825	46,825	25,557
64.00	27,769	747.0	52,577	99,401	29,241
64.50	37,697	836.0	16,303	115,705	40,460

Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=2.59 cfs @ 15.49 hrs HW=64.11' TW=63.21' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 2.59 cfs @ 0.81 fps)

Summary for Link AP1:

Inflow Area = 402.469 ac, 21.89% Impervious, Inflow Depth > 3.13" for 25 Year event
Inflow = 346.08 cfs @ 13.73 hrs, Volume= 104.929 af
Primary = 346.08 cfs @ 13.73 hrs, Volume= 104.929 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP2:

Inflow Area = 2.028 ac, 9.11% Impervious, Inflow Depth > 2.76" for 25 Year event
Inflow = 3.98 cfs @ 12.39 hrs, Volume= 0.466 af
Primary = 3.98 cfs @ 12.39 hrs, Volume= 0.466 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP3:

Inflow Area = 18.475 ac, 4.82% Impervious, Inflow Depth > 1.32" for 25 Year event
Inflow = 10.20 cfs @ 12.29 hrs, Volume= 2.032 af
Primary = 10.20 cfs @ 12.29 hrs, Volume= 2.032 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Runoff Area=238,223 sf 2.04% Impervious Runoff Depth>3.44"
Flow Length=620' Tc=37.4 min CN=71 Runoff=11.31 cfs 1.570 af

Subcatchment 2: Runoff Area=88,355 sf 9.11% Impervious Runoff Depth>3.77"
Flow Length=300' Tc=22.1 min CN=74 Runoff=5.80 cfs 0.637 af

Subcatchment 3: Runoff Area=625,250 sf 4.35% Impervious Runoff Depth>3.74"
Flow Length=1,188' Tc=54.9 min CN=74 Runoff=26.42 cfs 4.472 af

Subcatchment 4: Runoff Area=95,669 sf 6.65% Impervious Runoff Depth>4.19"
Flow Length=165' Tc=20.2 min CN=78 Runoff=7.22 cfs 0.767 af

Subcatchment OS1: Offsite Runoff Area=397.000 ac 22.17% Impervious Runoff Depth>4.19"
Flow Length=8,561' Slope=0.0110 '/' Tc=135.5 min CN=79 Runoff=460.24 cfs 138.473 af

Subcatchment OS2: Offsite Runoff Area=83,865 sf 6.20% Impervious Runoff Depth>4.19"
Flow Length=150' Slope=0.0100 '/' Tc=16.5 min CN=78 Runoff=6.86 cfs 0.672 af

Reach R3.1: Channel Avg. Flow Depth=0.38' Max Vel=1.70 fps Inflow=9.37 cfs 2.158 af
n=0.050 L=190.0' S=0.0205 '/' Capacity=342.91 cfs Outflow=9.34 cfs 2.154 af

Reach R3.2: Channel Avg. Flow Depth=0.31' Max Vel=1.57 fps Inflow=6.86 cfs 0.672 af
n=0.022 L=460.0' S=0.0043 '/' Capacity=358.68 cfs Outflow=6.47 cfs 0.670 af

Pond C2: 15" HDPE Peak Elev=74.92' Storage=1,209 cf Inflow=5.80 cfs 0.637 af
15.0" Round Culvert n=0.013 L=46.0' S=0.0185 '/' Outflow=5.07 cfs 0.636 af

Pond C3: 2 x 15" HDPE Peak Elev=61.06' Inflow=6.86 cfs 0.672 af
15.0" Round Culvert x 2.00 n=0.013 L=50.0' S=0.0080 '/' Outflow=6.86 cfs 0.672 af

Pond P3: Wetland Peak Elev=64.25' Storage=106,912 cf Inflow=26.42 cfs 4.472 af
Outflow=9.37 cfs 2.158 af

Link AP1: Inflow=462.44 cfs 140.043 af
Primary=462.44 cfs 140.043 af

Link AP2: Inflow=5.07 cfs 0.636 af
Primary=5.07 cfs 0.636 af

Link AP3: Inflow=13.69 cfs 3.590 af
Primary=13.69 cfs 3.590 af

Total Runoff Area = 422.972 ac Runoff Volume = 146.590 af Average Runoff Depth = 4.16"
78.91% Pervious = 333.786 ac 21.09% Impervious = 89.186 ac

Summary for Subcatchment 1:

Runoff = 11.31 cfs @ 12.52 hrs, Volume= 1.570 af, Depth> 3.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.70"

Area (sf)	CN	Description
19,462	80	1/2 acre lots, 25% imp, HSG C
218,761	70	Woods, Good, HSG C
238,223	71	Weighted Average
233,358		97.96% Pervious Area
4,866		2.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	150	0.0260	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
9.4	360	0.0652	0.64		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.4	110	0.0110	5.06	141.56	**Trap/Vee/Rect Channel Flow, CD** Bot.W=10.00' D=2.00' Z= 2.0 '/' Top.W=18.00' n= 0.040 Winding stream, pools & shoals
37.4	620	Total			

Summary for Subcatchment 2:

Runoff = 5.80 cfs @ 12.31 hrs, Volume= 0.637 af, Depth> 3.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.70"

Area (sf)	CN	Description
32,188	80	1/2 acre lots, 25% imp, HSG C
56,167	70	Woods, Good, HSG C
88,355	74	Weighted Average
80,308		90.89% Pervious Area
8,047		9.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	150	0.0733	0.14		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	60	0.0250	0.40		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
1.4	90	0.0250	1.11		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
22.1	300	Total			

Summary for Subcatchment 3:

Runoff = 26.42 cfs @ 12.75 hrs, Volume= 4.472 af, Depth> 3.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.70"

	Area (sf)	CN	Description
	47,802	80	1/2 acre lots, 25% imp, HSG C
*	15,248	98	Impervious
	265,068	70	Woods, Good, HSG C
	154,981	77	Woods, Good, HSG D
	111,025	71	Meadow, non-grazed, HSG C
	31,126	78	Meadow, non-grazed, HSG D
	625,250	74	Weighted Average
	598,052		95.65% Pervious Area
	27,199		4.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.4	150	0.0150	0.07		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
17.2	298	0.0134	0.29		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.4	300	0.0230	11.98	251.57	**Trap/Vee/Rect Channel Flow, CD** Bot.W=4.00' D=3.00' Z= 2.0 & 0.0 '/' Top.W=10.00' n= 0.025 Earth, clean & winding
2.9	440	0.0200	2.53	135.18	**Parabolic Channel, DE** W=40.00' D=2.00' Area=53.3 sf Perim=40.3' n= 0.100 Very weedy reaches w/pools
54.9	1,188	Total			

Summary for Subcatchment 4:

Runoff = 7.22 cfs @ 12.28 hrs, Volume= 0.767 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.70"

Area (sf)	CN	Description
70,233	77	Woods, Good, HSG D
25,436	80	1/2 acre lots, 25% imp, HSG C
95,669	78	Weighted Average
89,310		93.35% Pervious Area
6,359		6.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0350	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	65	0.0310	0.44		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
20.2	165	Total			

Summary for Subcatchment OS1: Offsite

Runoff = 460.24 cfs @ 13.72 hrs, Volume= 138.473 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.70"

Area (ac)	CN	Description
200.000	83	1/4 acre lots, 38% imp, HSG C
60.000	79	1 acre lots, 20% imp, HSG C
137.000	72	Woods/grass comb., Good, HSG C
397.000	79	Weighted Average
309.000		77.83% Pervious Area
88.000		22.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
67.8	150	0.0110	0.04		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
21.6	340	0.0110	0.26		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
6.2	272	0.0110	0.73		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
16.6	733	0.0110	0.73		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
23.3	7,066	0.0110	5.06	141.56	**Trap/Vee/Rect Channel Flow, EF** Bot.W=10.00' D=2.00' Z= 2.0 '/' Top.W=18.00' n= 0.040 Winding stream, pools & shoals
135.5	8,561	Total			

Summary for Subcatchment OS2: Offsite

Runoff = 6.86 cfs @ 12.23 hrs, Volume= 0.672 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.70"

Area (sf)	CN	Description
20,802	80	1/2 acre lots, 25% imp, HSG C
63,063	78	Meadow, non-grazed, HSG D
83,865	78	Weighted Average
78,665		93.80% Pervious Area
5,201		6.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	150	0.0100	0.15		**Sheet Flow, AB** Range n= 0.130 P2= 3.00"

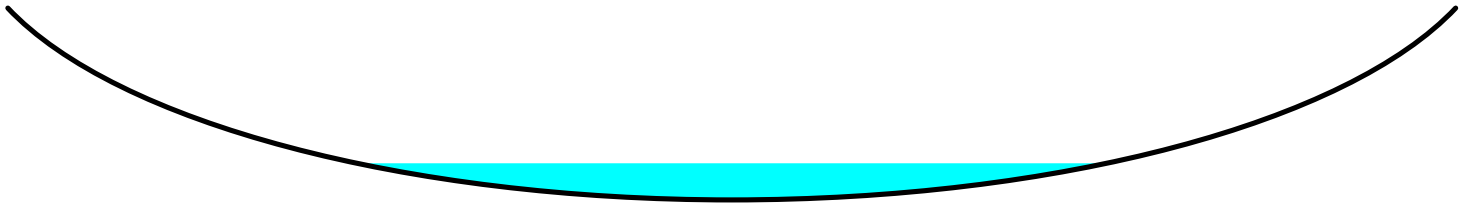
Summary for Reach R3.1: Channel

Inflow Area = 14.354 ac, 4.35% Impervious, Inflow Depth > 1.80" for 100 Year event
Inflow = 9.37 cfs @ 13.67 hrs, Volume= 2.158 af
Outflow = 9.34 cfs @ 13.69 hrs, Volume= 2.154 af, Atten= 0%, Lag= 1.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.70 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 1.06 fps, Avg. Travel Time= 3.0 min

Peak Storage= 1,044 cf @ 13.69 hrs
Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 342.91 cfs

50.00' x 2.00' deep Parabolic Channel, n= 0.050 Scattered brush, heavy weeds
Length= 190.0' Slope= 0.0205 '/'
Inlet Invert= 63.00', Outlet Invert= 59.10'



‡

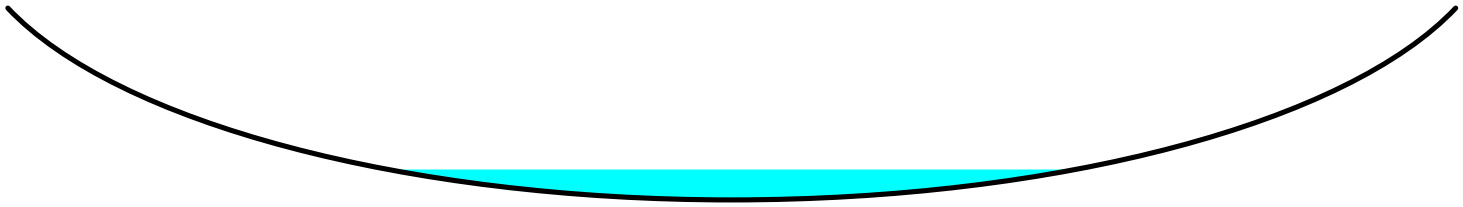
Summary for Reach R3.2: Channel

Inflow Area = 1.925 ac, 6.20% Impervious, Inflow Depth > 4.19" for 100 Year event
Inflow = 6.86 cfs @ 12.23 hrs, Volume= 0.672 af
Outflow = 6.47 cfs @ 12.29 hrs, Volume= 0.670 af, Atten= 6%, Lag= 3.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.57 fps, Min. Travel Time= 4.9 min
Avg. Velocity = 0.59 fps, Avg. Travel Time= 13.0 min

Peak Storage= 1,899 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 358.68 cfs

50.00' x 2.00' deep Parabolic Channel, n= 0.022 Earth, clean & straight
Length= 460.0' Slope= 0.0043 '/'
Inlet Invert= 59.00', Outlet Invert= 57.00'



‡

Summary for Pond C2: 15" HDPE

Inflow Area = 2.028 ac, 9.11% Impervious, Inflow Depth > 3.77" for 100 Year event
Inflow = 5.80 cfs @ 12.31 hrs, Volume= 0.637 af
Outflow = 5.07 cfs @ 12.43 hrs, Volume= 0.636 af, Atten= 13%, Lag= 7.3 min
Primary = 5.07 cfs @ 12.43 hrs, Volume= 0.636 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 74.92' @ 12.43 hrs Surf.Area= 1,840 sf Storage= 1,209 cf
Flood Elev= 74.40' Surf.Area= 983 sf Storage= 494 cf

Plug-Flow detention time= 2.0 min calculated for 0.636 af (100% of inflow)
Center-of-Mass det. time= 1.7 min (837.9 - 836.2)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	1,372 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
73.00	16	14.0	0	0	16
74.00	501	134.0	202	202	1,431
75.00	2,007	244.0	1,170	1,372	4,745

Device	Routing	Invert	Outlet Devices
#1	Primary	73.11'	**15.0" Round Culvert** L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 73.11' / 72.26' S= 0.0185 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=5.06 cfs @ 12.43 hrs HW=74.91' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 5.06 cfs @ 4.12 fps)

Summary for Pond C3: 2 x 15" HDPE

Inflow Area = 1.925 ac, 6.20% Impervious, Inflow Depth > 4.19" for 100 Year event
Inflow = 6.86 cfs @ 12.23 hrs, Volume= 0.672 af
Outflow = 6.86 cfs @ 12.23 hrs, Volume= 0.672 af, Atten= 0%, Lag= 0.0 min
Primary = 6.86 cfs @ 12.23 hrs, Volume= 0.672 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 61.06' @ 12.23 hrs
Flood Elev= 61.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	59.90'	**15.0" Round Culvert X 2.00** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.90' / 59.50' S= 0.0080 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=6.79 cfs @ 12.23 hrs HW=61.05' TW=59.30' (Dynamic Tailwater)
1=Culvert (Inlet Controls 6.79 cfs @ 2.88 fps)

Summary for Pond P3: Wetland

Inflow Area = 14.354 ac, 4.35% Impervious, Inflow Depth > 3.74" for 100 Year event
Inflow = 26.42 cfs @ 12.75 hrs, Volume= 4.472 af
Outflow = 9.37 cfs @ 13.67 hrs, Volume= 2.158 af, Atten= 65%, Lag= 55.1 min
Primary = 9.37 cfs @ 13.67 hrs, Volume= 2.158 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 64.25' @ 13.67 hrs Surf.Area= 32,531 sf Storage= 106,912 cf

Plug-Flow detention time= 243.4 min calculated for 2.158 af (48% of inflow)
Center-of-Mass det. time= 129.0 min (991.2 - 862.3)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	115,705 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
60.00	22,018	689.0	0	0	22,018
62.00	24,835	718.0	46,825	46,825	25,557
64.00	27,769	747.0	52,577	99,401	29,241
64.50	37,697	836.0	16,303	115,705	40,460

Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=9.34 cfs @ 13.67 hrs HW=64.25' TW=63.38' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 9.34 cfs @ 1.25 fps)

Summary for Link AP1:

Inflow Area = 402.469 ac, 21.89% Impervious, Inflow Depth > 4.18" for 100 Year event
Inflow = 462.44 cfs @ 13.72 hrs, Volume= 140.043 af
Primary = 462.44 cfs @ 13.72 hrs, Volume= 140.043 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP2:

Inflow Area = 2.028 ac, 9.11% Impervious, Inflow Depth > 3.76" for 100 Year event
Inflow = 5.07 cfs @ 12.43 hrs, Volume= 0.636 af
Primary = 5.07 cfs @ 12.43 hrs, Volume= 0.636 af, Atten= 0%, Lag= 0.0 min

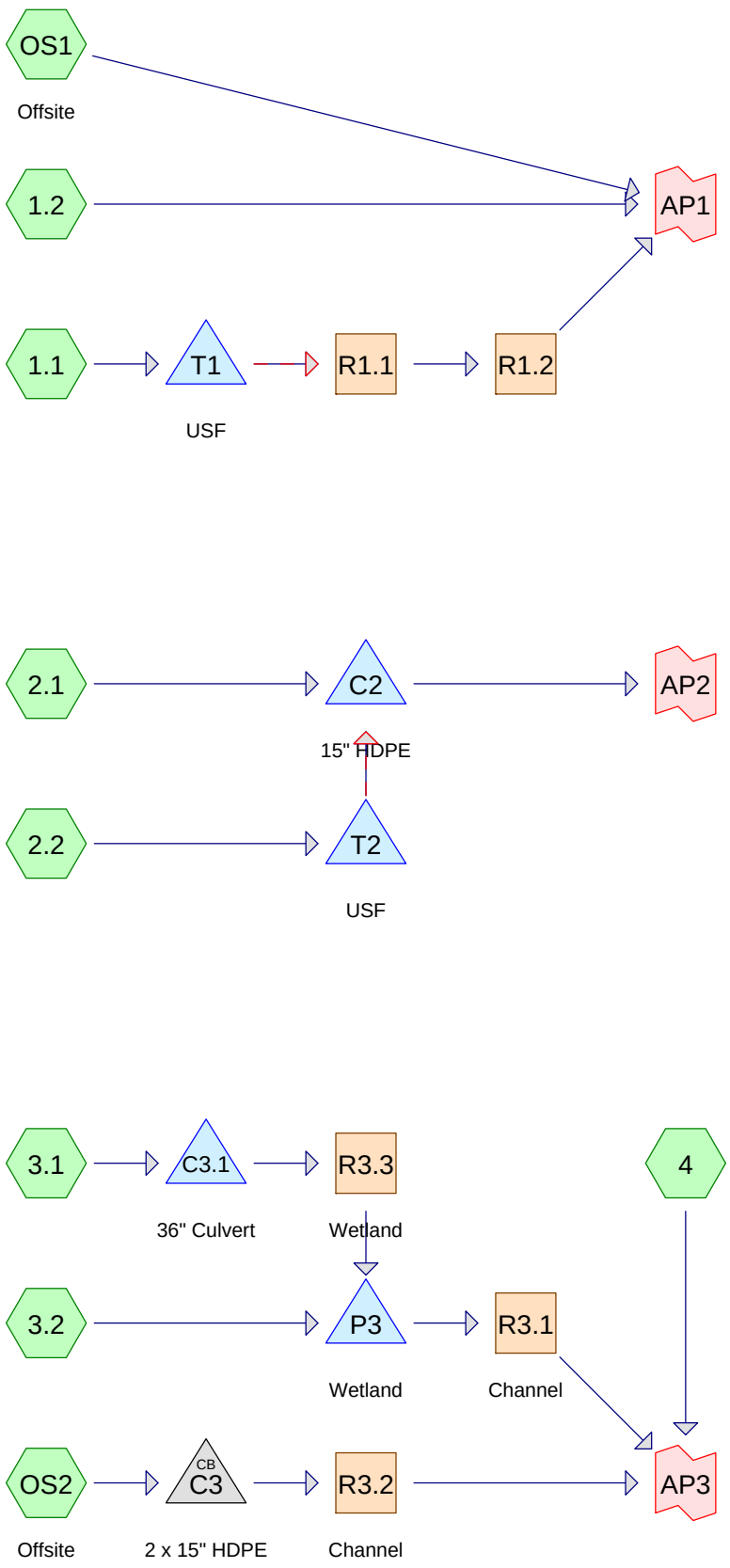
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP3:

Inflow Area = 18.475 ac, 4.82% Impervious, Inflow Depth > 2.33" for 100 Year event
Inflow = 13.69 cfs @ 12.28 hrs, Volume= 3.590 af
Primary = 13.69 cfs @ 12.28 hrs, Volume= 3.590 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Appendix B:
Post-Development HydroCAD Calculations



Subcat Reach Pond Link

Drainage Diagram for Post Development
Prepared by Land Design Solutions, Printed 2/8/2013
HydroCAD® 9.10 s/n 01350 © 2010 HydroCAD Software Solutions LLC

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1.1: Runoff Area=99,367 sf 31.72% Impervious Runoff Depth>1.30"
Flow Length=479' Tc=35.7 min CN=81 Runoff=1.81 cfs 0.248 af

Subcatchment 1.2: Runoff Area=144,157 sf 17.41% Impervious Runoff Depth>1.01"
Flow Length=560' Tc=23.8 min CN=76 Runoff=2.34 cfs 0.278 af

Subcatchment 2.1: Runoff Area=40,937 sf 14.62% Impervious Runoff Depth>1.01"
Flow Length=282' Tc=23.4 min CN=76 Runoff=0.67 cfs 0.079 af

Subcatchment 2.2: Runoff Area=42,552 sf 35.59% Impervious Runoff Depth>1.37"
Flow Length=458' Tc=18.0 min CN=82 Runoff=1.10 cfs 0.112 af

Subcatchment 3.1: Runoff Area=436,574 sf 6.91% Impervious Runoff Depth>0.90"
Flow Length=650' Tc=47.9 min CN=74 Runoff=4.43 cfs 0.748 af

Subcatchment 3.2: Runoff Area=188,217 sf 10.59% Impervious Runoff Depth>1.06"
Flow Length=345' Tc=25.3 min CN=77 Runoff=3.17 cfs 0.383 af

Subcatchment 4: Runoff Area=95,669 sf 6.65% Impervious Runoff Depth>1.12"
Flow Length=165' Tc=20.2 min CN=78 Runoff=1.88 cfs 0.206 af

Subcatchment OS1: Offsite Runoff Area=397.000 ac 22.17% Impervious Runoff Depth>1.14"
Flow Length=8,561' Slope=0.0110 '/' Tc=135.5 min CN=79 Runoff=121.49 cfs 37.834 af

Subcatchment OS2: Offsite Runoff Area=83,865 sf 6.20% Impervious Runoff Depth>1.12"
Flow Length=150' Slope=0.0100 '/' Tc=16.5 min CN=78 Runoff=1.79 cfs 0.180 af

Reach R1.1: Avg. Flow Depth=0.12' Max Vel=0.86 fps Inflow=1.01 cfs 0.163 af
n=0.035 L=85.0' S=0.0118 '/' Capacity=22.13 cfs Outflow=1.01 cfs 0.163 af

Reach R1.2: Avg. Flow Depth=0.11' Max Vel=0.86 fps Inflow=1.01 cfs 0.163 af
n=0.040 L=302.0' S=0.0110 '/' Capacity=141.52 cfs Outflow=0.94 cfs 0.161 af

Reach R3.1: Channel Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.050 L=150.0' S=0.0400 '/' Capacity=478.69 cfs Outflow=0.00 cfs 0.000 af

Reach R3.2: Channel Avg. Flow Depth=0.16' Max Vel=1.02 fps Inflow=1.79 cfs 0.180 af
n=0.022 L=460.0' S=0.0043 '/' Capacity=358.68 cfs Outflow=1.58 cfs 0.179 af

Reach R3.3: Wetland Avg. Flow Depth=0.40' Max Vel=0.92 fps Inflow=4.42 cfs 0.747 af
n=0.100 L=356.0' S=0.0225 '/' Capacity=143.29 cfs Outflow=4.33 cfs 0.743 af

Pond C2: 15" HDPE Peak Elev=73.55' Storage=50 cf Inflow=0.69 cfs 0.113 af
15.0" Round Culvert n=0.013 L=46.0' S=0.0185 '/' Outflow=0.69 cfs 0.113 af

Pond C3: 2 x 15" HDPE Peak Elev=60.41' Inflow=1.79 cfs 0.180 af
15.0" Round Culvert x 2.00 n=0.013 L=50.0' S=0.0080 '/' Outflow=1.79 cfs 0.180 af

Pond C3.1: 36" Culvert Peak Elev=76.16' Storage=416 cf Inflow=4.43 cfs 0.748 af
36.0" Round Culvert w/ 6.0" fill n=0.020 L=55.0' S=0.0200 '/' Outflow=4.42 cfs 0.747 af

Pond P3: Wetland Peak Elev=62.09' Storage=49,024 cf Inflow=6.04 cfs 1.126 af
Outflow=0.00 cfs 0.000 af

Pond T1: USF Peak Elev=67.11' Storage=4,093 cf Inflow=1.81 cfs 0.248 af
Primary=0.06 cfs 0.061 af Secondary=0.95 cfs 0.102 af Outflow=1.01 cfs 0.163 af

Pond T2: USF Peak Elev=77.42' Storage=3,488 cf Inflow=1.10 cfs 0.112 af
Primary=0.03 cfs 0.034 af Secondary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.034 af

Link AP1: Inflow=122.23 cfs 38.274 af
Primary=122.23 cfs 38.274 af

Link AP2: Inflow=0.69 cfs 0.113 af
Primary=0.69 cfs 0.113 af

Link AP3: Inflow=3.45 cfs 0.385 af
Primary=3.45 cfs 0.385 af

Total Runoff Area = 422.972 ac Runoff Volume = 40.068 af Average Runoff Depth = 1.14"
78.44% Pervious = 331.771 ac 21.56% Impervious = 91.201 ac

Summary for Subcatchment 1.1:

Runoff = 1.81 cfs @ 12.51 hrs, Volume= 0.248 af, Depth> 1.30"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.00"

	Area (sf)	CN	Description
*	14,020	98	New Road Impervious
*	17,500	98	New Lot Impervious
*	22,068	74	New Road Landscaped (HSG C)
*	35,000	74	New Lot Lawn HSG C
	10,779	70	Woods, Good, HSG C
	99,367	81	Weighted Average
	67,847		68.28% Pervious Area
	31,520		31.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.7	150	0.0800	0.08		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
3.9	60	0.0800	0.26		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.00"
0.7	76	0.0600	1.71		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.4	193	0.0470	7.17	28.70	**Trap/Vee/Rect Channel Flow, DE** Bot.W=1.00' D=1.00' Z= 3.0 '/' Top.W=7.00' n= 0.030 Earth, grassed & winding
35.7	479	Total			

Summary for Subcatchment 1.2:

Runoff = 2.34 cfs @ 12.36 hrs, Volume= 0.278 af, Depth> 1.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.00"

	Area (sf)	CN	Description
*	2,557	98	New Road Impervious
*	15,000	98	New Lot Impervious
*	30,684	74	New Lanscaped Area, HSG C
	30,159	80	1/2 acre lots, 25% imp, HSG C
	65,757	70	Woods, Good, HSG C
	144,157	76	Weighted Average
	119,060		82.59% Pervious Area
	25,097		17.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	140	0.0140	0.15		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.00"
8.1	310	0.0652	0.64		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.4	110	0.0110	5.06	141.56	**Trap/Vee/Rect Channel Flow, CD** Bot.W=10.00' D=2.00' Z= 2.0 '/' Top.W=18.00' n= 0.040 Winding stream, pools & shoals
23.8	560	Total			

Summary for Subcatchment 2.1:

Runoff = 0.67 cfs @ 12.35 hrs, Volume= 0.079 af, Depth> 1.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.00"

	Area (sf)	CN	Description
*	2,500	98	New Lot Impervious
*	5,000	74	New Landscaped Area, HSG C
	13,940	80	1/2 acre lots, 25% imp, HSG C
	19,497	70	Woods, Good, HSG C
	40,937	76	Weighted Average
	34,952		85.38% Pervious Area
	5,985		14.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	150	0.0800	0.14		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
5.8	132	0.0230	0.38		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
23.4	282	Total			

Summary for Subcatchment 2.2:

Runoff = 1.10 cfs @ 12.26 hrs, Volume= 0.112 af, Depth> 1.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.00"

	Area (sf)	CN	Description
*	10,645	98	New Road Impervious
*	4,500	98	New Lot Impervious
*	21,459	74	New Landscaped Area, HSG C
	5,948	70	Woods, Good, HSG C
	42,552	82	Weighted Average
	27,407		64.41% Pervious Area
	15,145		35.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	50	0.0640	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
0.5	281	0.0340	9.29	130.05	**Trap/Vee/Rect Channel Flow, BC** Bot.W=1.00' D=2.00' Z= 3.0 '/' Top.W=13.00' n= 0.030 Earth, grassed & winding
9.5	127	0.0080	0.22		**Shallow Concentrated Flow, DE** Forest w/Heavy Litter Kv= 2.5 fps
18.0	458	Total			

Summary for Subcatchment 3.1:

Runoff = 4.43 cfs @ 12.72 hrs, Volume= 0.748 af, Depth> 0.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.00"

	Area (sf)	CN	Description
*	14,680	98	Existing Impervious
*	15,500	98	New Lot Impervious
*	0	98	New Road Impervious
	163,537	70	Woods, Good, HSG C
	74,338	77	Woods, Good, HSG D
	111,026	71	Meadow, non-grazed, HSG C
	25,011	78	Meadow, non-grazed, HSG D
*	32,482	74	New Lawn, HSG C
	436,574	74	Weighted Average
	406,394		93.09% Pervious Area
	30,180		6.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.0	150	0.0134	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
11.5	200	0.0134	0.29		**Shallow Concentrated Flow, AB** Forest w/Heavy Litter Kv= 2.5 fps
0.4	300	0.0230	12.95	388.60	**Trap/Vee/Rect Channel Flow, DE** Bot.W=4.00' D=3.00' Z= 2.0 '/' Top.W=16.00' n= 0.025 Earth, clean & winding
47.9	650	Total			

Summary for Subcatchment 3.2:

Runoff = 3.17 cfs @ 12.38 hrs, Volume= 0.383 af, Depth> 1.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.00"

	Area (sf)	CN	Description
	46,211	80	1/2 acre lots, 25% imp, HSG C
*	568	98	Existing Impervious
*	2,812	98	New Road Impervious
	52,712	70	Woods, Good, HSG C
	68,135	77	Woods, Good, HSG D
*	12,779	74	New Landscaped Area, HSG C
*	5,000	98	New Lot Impervious
	188,217	77	Weighted Average
	168,284		89.41% Pervious Area
	19,933		10.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	150	0.1000	0.16		**Sheet Flow, AB**
					Woods: Light underbrush n= 0.400 P2= 3.00"
9.2	195	0.0200	0.35		**Shallow Concentrated Flow, BC**
					Forest w/Heavy Litter Kv= 2.5 fps
25.3	345	Total			

Summary for Subcatchment 4:

Runoff = 1.88 cfs @ 12.30 hrs, Volume= 0.206 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.00"

Area (sf)	CN	Description
70,233	77	Woods, Good, HSG D
25,436	80	1/2 acre lots, 25% imp, HSG C
95,669	78	Weighted Average
89,310		93.35% Pervious Area
6,359		6.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0350	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	65	0.0310	0.44		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
20.2	165	Total			

Summary for Subcatchment OS1: Offsite

Runoff = 121.49 cfs @ 13.87 hrs, Volume= 37.834 af, Depth> 1.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.00"

Area (ac)	CN	Description
200.000	83	1/4 acre lots, 38% imp, HSG C
60.000	79	1 acre lots, 20% imp, HSG C
137.000	72	Woods/grass comb., Good, HSG C
397.000	79	Weighted Average
309.000		77.83% Pervious Area
88.000		22.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
67.8	150	0.0110	0.04		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
21.6	340	0.0110	0.26		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
6.2	272	0.0110	0.73		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
16.6	733	0.0110	0.73		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
23.3	7,066	0.0110	5.06	141.56	**Trap/Vee/Rect Channel Flow, EF** Bot.W=10.00' D=2.00' Z= 2.0 '/' Top.W=18.00' n= 0.040 Winding stream, pools & shoals
135.5	8,561	Total			

Summary for Subcatchment OS2: Offsite

Runoff = 1.79 cfs @ 12.24 hrs, Volume= 0.180 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.00"

Area (sf)	CN	Description
20,802	80	1/2 acre lots, 25% imp, HSG C
63,063	78	Meadow, non-grazed, HSG D
83,865	78	Weighted Average
78,665		93.80% Pervious Area
5,201		6.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	150	0.0100	0.15		**Sheet Flow, AB** Range n= 0.130 P2= 3.00"

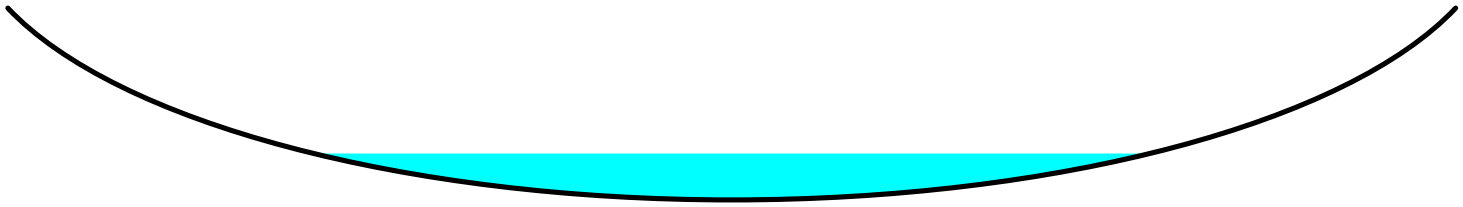
Summary for Reach R1.1:

Inflow Area = 2.281 ac, 31.72% Impervious, Inflow Depth > 0.86" for 2 Year event
Inflow = 1.01 cfs @ 12.94 hrs, Volume= 0.163 af
Outflow = 1.01 cfs @ 12.96 hrs, Volume= 0.163 af, Atten= 0%, Lag= 1.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.86 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 0.41 fps, Avg. Travel Time= 3.4 min

Peak Storage= 100 cf @ 12.96 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 22.13 cfs

30.00' x 0.50' deep Parabolic Channel, n= 0.035 High grass
Length= 85.0' Slope= 0.0118 '/'
Inlet Invert= 63.00', Outlet Invert= 62.00'



‡

Summary for Reach R1.2:

Inflow Area = 2.281 ac, 31.72% Impervious, Inflow Depth > 0.86" for 2 Year event
Inflow = 1.01 cfs @ 12.96 hrs, Volume= 0.163 af
Outflow = 0.94 cfs @ 13.06 hrs, Volume= 0.161 af, Atten= 7%, Lag= 5.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.86 fps, Min. Travel Time= 5.8 min
Avg. Velocity = 0.38 fps, Avg. Travel Time= 13.2 min

Peak Storage= 328 cf @ 13.06 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 141.52 cfs

10.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 18.00'
Length= 302.0' Slope= 0.0110 '/'
Inlet Invert= 61.00', Outlet Invert= 57.68'

‡

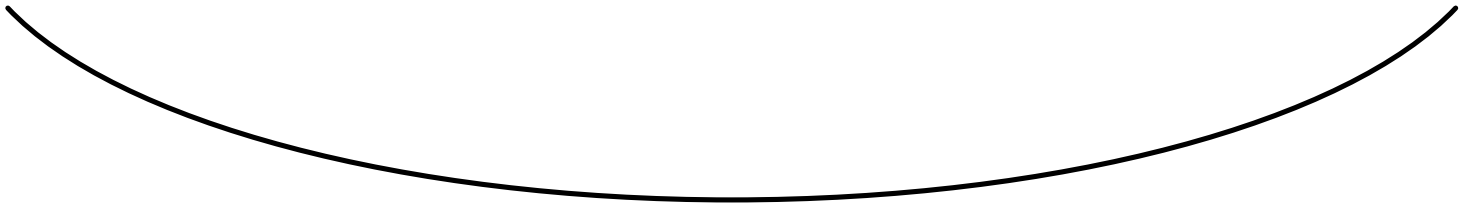
Summary for Reach R3.1: Channel

Inflow Area = 14.343 ac, 8.02% Impervious, Inflow Depth = 0.00" for 2 Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 478.69 cfs

50.00' x 2.00' deep Parabolic Channel, n= 0.050 Scattered brush, heavy weeds
Length= 150.0' Slope= 0.0400 '/'
Inlet Invert= 63.00', Outlet Invert= 57.00'



‡

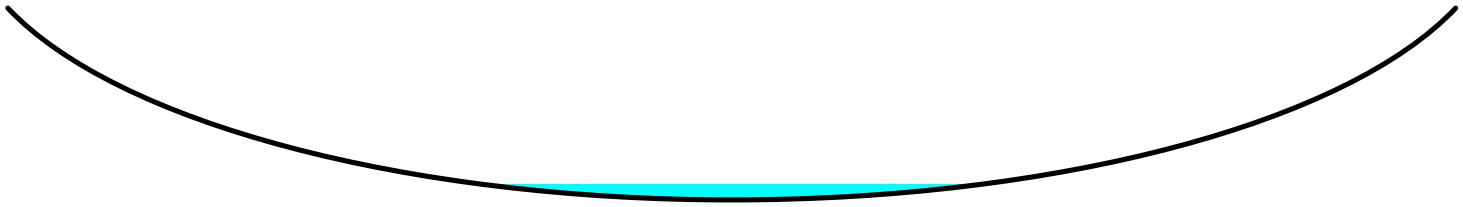
Summary for Reach R3.2: Channel

Inflow Area = 1.925 ac, 6.20% Impervious, Inflow Depth > 1.12" for 2 Year event
Inflow = 1.79 cfs @ 12.24 hrs, Volume= 0.180 af
Outflow = 1.58 cfs @ 12.34 hrs, Volume= 0.179 af, Atten= 11%, Lag= 5.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.02 fps, Min. Travel Time= 7.5 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 17.3 min

Peak Storage= 717 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 358.68 cfs

50.00' x 2.00' deep Parabolic Channel, n= 0.022 Earth, clean & straight
Length= 460.0' Slope= 0.0043 '/'
Inlet Invert= 59.00', Outlet Invert= 57.00'



‡

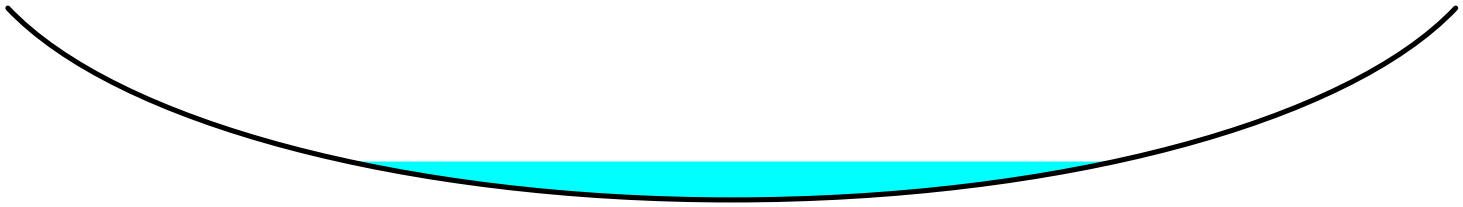
Summary for Reach R3.3: Wetland

Inflow Area = 10.022 ac, 6.91% Impervious, Inflow Depth > 0.89" for 2 Year event
Inflow = 4.42 cfs @ 12.74 hrs, Volume= 0.747 af
Outflow = 4.33 cfs @ 12.82 hrs, Volume= 0.743 af, Atten= 2%, Lag= 4.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.92 fps, Min. Travel Time= 6.5 min
Avg. Velocity = 0.47 fps, Avg. Travel Time= 12.5 min

Peak Storage= 1,680 cf @ 12.82 hrs
Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 143.29 cfs

40.00' x 2.00' deep Parabolic Channel, n= 0.100 Very weedy reaches w/pools
Length= 356.0' Slope= 0.0225 '/'
Inlet Invert= 73.00', Outlet Invert= 65.00'



‡

Summary for Pond C2: 15" HDPE

Inflow Area = 1.917 ac, 25.31% Impervious, Inflow Depth > 0.71" for 2 Year event
Inflow = 0.69 cfs @ 12.35 hrs, Volume= 0.113 af
Outflow = 0.69 cfs @ 12.37 hrs, Volume= 0.113 af, Atten= 0%, Lag= 1.1 min
Primary = 0.69 cfs @ 12.37 hrs, Volume= 0.113 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 73.55' @ 12.37 hrs Surf.Area= 200 sf Storage= 50 cf
Flood Elev= 75.11' Surf.Area= 2,007 sf Storage= 1,372 cf

Plug-Flow detention time= 2.0 min calculated for 0.113 af (100% of inflow)
Center-of-Mass det. time= 1.1 min (924.8 - 923.6)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	1,372 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
73.00	16	14.0	0	0	16
74.00	501	134.0	202	202	1,431
75.00	2,007	244.0	1,170	1,372	4,745

Device	Routing	Invert	Outlet Devices
#1	Primary	73.11'	**15.0" Round Culvert** L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 73.11' / 72.26' S= 0.0185 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.69 cfs @ 12.37 hrs HW=73.55' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.69 cfs @ 1.78 fps)

Summary for Pond C3: 2 x 15" HDPE

Inflow Area = 1.925 ac, 6.20% Impervious, Inflow Depth > 1.12" for 2 Year event
Inflow = 1.79 cfs @ 12.24 hrs, Volume= 0.180 af
Outflow = 1.79 cfs @ 12.24 hrs, Volume= 0.180 af, Atten= 0%, Lag= 0.0 min
Primary = 1.79 cfs @ 12.24 hrs, Volume= 0.180 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 60.41' @ 12.24 hrs
Flood Elev= 61.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	59.90'	**15.0" Round Culvert X 2.00** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.90' / 59.50' S= 0.0080 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.78 cfs @ 12.24 hrs HW=60.41' TW=59.15' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.78 cfs @ 1.91 fps)

Summary for Pond C3.1: 36" Culvert

Inflow Area = 10.022 ac, 6.91% Impervious, Inflow Depth > 0.90" for 2 Year event
Inflow = 4.43 cfs @ 12.72 hrs, Volume= 0.748 af
Outflow = 4.42 cfs @ 12.74 hrs, Volume= 0.747 af, Atten= 0%, Lag= 1.5 min
Primary = 4.42 cfs @ 12.74 hrs, Volume= 0.747 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 76.16' @ 12.74 hrs Surf.Area= 827 sf Storage= 416 cf
Flood Elev= 77.50' Surf.Area= 2,715 sf Storage= 2,664 cf

Plug-Flow detention time= 2.4 min calculated for 0.747 af (100% of inflow)
Center-of-Mass det. time= 1.5 min (898.9 - 897.4)

Volume	Invert	Avail.Storage	Storage Description
#1	74.90'	2,664 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
74.90	0	0.0	0	0	0
75.50	296	71.0	59	59	402
77.50	2,715	271.0	2,605	2,664	5,856

Device	Routing	Invert	Outlet Devices
#1	Primary	75.40'	**36.0" Round Culvert w/ 6.0" fill** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 74.90' / 73.80' S= 0.0200 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior

Primary OutFlow Max=4.42 cfs @ 12.74 hrs HW=76.16' TW=73.39' (Dynamic Tailwater)
1=Culvert (Inlet Controls 4.42 cfs @ 2.16 fps)

Summary for Pond P3: Wetland

Inflow Area = 14.343 ac, 8.02% Impervious, Inflow Depth > 0.94" for 2 Year event
Inflow = 6.04 cfs @ 12.68 hrs, Volume= 1.126 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 62.09' @ 24.00 hrs Surf.Area= 24,961 sf Storage= 49,024 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	115,705 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
60.00	22,018	689.0	0	0	22,018
62.00	24,835	718.0	46,825	46,825	25,557
64.00	27,769	747.0	52,577	99,401	29,241
64.50	37,697	836.0	16,303	115,705	40,460

Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=60.00' TW=63.00' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond T1: USF

Inflow Area = 2.281 ac, 31.72% Impervious, Inflow Depth > 1.30" for 2 Year event
Inflow = 1.81 cfs @ 12.51 hrs, Volume= 0.248 af
Outflow = 1.01 cfs @ 12.94 hrs, Volume= 0.163 af, Atten= 44%, Lag= 25.4 min
Primary = 0.06 cfs @ 12.94 hrs, Volume= 0.061 af
Secondary = 0.95 cfs @ 12.94 hrs, Volume= 0.102 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 67.11' @ 12.94 hrs Surf.Area= 3,533 sf Storage= 4,093 cf

Plug-Flow detention time= 174.6 min calculated for 0.163 af (66% of inflow)
Center-of-Mass det. time= 72.8 min (938.3 - 865.5)

Volume	Invert	Avail.Storage	Storage Description
#1	65.50'	5,672 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
65.50	1,779	267.0	0	0	1,779
66.00	2,223	296.0	998	998	3,086
67.00	3,229	370.0	2,710	3,709	7,022
67.50	4,668	374.0	1,963	5,672	7,323

Device	Routing	Invert	Outlet Devices
#1	Primary	65.50'	**0.750 in/hr Exfiltration over Horizontal area**
#2	Secondary	67.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.06 cfs @ 12.94 hrs HW=67.11' TW=63.12' (Dynamic Tailwater)
1=Exfiltration (Exfiltration Controls 0.06 cfs)

Secondary OutFlow Max=0.95 cfs @ 12.94 hrs HW=67.11' TW=63.12' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 0.95 cfs @ 0.84 fps)

Summary for Pond T2: USF

Inflow Area = 0.977 ac, 35.59% Impervious, Inflow Depth > 1.37" for 2 Year event
Inflow = 1.10 cfs @ 12.26 hrs, Volume= 0.112 af
Outflow = 0.03 cfs @ 19.80 hrs, Volume= 0.034 af, Atten= 97%, Lag= 452.8 min
Primary = 0.03 cfs @ 19.80 hrs, Volume= 0.034 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 77.42' @ 19.80 hrs Surf.Area= 3,007 sf Storage= 3,488 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 196.1 min (1,044.4 - 848.3)

Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	5,356 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
76.00	1,931	240.0	0	0	1,931
77.50	3,071	270.0	3,719	3,719	3,207
78.00	3,482	281.0	1,637	5,356	3,709

Device	Routing	Invert	Outlet Devices
#1	Primary	76.00'	**0.750 in/hr Exfiltration X 0.60 over Horizontal area**
#2	Secondary	77.50'	**7.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.03 cfs @ 19.80 hrs HW=77.42' TW=73.23' (Dynamic Tailwater)
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=76.00' TW=73.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Link AP1:

Inflow Area = 402.591 ac, 22.18% Impervious, Inflow Depth > 1.14" for 2 Year event
Inflow = 122.23 cfs @ 13.86 hrs, Volume= 38.274 af
Primary = 122.23 cfs @ 13.86 hrs, Volume= 38.274 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP2:

Inflow Area = 1.917 ac, 25.31% Impervious, Inflow Depth > 0.70" for 2 Year event
Inflow = 0.69 cfs @ 12.37 hrs, Volume= 0.113 af
Primary = 0.69 cfs @ 12.37 hrs, Volume= 0.113 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP3:

Inflow Area = 18.465 ac, 7.67% Impervious, Inflow Depth > 0.25" for 2 Year event
Inflow = 3.45 cfs @ 12.32 hrs, Volume= 0.385 af
Primary = 3.45 cfs @ 12.32 hrs, Volume= 0.385 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1.1: Runoff Area=99,367 sf 31.72% Impervious Runoff Depth>2.70"
Flow Length=479' Tc=35.7 min CN=81 Runoff=3.79 cfs 0.514 af

Subcatchment 1.2: Runoff Area=144,157 sf 17.41% Impervious Runoff Depth>2.28"
Flow Length=560' Tc=23.8 min CN=76 Runoff=5.52 cfs 0.629 af

Subcatchment 2.1: Runoff Area=40,937 sf 14.62% Impervious Runoff Depth>2.28"
Flow Length=282' Tc=23.4 min CN=76 Runoff=1.58 cfs 0.179 af

Subcatchment 2.2: Runoff Area=42,552 sf 35.59% Impervious Runoff Depth>2.80"
Flow Length=458' Tc=18.0 min CN=82 Runoff=2.26 cfs 0.228 af

Subcatchment 3.1: Runoff Area=436,574 sf 6.91% Impervious Runoff Depth>2.10"
Flow Length=650' Tc=47.9 min CN=74 Runoff=11.05 cfs 1.757 af

Subcatchment 3.2: Runoff Area=188,217 sf 10.59% Impervious Runoff Depth>2.36"
Flow Length=345' Tc=25.3 min CN=77 Runoff=7.31 cfs 0.850 af

Subcatchment 4: Runoff Area=95,669 sf 6.65% Impervious Runoff Depth>2.45"
Flow Length=165' Tc=20.2 min CN=78 Runoff=4.23 cfs 0.448 af

Subcatchment OS1: Offsite Runoff Area=397.000 ac 22.17% Impervious Runoff Depth>2.46"
Flow Length=8,561' Slope=0.0110 '/' Tc=135.5 min CN=79 Runoff=269.51 cfs 81.499 af

Subcatchment OS2: Offsite Runoff Area=83,865 sf 6.20% Impervious Runoff Depth>2.45"
Flow Length=150' Slope=0.0100 '/' Tc=16.5 min CN=78 Runoff=4.01 cfs 0.393 af

Reach R1.1: Avg. Flow Depth=0.22' Max Vel=1.27 fps Inflow=3.70 cfs 0.428 af
n=0.035 L=85.0' S=0.0118 '/' Capacity=22.13 cfs Outflow=3.69 cfs 0.427 af

Reach R1.2: Avg. Flow Depth=0.24' Max Vel=1.45 fps Inflow=3.69 cfs 0.427 af
n=0.040 L=302.0' S=0.0110 '/' Capacity=141.52 cfs Outflow=3.65 cfs 0.426 af

Reach R3.1: Channel Avg. Flow Depth=0.10' Max Vel=1.00 fps Inflow=0.77 cfs 0.293 af
n=0.050 L=150.0' S=0.0400 '/' Capacity=478.69 cfs Outflow=0.77 cfs 0.291 af

Reach R3.2: Channel Avg. Flow Depth=0.24' Max Vel=1.32 fps Inflow=4.01 cfs 0.393 af
n=0.022 L=460.0' S=0.0043 '/' Capacity=358.68 cfs Outflow=3.72 cfs 0.391 af

Reach R3.3: Wetland Avg. Flow Depth=0.61' Max Vel=1.22 fps Inflow=11.01 cfs 1.755 af
n=0.100 L=356.0' S=0.0225 '/' Capacity=143.29 cfs Outflow=10.89 cfs 1.749 af

Pond C2: 15" HDPE Peak Elev=73.98' Storage=190 cf Inflow=2.29 cfs 0.321 af
15.0" Round Culvert n=0.013 L=46.0' S=0.0185 '/' Outflow=2.27 cfs 0.321 af

Pond C3: 2 x 15" HDPE Peak Elev=60.70' Inflow=4.01 cfs 0.393 af
15.0" Round Culvert x 2.00 n=0.013 L=50.0' S=0.0080 '/' Outflow=4.01 cfs 0.393 af

Pond C3.1: 36" Culvert Peak Elev=76.75' Storage=1,102 cf Inflow=11.05 cfs 1.757 af
36.0" Round Culvert w/ 6.0" fill n=0.020 L=55.0' S=0.0200 '/' Outflow=11.01 cfs 1.755 af

Pond P3: Wetland Peak Elev=64.05' Storage=100,742 cf Inflow=15.00 cfs 2.599 af
Outflow=0.77 cfs 0.293 af

Pond T1: USF Peak Elev=67.28' Storage=4,699 cf Inflow=3.79 cfs 0.514 af
Primary=0.07 cfs 0.068 af Secondary=3.63 cfs 0.360 af Outflow=3.70 cfs 0.428 af

Pond T2: USF Peak Elev=77.66' Storage=4,214 cf Inflow=2.26 cfs 0.228 af
Primary=0.03 cfs 0.038 af Secondary=1.10 cfs 0.104 af Outflow=1.13 cfs 0.142 af

Link AP1: Inflow=271.00 cfs 82.553 af
Primary=271.00 cfs 82.553 af

Link AP2: Inflow=2.27 cfs 0.321 af
Primary=2.27 cfs 0.321 af

Link AP3: Inflow=7.93 cfs 1.131 af
Primary=7.93 cfs 1.131 af

Total Runoff Area = 422.972 ac Runoff Volume = 86.497 af Average Runoff Depth = 2.45"
78.44% Pervious = 331.771 ac 21.56% Impervious = 91.201 ac

Summary for Subcatchment 1.1:

Runoff = 3.79 cfs @ 12.50 hrs, Volume= 0.514 af, Depth> 2.70"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

	Area (sf)	CN	Description
*	14,020	98	New Road Impervious
*	17,500	98	New Lot Impervious
*	22,068	74	New Road Landscaped (HSG C)
*	35,000	74	New Lot Lawn HSG C
	10,779	70	Woods, Good, HSG C
	99,367	81	Weighted Average
	67,847		68.28% Pervious Area
	31,520		31.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.7	150	0.0800	0.08		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
3.9	60	0.0800	0.26		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.00"
0.7	76	0.0600	1.71		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.4	193	0.0470	7.17	28.70	**Trap/Vee/Rect Channel Flow, DE** Bot.W=1.00' D=1.00' Z= 3.0 '/' Top.W=7.00' n= 0.030 Earth, grassed & winding
35.7	479	Total			

Summary for Subcatchment 1.2:

Runoff = 5.52 cfs @ 12.34 hrs, Volume= 0.629 af, Depth> 2.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

	Area (sf)	CN	Description
*	2,557	98	New Road Impervious
*	15,000	98	New Lot Impervious
*	30,684	74	New Lanscaped Area, HSG C
	30,159	80	1/2 acre lots, 25% imp, HSG C
	65,757	70	Woods, Good, HSG C
	144,157	76	Weighted Average
	119,060		82.59% Pervious Area
	25,097		17.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	140	0.0140	0.15		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.00"
8.1	310	0.0652	0.64		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.4	110	0.0110	5.06	141.56	**Trap/Vee/Rect Channel Flow, CD** Bot.W=10.00' D=2.00' Z= 2.0 '/' Top.W=18.00' n= 0.040 Winding stream, pools & shoals
23.8	560	Total			

Summary for Subcatchment 2.1:

Runoff = 1.58 cfs @ 12.33 hrs, Volume= 0.179 af, Depth> 2.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

	Area (sf)	CN	Description
*	2,500	98	New Lot Impervious
*	5,000	74	New Landscaped Area, HSG C
	13,940	80	1/2 acre lots, 25% imp, HSG C
	19,497	70	Woods, Good, HSG C
	40,937	76	Weighted Average
	34,952		85.38% Pervious Area
	5,985		14.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	150	0.0800	0.14		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
5.8	132	0.0230	0.38		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
23.4	282	Total			

Summary for Subcatchment 2.2:

Runoff = 2.26 cfs @ 12.25 hrs, Volume= 0.228 af, Depth> 2.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

	Area (sf)	CN	Description
*	10,645	98	New Road Impervious
*	4,500	98	New Lot Impervious
*	21,459	74	New Landscaped Area, HSG C
	5,948	70	Woods, Good, HSG C
	42,552	82	Weighted Average
	27,407		64.41% Pervious Area
	15,145		35.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	50	0.0640	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
0.5	281	0.0340	9.29	130.05	**Trap/Vee/Rect Channel Flow, BC** Bot.W=1.00' D=2.00' Z= 3.0 '/' Top.W=13.00' n= 0.030 Earth, grassed & winding
9.5	127	0.0080	0.22		**Shallow Concentrated Flow, DE** Forest w/Heavy Litter Kv= 2.5 fps
18.0	458	Total			

Summary for Subcatchment 3.1:

Runoff = 11.05 cfs @ 12.68 hrs, Volume= 1.757 af, Depth> 2.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

	Area (sf)	CN	Description
*	14,680	98	Existing Impervious
*	15,500	98	New Lot Impervious
*	0	98	New Road Impervious
	163,537	70	Woods, Good, HSG C
	74,338	77	Woods, Good, HSG D
	111,026	71	Meadow, non-grazed, HSG C
	25,011	78	Meadow, non-grazed, HSG D
*	32,482	74	New Lawn, HSG C
	436,574	74	Weighted Average
	406,394		93.09% Pervious Area
	30,180		6.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.0	150	0.0134	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
11.5	200	0.0134	0.29		**Shallow Concentrated Flow, AB** Forest w/Heavy Litter Kv= 2.5 fps
0.4	300	0.0230	12.95	388.60	**Trap/Vee/Rect Channel Flow, DE** Bot.W=4.00' D=3.00' Z= 2.0 '/' Top.W=16.00' n= 0.025 Earth, clean & winding
47.9	650	Total			

Summary for Subcatchment 3.2:

Runoff = 7.31 cfs @ 12.36 hrs, Volume= 0.850 af, Depth> 2.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

	Area (sf)	CN	Description
	46,211	80	1/2 acre lots, 25% imp, HSG C
*	568	98	Existing Impervious
*	2,812	98	New Road Impervious
	52,712	70	Woods, Good, HSG C
	68,135	77	Woods, Good, HSG D
*	12,779	74	New Landscaped Area, HSG C
*	5,000	98	New Lot Impervious
	188,217	77	Weighted Average
	168,284		89.41% Pervious Area
	19,933		10.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	150	0.1000	0.16		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
9.2	195	0.0200	0.35		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
25.3	345	Total			

Summary for Subcatchment 4:

Runoff = 4.23 cfs @ 12.28 hrs, Volume= 0.448 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

Area (sf)	CN	Description
70,233	77	Woods, Good, HSG D
25,436	80	1/2 acre lots, 25% imp, HSG C
95,669	78	Weighted Average
89,310		93.35% Pervious Area
6,359		6.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0350	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	65	0.0310	0.44		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
20.2	165	Total			

Summary for Subcatchment OS1: Offsite

Runoff = 269.51 cfs @ 13.77 hrs, Volume= 81.499 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

Area (ac)	CN	Description
200.000	83	1/4 acre lots, 38% imp, HSG C
60.000	79	1 acre lots, 20% imp, HSG C
137.000	72	Woods/grass comb., Good, HSG C
397.000	79	Weighted Average
309.000		77.83% Pervious Area
88.000		22.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
67.8	150	0.0110	0.04		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
21.6	340	0.0110	0.26		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
6.2	272	0.0110	0.73		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
16.6	733	0.0110	0.73		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
23.3	7,066	0.0110	5.06	141.56	**Trap/Vee/Rect Channel Flow, EF** Bot.W=10.00' D=2.00' Z= 2.0 '/' Top.W=18.00' n= 0.040 Winding stream, pools & shoals
135.5	8,561	Total			

Summary for Subcatchment OS2: Offsite

Runoff = 4.01 cfs @ 12.23 hrs, Volume= 0.393 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

Area (sf)	CN	Description
20,802	80	1/2 acre lots, 25% imp, HSG C
63,063	78	Meadow, non-grazed, HSG D
83,865	78	Weighted Average
78,665		93.80% Pervious Area
5,201		6.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	150	0.0100	0.15		**Sheet Flow, AB** Range n= 0.130 P2= 3.00"

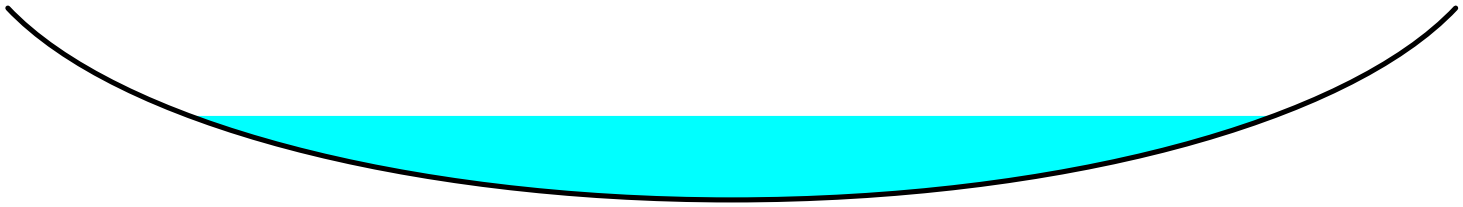
Summary for Reach R1.1:

Inflow Area = 2.281 ac, 31.72% Impervious, Inflow Depth > 2.25" for 10 Year event
Inflow = 3.70 cfs @ 12.57 hrs, Volume= 0.428 af
Outflow = 3.69 cfs @ 12.58 hrs, Volume= 0.427 af, Atten= 0%, Lag= 0.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.27 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 0.49 fps, Avg. Travel Time= 2.9 min

Peak Storage= 246 cf @ 12.58 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 22.13 cfs

30.00' x 0.50' deep Parabolic Channel, n= 0.035 High grass
Length= 85.0' Slope= 0.0118 '/'
Inlet Invert= 63.00', Outlet Invert= 62.00'



‡

Summary for Reach R1.2:

Inflow Area = 2.281 ac, 31.72% Impervious, Inflow Depth > 2.25" for 10 Year event
Inflow = 3.69 cfs @ 12.58 hrs, Volume= 0.427 af
Outflow = 3.65 cfs @ 12.63 hrs, Volume= 0.426 af, Atten= 1%, Lag= 2.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.45 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 0.48 fps, Avg. Travel Time= 10.5 min

Peak Storage= 760 cf @ 12.63 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 141.52 cfs

10.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 18.00'
Length= 302.0' Slope= 0.0110 '/'
Inlet Invert= 61.00', Outlet Invert= 57.68'

‡

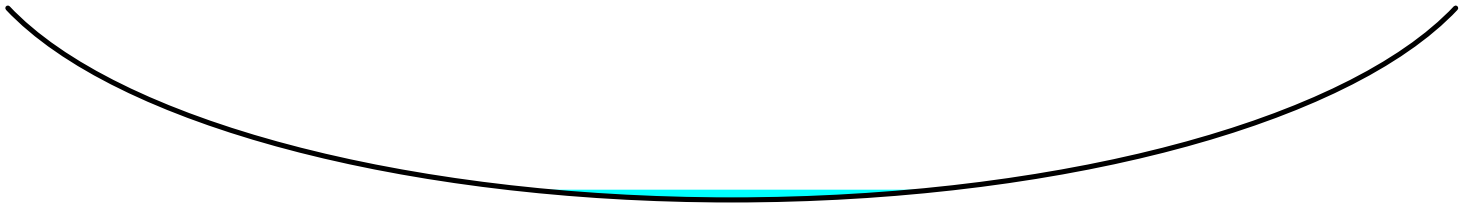
Summary for Reach R3.1: Channel

Inflow Area = 14.343 ac, 8.02% Impervious, Inflow Depth > 0.25" for 10 Year event
Inflow = 0.77 cfs @ 19.67 hrs, Volume= 0.293 af
Outflow = 0.77 cfs @ 19.69 hrs, Volume= 0.291 af, Atten= 0%, Lag= 1.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.00 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 0.92 fps, Avg. Travel Time= 2.7 min

Peak Storage= 116 cf @ 19.69 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 478.69 cfs

50.00' x 2.00' deep Parabolic Channel, n= 0.050 Scattered brush, heavy weeds
Length= 150.0' Slope= 0.0400 '/'
Inlet Invert= 63.00', Outlet Invert= 57.00'



‡

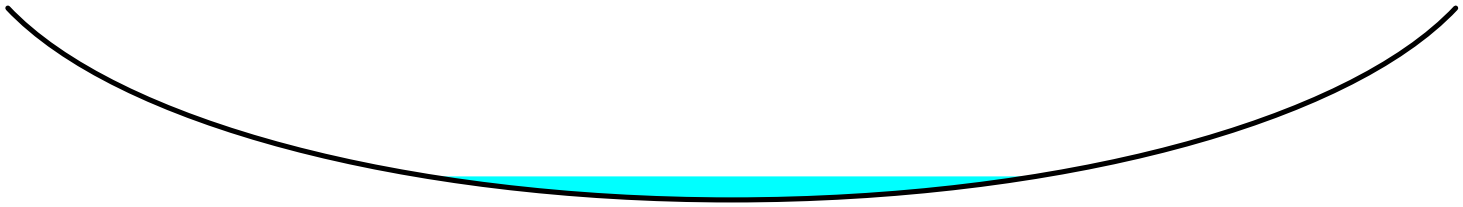
Summary for Reach R3.2: Channel

Inflow Area = 1.925 ac, 6.20% Impervious, Inflow Depth > 2.45" for 10 Year event
Inflow = 4.01 cfs @ 12.23 hrs, Volume= 0.393 af
Outflow = 3.72 cfs @ 12.30 hrs, Volume= 0.391 af, Atten= 7%, Lag= 4.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.32 fps, Min. Travel Time= 5.8 min
Avg. Velocity = 0.52 fps, Avg. Travel Time= 14.6 min

Peak Storage= 1,294 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 358.68 cfs

50.00' x 2.00' deep Parabolic Channel, n= 0.022 Earth, clean & straight
Length= 460.0' Slope= 0.0043 '/'
Inlet Invert= 59.00', Outlet Invert= 57.00'



‡

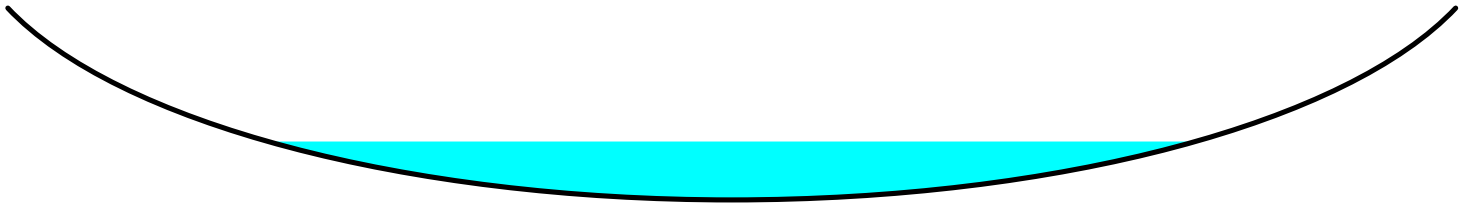
Summary for Reach R3.3: Wetland

Inflow Area = 10.022 ac, 6.91% Impervious, Inflow Depth > 2.10" for 10 Year event
Inflow = 11.01 cfs @ 12.71 hrs, Volume= 1.755 af
Outflow = 10.89 cfs @ 12.77 hrs, Volume= 1.749 af, Atten= 1%, Lag= 3.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.22 fps, Min. Travel Time= 4.9 min
Avg. Velocity = 0.58 fps, Avg. Travel Time= 10.3 min

Peak Storage= 3,181 cf @ 12.77 hrs
Average Depth at Peak Storage= 0.61'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 143.29 cfs

40.00' x 2.00' deep Parabolic Channel, n= 0.100 Very weedy reaches w/pools
Length= 356.0' Slope= 0.0225 '/'
Inlet Invert= 73.00', Outlet Invert= 65.00'



‡

Summary for Pond C2: 15" HDPE

Inflow Area = 1.917 ac, 25.31% Impervious, Inflow Depth > 2.01" for 10 Year event
Inflow = 2.29 cfs @ 12.53 hrs, Volume= 0.321 af
Outflow = 2.27 cfs @ 12.57 hrs, Volume= 0.321 af, Atten= 1%, Lag= 2.0 min
Primary = 2.27 cfs @ 12.57 hrs, Volume= 0.321 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 73.98' @ 12.57 hrs Surf.Area= 481 sf Storage= 190 cf
Flood Elev= 75.11' Surf.Area= 2,007 sf Storage= 1,372 cf

Plug-Flow detention time= 1.5 min calculated for 0.320 af (100% of inflow)
Center-of-Mass det. time= 1.1 min (874.2 - 873.1)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	1,372 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
73.00	16	14.0	0	0	16
74.00	501	134.0	202	202	1,431
75.00	2,007	244.0	1,170	1,372	4,745

Device	Routing	Invert	Outlet Devices
#1	Primary	73.11'	**15.0" Round Culvert** L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 73.11' / 72.26' S= 0.0185 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.25 cfs @ 12.57 hrs HW=73.97' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.25 cfs @ 2.49 fps)

Summary for Pond C3: 2 x 15" HDPE

Inflow Area = 1.925 ac, 6.20% Impervious, Inflow Depth > 2.45" for 10 Year event
Inflow = 4.01 cfs @ 12.23 hrs, Volume= 0.393 af
Outflow = 4.01 cfs @ 12.23 hrs, Volume= 0.393 af, Atten= 0%, Lag= 0.0 min
Primary = 4.01 cfs @ 12.23 hrs, Volume= 0.393 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 60.70' @ 12.23 hrs
Flood Elev= 61.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	59.90'	**15.0" Round Culvert X 2.00** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.90' / 59.50' S= 0.0080 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.98 cfs @ 12.23 hrs HW=60.70' TW=59.23' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.98 cfs @ 2.40 fps)

Summary for Pond C3.1: 36" Culvert

Inflow Area = 10.022 ac, 6.91% Impervious, Inflow Depth > 2.10" for 10 Year event
Inflow = 11.05 cfs @ 12.68 hrs, Volume= 1.757 af
Outflow = 11.01 cfs @ 12.71 hrs, Volume= 1.755 af, Atten= 0%, Lag= 2.0 min
Primary = 11.01 cfs @ 12.71 hrs, Volume= 1.755 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 76.75' @ 12.71 hrs Surf.Area= 1,527 sf Storage= 1,102 cf
Flood Elev= 77.50' Surf.Area= 2,715 sf Storage= 2,664 cf

Plug-Flow detention time= 1.9 min calculated for 1.752 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (874.2 - 872.8)

Volume	Invert	Avail.Storage	Storage Description
#1	74.90'	2,664 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
74.90	0	0.0	0	0	0
75.50	296	71.0	59	59	402
77.50	2,715	271.0	2,605	2,664	5,856

Device	Routing	Invert	Outlet Devices
#1	Primary	75.40'	**36.0" Round Culvert w/ 6.0" fill** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 74.90' / 73.80' S= 0.0200 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior

Primary OutFlow Max=10.99 cfs @ 12.71 hrs HW=76.75' TW=73.60' (Dynamic Tailwater)
1=Culvert (Inlet Controls 10.99 cfs @ 2.89 fps)

Summary for Pond P3: Wetland

Inflow Area = 14.343 ac, 8.02% Impervious, Inflow Depth > 2.17" for 10 Year event
Inflow = 15.00 cfs @ 12.63 hrs, Volume= 2.599 af
Outflow = 0.77 cfs @ 19.67 hrs, Volume= 0.293 af, Atten= 95%, Lag= 422.0 min
Primary = 0.77 cfs @ 19.67 hrs, Volume= 0.293 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 64.05' @ 19.67 hrs Surf.Area= 28,648 sf Storage= 100,742 cf

Plug-Flow detention time= 563.2 min calculated for 0.293 af (11% of inflow)
Center-of-Mass det. time= 402.4 min (1,271.5 - 869.1)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	115,705 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
60.00	22,018	689.0	0	0	22,018
62.00	24,835	718.0	46,825	46,825	25,557
64.00	27,769	747.0	52,577	99,401	29,241
64.50	37,697	836.0	16,303	115,705	40,460

Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.77 cfs @ 19.67 hrs HW=64.05' TW=63.10' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 0.77 cfs @ 0.54 fps)

Summary for Pond T1: USF

Inflow Area = 2.281 ac, 31.72% Impervious, Inflow Depth > 2.70" for 10 Year event
Inflow = 3.79 cfs @ 12.50 hrs, Volume= 0.514 af
Outflow = 3.70 cfs @ 12.57 hrs, Volume= 0.428 af, Atten= 2%, Lag= 4.3 min
Primary = 0.07 cfs @ 12.57 hrs, Volume= 0.068 af
Secondary = 3.63 cfs @ 12.57 hrs, Volume= 0.360 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 67.28' @ 12.57 hrs Surf.Area= 3,988 sf Storage= 4,699 cf

Plug-Flow detention time= 99.4 min calculated for 0.427 af (83% of inflow)
Center-of-Mass det. time= 33.3 min (878.2 - 844.9)

Volume	Invert	Avail.Storage	Storage Description
#1	65.50'	5,672 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
65.50	1,779	267.0	0	0	1,779
66.00	2,223	296.0	998	998	3,086
67.00	3,229	370.0	2,710	3,709	7,022
67.50	4,668	374.0	1,963	5,672	7,323

Device	Routing	Invert	Outlet Devices
#1	Primary	65.50'	**0.750 in/hr Exfiltration over Horizontal area**
#2	Secondary	67.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.07 cfs @ 12.57 hrs HW=67.27' TW=63.22' (Dynamic Tailwater)
1=Exfiltration (Exfiltration Controls 0.07 cfs)

Secondary OutFlow Max=3.61 cfs @ 12.57 hrs HW=67.27' TW=63.22' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 3.61 cfs @ 1.32 fps)

Summary for Pond T2: USF

Inflow Area = 0.977 ac, 35.59% Impervious, Inflow Depth > 2.80" for 10 Year event
Inflow = 2.26 cfs @ 12.25 hrs, Volume= 0.228 af
Outflow = 1.13 cfs @ 12.58 hrs, Volume= 0.142 af, Atten= 50%, Lag= 19.7 min
Primary = 0.03 cfs @ 12.58 hrs, Volume= 0.038 af
Secondary = 1.10 cfs @ 12.58 hrs, Volume= 0.104 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 77.66' @ 12.58 hrs Surf.Area= 3,198 sf Storage= 4,214 cf

Plug-Flow detention time= 178.7 min calculated for 0.142 af (62% of inflow)
Center-of-Mass det. time= 76.0 min (904.0 - 828.0)

Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	5,356 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
76.00	1,931	240.0	0	0	1,931
77.50	3,071	270.0	3,719	3,719	3,207
78.00	3,482	281.0	1,637	5,356	3,709

Device	Routing	Invert	Outlet Devices
#1	Primary	76.00'	**0.750 in/hr Exfiltration X 0.60 over Horizontal area**
#2	Secondary	77.50'	**7.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.03 cfs @ 12.58 hrs HW=77.66' TW=73.97' (Dynamic Tailwater)
└**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Secondary OutFlow Max=1.09 cfs @ 12.58 hrs HW=77.66' TW=73.97' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 1.09 cfs @ 0.99 fps)

Summary for Link AP1:

Inflow Area = 402.591 ac, 22.18% Impervious, Inflow Depth > 2.46" for 10 Year event
Inflow = 271.00 cfs @ 13.76 hrs, Volume= 82.553 af
Primary = 271.00 cfs @ 13.76 hrs, Volume= 82.553 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP2:

Inflow Area = 1.917 ac, 25.31% Impervious, Inflow Depth > 2.01" for 10 Year event
Inflow = 2.27 cfs @ 12.57 hrs, Volume= 0.321 af
Primary = 2.27 cfs @ 12.57 hrs, Volume= 0.321 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP3:

Inflow Area = 18.465 ac, 7.67% Impervious, Inflow Depth > 0.74" for 10 Year event
Inflow = 7.93 cfs @ 12.29 hrs, Volume= 1.131 af
Primary = 7.93 cfs @ 12.29 hrs, Volume= 1.131 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1.1: Runoff Area=99,367 sf 31.72% Impervious Runoff Depth>3.41"
Flow Length=479' Tc=35.7 min CN=81 Runoff=4.77 cfs 0.648 af

Subcatchment 1.2: Runoff Area=144,157 sf 17.41% Impervious Runoff Depth>2.94"
Flow Length=560' Tc=23.8 min CN=76 Runoff=7.15 cfs 0.811 af

Subcatchment 2.1: Runoff Area=40,937 sf 14.62% Impervious Runoff Depth>2.94"
Flow Length=282' Tc=23.4 min CN=76 Runoff=2.05 cfs 0.230 af

Subcatchment 2.2: Runoff Area=42,552 sf 35.59% Impervious Runoff Depth>3.52"
Flow Length=458' Tc=18.0 min CN=82 Runoff=2.83 cfs 0.286 af

Subcatchment 3.1: Runoff Area=436,574 sf 6.91% Impervious Runoff Depth>2.74"
Flow Length=650' Tc=47.9 min CN=74 Runoff=14.49 cfs 2.289 af

Subcatchment 3.2: Runoff Area=188,217 sf 10.59% Impervious Runoff Depth>3.03"
Flow Length=345' Tc=25.3 min CN=77 Runoff=9.40 cfs 1.092 af

Subcatchment 4: Runoff Area=95,669 sf 6.65% Impervious Runoff Depth>3.13"
Flow Length=165' Tc=20.2 min CN=78 Runoff=5.41 cfs 0.573 af

Subcatchment OS1: Offsite Runoff Area=397.000 ac 22.17% Impervious Runoff Depth>3.14"
Flow Length=8,561' Slope=0.0110 '/' Tc=135.5 min CN=79 Runoff=344.44 cfs 103.799 af

Subcatchment OS2: Offsite Runoff Area=83,865 sf 6.20% Impervious Runoff Depth>3.13"
Flow Length=150' Slope=0.0100 '/' Tc=16.5 min CN=78 Runoff=5.14 cfs 0.502 af

Reach R1.1: Avg. Flow Depth=0.24' Max Vel=1.37 fps Inflow=4.70 cfs 0.562 af
n=0.035 L=85.0' S=0.0118 '/' Capacity=22.13 cfs Outflow=4.69 cfs 0.561 af

Reach R1.2: Avg. Flow Depth=0.28' Max Vel=1.59 fps Inflow=4.69 cfs 0.561 af
n=0.040 L=302.0' S=0.0110 '/' Capacity=141.52 cfs Outflow=4.66 cfs 0.559 af

Reach R3.1: Channel Avg. Flow Depth=0.19' Max Vel=1.49 fps Inflow=2.86 cfs 1.061 af
n=0.050 L=150.0' S=0.0400 '/' Capacity=478.69 cfs Outflow=2.86 cfs 1.059 af

Reach R3.2: Channel Avg. Flow Depth=0.27' Max Vel=1.43 fps Inflow=5.14 cfs 0.502 af
n=0.022 L=460.0' S=0.0043 '/' Capacity=358.68 cfs Outflow=4.80 cfs 0.500 af

Reach R3.3: Wetland Avg. Flow Depth=0.69' Max Vel=1.32 fps Inflow=14.42 cfs 2.287 af
n=0.100 L=356.0' S=0.0225 '/' Capacity=143.29 cfs Outflow=14.29 cfs 2.279 af

Pond C2: 15" HDPE Peak Elev=74.36' Storage=452 cf Inflow=3.93 cfs 0.431 af
15.0" Round Culvert n=0.013 L=46.0' S=0.0185 '/' Outflow=3.69 cfs 0.430 af

Pond C3: 2 x 15" HDPE Peak Elev=60.84' Inflow=5.14 cfs 0.502 af
15.0" Round Culvert x 2.00 n=0.013 L=50.0' S=0.0080 '/' Outflow=5.14 cfs 0.502 af

Pond C3.1: 36" Culvert Peak Elev=77.01' Storage=1,543 cf Inflow=14.49 cfs 2.289 af
36.0" Round Culvert w/ 6.0" fill n=0.020 L=55.0' S=0.0200 '/' Outflow=14.42 cfs 2.287 af

Pond P3: Wetland Peak Elev=64.11' Storage=102,677 cf Inflow=19.60 cfs 3.370 af
Outflow=2.86 cfs 1.061 af

Pond T1: USF Peak Elev=67.32' Storage=4,890 cf Inflow=4.77 cfs 0.648 af
Primary=0.07 cfs 0.071 af Secondary=4.63 cfs 0.491 af Outflow=4.70 cfs 0.562 af

Pond T2: USF Peak Elev=77.73' Storage=4,460 cf Inflow=2.83 cfs 0.286 af
Primary=0.03 cfs 0.040 af Secondary=1.99 cfs 0.161 af Outflow=2.02 cfs 0.201 af

Link AP1: Inflow=346.30 cfs 105.168 af
Primary=346.30 cfs 105.168 af

Link AP2: Inflow=3.69 cfs 0.430 af
Primary=3.69 cfs 0.430 af

Link AP3: Inflow=10.20 cfs 2.132 af
Primary=10.20 cfs 2.132 af

Total Runoff Area = 422.972 ac Runoff Volume = 110.229 af Average Runoff Depth = 3.13"
78.44% Pervious = 331.771 ac 21.56% Impervious = 91.201 ac

Summary for Subcatchment 1.1:

Runoff = 4.77 cfs @ 12.49 hrs, Volume= 0.648 af, Depth> 3.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.50"

	Area (sf)	CN	Description
*	14,020	98	New Road Impervious
*	17,500	98	New Lot Impervious
*	22,068	74	New Road Landscaped (HSG C)
*	35,000	74	New Lot Lawn HSG C
	10,779	70	Woods, Good, HSG C
	99,367	81	Weighted Average
	67,847		68.28% Pervious Area
	31,520		31.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.7	150	0.0800	0.08		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
3.9	60	0.0800	0.26		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.00"
0.7	76	0.0600	1.71		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.4	193	0.0470	7.17	28.70	**Trap/Vee/Rect Channel Flow, DE** Bot.W=1.00' D=1.00' Z= 3.0 '/' Top.W=7.00' n= 0.030 Earth, grassed & winding
35.7	479	Total			

Summary for Subcatchment 1.2:

Runoff = 7.15 cfs @ 12.33 hrs, Volume= 0.811 af, Depth> 2.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.50"

	Area (sf)	CN	Description
*	2,557	98	New Road Impervious
*	15,000	98	New Lot Impervious
*	30,684	74	New Lanscaped Area, HSG C
	30,159	80	1/2 acre lots, 25% imp, HSG C
	65,757	70	Woods, Good, HSG C
	144,157	76	Weighted Average
	119,060		82.59% Pervious Area
	25,097		17.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	140	0.0140	0.15		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.00"
8.1	310	0.0652	0.64		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.4	110	0.0110	5.06	141.56	**Trap/Vee/Rect Channel Flow, CD** Bot.W=10.00' D=2.00' Z= 2.0 '/' Top.W=18.00' n= 0.040 Winding stream, pools & shoals
23.8	560	Total			

Summary for Subcatchment 2.1:

Runoff = 2.05 cfs @ 12.33 hrs, Volume= 0.230 af, Depth> 2.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.50"

	Area (sf)	CN	Description
*	2,500	98	New Lot Impervious
*	5,000	74	New Landscaped Area, HSG C
	13,940	80	1/2 acre lots, 25% imp, HSG C
	19,497	70	Woods, Good, HSG C
	40,937	76	Weighted Average
	34,952		85.38% Pervious Area
	5,985		14.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	150	0.0800	0.14		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
5.8	132	0.0230	0.38		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
23.4	282	Total			

Summary for Subcatchment 2.2:

Runoff = 2.83 cfs @ 12.25 hrs, Volume= 0.286 af, Depth> 3.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.50"

	Area (sf)	CN	Description
*	10,645	98	New Road Impervious
*	4,500	98	New Lot Impervious
*	21,459	74	New Landscaped Area, HSG C
	5,948	70	Woods, Good, HSG C
	42,552	82	Weighted Average
	27,407		64.41% Pervious Area
	15,145		35.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	50	0.0640	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
0.5	281	0.0340	9.29	130.05	**Trap/Vee/Rect Channel Flow, BC** Bot.W=1.00' D=2.00' Z= 3.0 '/' Top.W=13.00' n= 0.030 Earth, grassed & winding
9.5	127	0.0080	0.22		**Shallow Concentrated Flow, DE** Forest w/Heavy Litter Kv= 2.5 fps
18.0	458	Total			

Summary for Subcatchment 3.1:

Runoff = 14.49 cfs @ 12.67 hrs, Volume= 2.289 af, Depth> 2.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.50"

	Area (sf)	CN	Description
*	14,680	98	Existing Impervious
*	15,500	98	New Lot Impervious
*	0	98	New Road Impervious
	163,537	70	Woods, Good, HSG C
	74,338	77	Woods, Good, HSG D
	111,026	71	Meadow, non-grazed, HSG C
	25,011	78	Meadow, non-grazed, HSG D
*	32,482	74	New Lawn, HSG C
	436,574	74	Weighted Average
	406,394		93.09% Pervious Area
	30,180		6.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.0	150	0.0134	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
11.5	200	0.0134	0.29		**Shallow Concentrated Flow, AB** Forest w/Heavy Litter Kv= 2.5 fps
0.4	300	0.0230	12.95	388.60	**Trap/Vee/Rect Channel Flow, DE** Bot.W=4.00' D=3.00' Z= 2.0 '/' Top.W=16.00' n= 0.025 Earth, clean & winding
47.9	650	Total			

Summary for Subcatchment 3.2:

Runoff = 9.40 cfs @ 12.35 hrs, Volume= 1.092 af, Depth> 3.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.50"

	Area (sf)	CN	Description
	46,211	80	1/2 acre lots, 25% imp, HSG C
*	568	98	Existing Impervious
*	2,812	98	New Road Impervious
	52,712	70	Woods, Good, HSG C
	68,135	77	Woods, Good, HSG D
*	12,779	74	New Landscaped Area, HSG C
*	5,000	98	New Lot Impervious
	188,217	77	Weighted Average
	168,284		89.41% Pervious Area
	19,933		10.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	150	0.1000	0.16		**Sheet Flow, AB**
					Woods: Light underbrush n= 0.400 P2= 3.00"
9.2	195	0.0200	0.35		**Shallow Concentrated Flow, BC**
					Forest w/Heavy Litter Kv= 2.5 fps
25.3	345	Total			

Summary for Subcatchment 4:

Runoff = 5.41 cfs @ 12.28 hrs, Volume= 0.573 af, Depth> 3.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.50"

Area (sf)	CN	Description
70,233	77	Woods, Good, HSG D
25,436	80	1/2 acre lots, 25% imp, HSG C
95,669	78	Weighted Average
89,310		93.35% Pervious Area
6,359		6.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0350	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	65	0.0310	0.44		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
20.2	165	Total			

Summary for Subcatchment OS1: Offsite

Runoff = 344.44 cfs @ 13.74 hrs, Volume= 103.799 af, Depth> 3.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.50"

Area (ac)	CN	Description
200.000	83	1/4 acre lots, 38% imp, HSG C
60.000	79	1 acre lots, 20% imp, HSG C
137.000	72	Woods/grass comb., Good, HSG C
397.000	79	Weighted Average
309.000		77.83% Pervious Area
88.000		22.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
67.8	150	0.0110	0.04		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
21.6	340	0.0110	0.26		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
6.2	272	0.0110	0.73		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
16.6	733	0.0110	0.73		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
23.3	7,066	0.0110	5.06	141.56	**Trap/Vee/Rect Channel Flow, EF** Bot.W=10.00' D=2.00' Z= 2.0 '/' Top.W=18.00' n= 0.040 Winding stream, pools & shoals
135.5	8,561	Total			

Summary for Subcatchment OS2: Offsite

Runoff = 5.14 cfs @ 12.23 hrs, Volume= 0.502 af, Depth> 3.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.50"

Area (sf)	CN	Description
20,802	80	1/2 acre lots, 25% imp, HSG C
63,063	78	Meadow, non-grazed, HSG D
83,865	78	Weighted Average
78,665		93.80% Pervious Area
5,201		6.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	150	0.0100	0.15		**Sheet Flow, AB** Range n= 0.130 P2= 3.00"

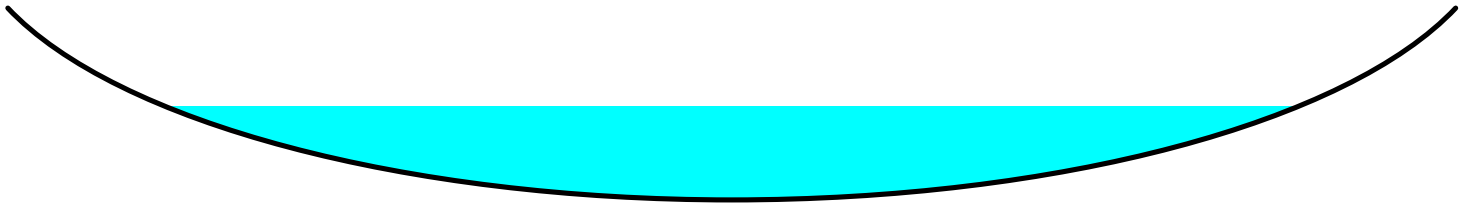
Summary for Reach R1.1:

Inflow Area = 2.281 ac, 31.72% Impervious, Inflow Depth > 2.95" for 25 Year event
Inflow = 4.70 cfs @ 12.55 hrs, Volume= 0.562 af
Outflow = 4.69 cfs @ 12.56 hrs, Volume= 0.561 af, Atten= 0%, Lag= 0.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.37 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 2.8 min

Peak Storage= 291 cf @ 12.56 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 22.13 cfs

30.00' x 0.50' deep Parabolic Channel, n= 0.035 High grass
Length= 85.0' Slope= 0.0118 '/'
Inlet Invert= 63.00', Outlet Invert= 62.00'



‡

Summary for Reach R1.2:

Inflow Area = 2.281 ac, 31.72% Impervious, Inflow Depth > 2.95" for 25 Year event
Inflow = 4.69 cfs @ 12.56 hrs, Volume= 0.561 af
Outflow = 4.66 cfs @ 12.60 hrs, Volume= 0.559 af, Atten= 1%, Lag= 2.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.59 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 9.9 min

Peak Storage= 886 cf @ 12.60 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 141.52 cfs

10.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 18.00'
Length= 302.0' Slope= 0.0110 '/'
Inlet Invert= 61.00', Outlet Invert= 57.68'

‡

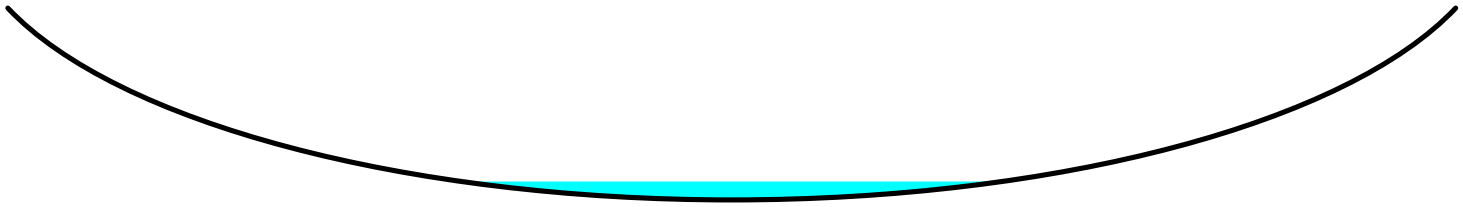
Summary for Reach R3.1: Channel

Inflow Area = 14.343 ac, 8.02% Impervious, Inflow Depth > 0.89" for 25 Year event
Inflow = 2.86 cfs @ 15.05 hrs, Volume= 1.061 af
Outflow = 2.86 cfs @ 15.07 hrs, Volume= 1.059 af, Atten= 0%, Lag= 1.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.49 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 1.14 fps, Avg. Travel Time= 2.2 min

Peak Storage= 288 cf @ 15.07 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 478.69 cfs

50.00' x 2.00' deep Parabolic Channel, n= 0.050 Scattered brush, heavy weeds
Length= 150.0' Slope= 0.0400 '/'
Inlet Invert= 63.00', Outlet Invert= 57.00'



‡

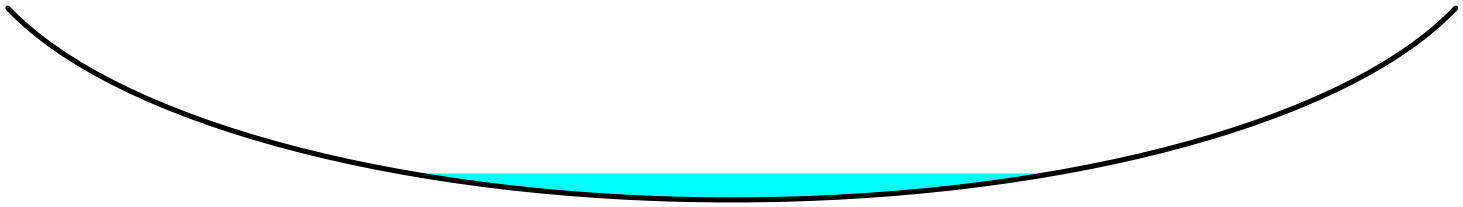
Summary for Reach R3.2: Channel

Inflow Area = 1.925 ac, 6.20% Impervious, Inflow Depth > 3.13" for 25 Year event
Inflow = 5.14 cfs @ 12.23 hrs, Volume= 0.502 af
Outflow = 4.80 cfs @ 12.30 hrs, Volume= 0.500 af, Atten= 7%, Lag= 4.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.43 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 0.55 fps, Avg. Travel Time= 13.8 min

Peak Storage= 1,544 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 358.68 cfs

50.00' x 2.00' deep Parabolic Channel, n= 0.022 Earth, clean & straight
Length= 460.0' Slope= 0.0043 '/'
Inlet Invert= 59.00', Outlet Invert= 57.00'



‡

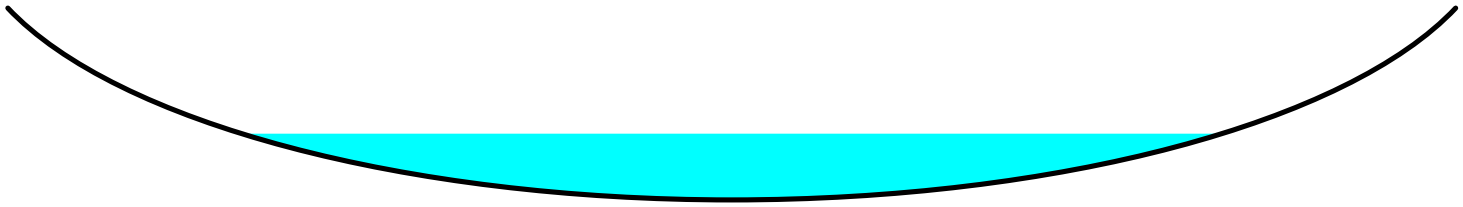
Summary for Reach R3.3: Wetland

Inflow Area = 10.022 ac, 6.91% Impervious, Inflow Depth > 2.74" for 25 Year event
Inflow = 14.42 cfs @ 12.71 hrs, Volume= 2.287 af
Outflow = 14.29 cfs @ 12.76 hrs, Volume= 2.279 af, Atten= 1%, Lag= 3.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.32 fps, Min. Travel Time= 4.5 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 9.7 min

Peak Storage= 3,840 cf @ 12.76 hrs
Average Depth at Peak Storage= 0.69'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 143.29 cfs

40.00' x 2.00' deep Parabolic Channel, n= 0.100 Very weedy reaches w/pools
Length= 356.0' Slope= 0.0225 '/'
Inlet Invert= 73.00', Outlet Invert= 65.00'



‡

Summary for Pond C2: 15" HDPE

Inflow Area = 1.917 ac, 25.31% Impervious, Inflow Depth > 2.70" for 25 Year event
Inflow = 3.93 cfs @ 12.41 hrs, Volume= 0.431 af
Outflow = 3.69 cfs @ 12.48 hrs, Volume= 0.430 af, Atten= 6%, Lag= 4.0 min
Primary = 3.69 cfs @ 12.48 hrs, Volume= 0.430 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 74.36' @ 12.48 hrs Surf.Area= 923 sf Storage= 452 cf
Flood Elev= 75.11' Surf.Area= 2,007 sf Storage= 1,372 cf

Plug-Flow detention time= 1.6 min calculated for 0.430 af (100% of inflow)
Center-of-Mass det. time= 1.2 min (860.5 - 859.3)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	1,372 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
73.00	16	14.0	0	0	16
74.00	501	134.0	202	202	1,431
75.00	2,007	244.0	1,170	1,372	4,745

Device	Routing	Invert	Outlet Devices
#1	Primary	73.11'	**15.0" Round Culvert** L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 73.11' / 72.26' S= 0.0185 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.67 cfs @ 12.48 hrs HW=74.35' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.67 cfs @ 2.99 fps)

Summary for Pond C3: 2 x 15" HDPE

Inflow Area = 1.925 ac, 6.20% Impervious, Inflow Depth > 3.13" for 25 Year event
Inflow = 5.14 cfs @ 12.23 hrs, Volume= 0.502 af
Outflow = 5.14 cfs @ 12.23 hrs, Volume= 0.502 af, Atten= 0%, Lag= 0.0 min
Primary = 5.14 cfs @ 12.23 hrs, Volume= 0.502 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 60.84' @ 12.23 hrs
Flood Elev= 61.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	59.90'	**15.0" Round Culvert X 2.00** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.90' / 59.50' S= 0.0080 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=5.09 cfs @ 12.23 hrs HW=60.83' TW=59.26' (Dynamic Tailwater)
1=Culvert (Inlet Controls 5.09 cfs @ 2.59 fps)

Summary for Pond C3.1: 36" Culvert

Inflow Area = 10.022 ac, 6.91% Impervious, Inflow Depth > 2.74" for 25 Year event
Inflow = 14.49 cfs @ 12.67 hrs, Volume= 2.289 af
Outflow = 14.42 cfs @ 12.71 hrs, Volume= 2.287 af, Atten= 0%, Lag= 2.3 min
Primary = 14.42 cfs @ 12.71 hrs, Volume= 2.287 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 77.01' @ 12.71 hrs Surf.Area= 1,899 sf Storage= 1,543 cf
Flood Elev= 77.50' Surf.Area= 2,715 sf Storage= 2,664 cf

Plug-Flow detention time= 1.9 min calculated for 2.282 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (866.8 - 865.4)

Volume	Invert	Avail.Storage	Storage Description
#1	74.90'	2,664 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
74.90	0	0.0	0	0	0
75.50	296	71.0	59	59	402
77.50	2,715	271.0	2,605	2,664	5,856

Device	Routing	Invert	Outlet Devices
#1	Primary	75.40'	**36.0" Round Culvert w/ 6.0" fill** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 74.90' / 73.80' S= 0.0200 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior

Primary OutFlow Max=14.41 cfs @ 12.71 hrs HW=77.01' TW=73.69' (Dynamic Tailwater)
1=Culvert (Inlet Controls 14.41 cfs @ 3.17 fps)

Summary for Pond P3: Wetland

Inflow Area = 14.343 ac, 8.02% Impervious, Inflow Depth > 2.82" for 25 Year event
Inflow = 19.60 cfs @ 12.62 hrs, Volume= 3.370 af
Outflow = 2.86 cfs @ 15.05 hrs, Volume= 1.061 af, Atten= 85%, Lag= 145.8 min
Primary = 2.86 cfs @ 15.05 hrs, Volume= 1.061 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 64.11' @ 15.05 hrs Surf.Area= 29,892 sf Storage= 102,677 cf

Plug-Flow detention time= 348.3 min calculated for 1.059 af (31% of inflow)
Center-of-Mass det. time= 216.9 min (1,078.6 - 861.7)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	115,705 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
60.00	22,018	689.0	0	0	22,018
62.00	24,835	718.0	46,825	46,825	25,557
64.00	27,769	747.0	52,577	99,401	29,241
64.50	37,697	836.0	16,303	115,705	40,460

Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=2.86 cfs @ 15.05 hrs HW=64.11' TW=63.19' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 2.86 cfs @ 0.84 fps)

Summary for Pond T1: USF

Inflow Area = 2.281 ac, 31.72% Impervious, Inflow Depth > 3.41" for 25 Year event
Inflow = 4.77 cfs @ 12.49 hrs, Volume= 0.648 af
Outflow = 4.70 cfs @ 12.55 hrs, Volume= 0.562 af, Atten= 2%, Lag= 3.3 min
Primary = 0.07 cfs @ 12.55 hrs, Volume= 0.071 af
Secondary = 4.63 cfs @ 12.55 hrs, Volume= 0.491 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 67.32' @ 12.55 hrs Surf.Area= 4,125 sf Storage= 4,890 cf

Plug-Flow detention time= 85.8 min calculated for 0.562 af (87% of inflow)
Center-of-Mass det. time= 28.5 min (867.0 - 838.4)

Volume	Invert	Avail.Storage	Storage Description
#1	65.50'	5,672 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
65.50	1,779	267.0	0	0	1,779
66.00	2,223	296.0	998	998	3,086
67.00	3,229	370.0	2,710	3,709	7,022
67.50	4,668	374.0	1,963	5,672	7,323

Device	Routing	Invert	Outlet Devices
#1	Primary	65.50'	**0.750 in/hr Exfiltration over Horizontal area**
#2	Secondary	67.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.07 cfs @ 12.55 hrs HW=67.32' TW=63.24' (Dynamic Tailwater)
1=Exfiltration (Exfiltration Controls 0.07 cfs)

Secondary OutFlow Max=4.62 cfs @ 12.55 hrs HW=67.32' TW=63.24' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 4.62 cfs @ 1.44 fps)

Summary for Pond T2: USF

Inflow Area = 0.977 ac, 35.59% Impervious, Inflow Depth > 3.52" for 25 Year event
Inflow = 2.83 cfs @ 12.25 hrs, Volume= 0.286 af
Outflow = 2.02 cfs @ 12.44 hrs, Volume= 0.201 af, Atten= 29%, Lag= 11.5 min
Primary = 0.03 cfs @ 12.44 hrs, Volume= 0.040 af
Secondary = 1.99 cfs @ 12.44 hrs, Volume= 0.161 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 77.73' @ 12.44 hrs Surf.Area= 3,260 sf Storage= 4,460 cf

Plug-Flow detention time= 150.2 min calculated for 0.200 af (70% of inflow)
Center-of-Mass det. time= 58.5 min (880.1 - 821.6)

Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	5,356 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
76.00	1,931	240.0	0	0	1,931
77.50	3,071	270.0	3,719	3,719	3,207
78.00	3,482	281.0	1,637	5,356	3,709

Device	Routing	Invert	Outlet Devices
#1	Primary	76.00'	**0.750 in/hr Exfiltration X 0.60 over Horizontal area**
#2	Secondary	77.50'	**7.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.03 cfs @ 12.44 hrs HW=77.73' TW=74.33' (Dynamic Tailwater)
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Secondary OutFlow Max=1.97 cfs @ 12.44 hrs HW=77.73' TW=74.33' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 1.97 cfs @ 1.21 fps)

Summary for Link AP1:

Inflow Area = 402.591 ac, 22.18% Impervious, Inflow Depth > 3.13" for 25 Year event
Inflow = 346.30 cfs @ 13.73 hrs, Volume= 105.168 af
Primary = 346.30 cfs @ 13.73 hrs, Volume= 105.168 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP2:

Inflow Area = 1.917 ac, 25.31% Impervious, Inflow Depth > 2.70" for 25 Year event
Inflow = 3.69 cfs @ 12.48 hrs, Volume= 0.430 af
Primary = 3.69 cfs @ 12.48 hrs, Volume= 0.430 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP3:

Inflow Area = 18.465 ac, 7.67% Impervious, Inflow Depth > 1.39" for 25 Year event
Inflow = 10.20 cfs @ 12.29 hrs, Volume= 2.132 af
Primary = 10.20 cfs @ 12.29 hrs, Volume= 2.132 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1.1: Runoff Area=99,367 sf 31.72% Impervious Runoff Depth>4.50"
Flow Length=479' Tc=35.7 min CN=81 Runoff=6.26 cfs 0.855 af

Subcatchment 1.2: Runoff Area=144,157 sf 17.41% Impervious Runoff Depth>3.97"
Flow Length=560' Tc=23.8 min CN=76 Runoff=9.67 cfs 1.096 af

Subcatchment 2.1: Runoff Area=40,937 sf 14.62% Impervious Runoff Depth>3.97"
Flow Length=282' Tc=23.4 min CN=76 Runoff=2.77 cfs 0.311 af

Subcatchment 2.2: Runoff Area=42,552 sf 35.59% Impervious Runoff Depth>4.62"
Flow Length=458' Tc=18.0 min CN=82 Runoff=3.69 cfs 0.376 af

Subcatchment 3.1: Runoff Area=436,574 sf 6.91% Impervious Runoff Depth>3.74"
Flow Length=650' Tc=47.9 min CN=74 Runoff=19.86 cfs 3.127 af

Subcatchment 3.2: Runoff Area=188,217 sf 10.59% Impervious Runoff Depth>4.08"
Flow Length=345' Tc=25.3 min CN=77 Runoff=12.63 cfs 1.468 af

Subcatchment 4: Runoff Area=95,669 sf 6.65% Impervious Runoff Depth>4.19"
Flow Length=165' Tc=20.2 min CN=78 Runoff=7.22 cfs 0.767 af

Subcatchment OS1: Offsite Runoff Area=397.000 ac 22.17% Impervious Runoff Depth>4.19"
Flow Length=8,561' Slope=0.0110 '/' Tc=135.5 min CN=79 Runoff=460.24 cfs 138.473 af

Subcatchment OS2: Offsite Runoff Area=83,865 sf 6.20% Impervious Runoff Depth>4.19"
Flow Length=150' Slope=0.0100 '/' Tc=16.5 min CN=78 Runoff=6.86 cfs 0.672 af

Reach R1.1: Avg. Flow Depth=0.28' Max Vel=1.49 fps Inflow=6.18 cfs 0.768 af
n=0.035 L=85.0' S=0.0118 '/' Capacity=22.13 cfs Outflow=6.17 cfs 0.768 af

Reach R1.2: Avg. Flow Depth=0.33' Max Vel=1.76 fps Inflow=6.17 cfs 0.768 af
n=0.040 L=302.0' S=0.0110 '/' Capacity=141.52 cfs Outflow=6.14 cfs 0.765 af

Reach R3.1: Channel Avg. Flow Depth=0.34' Max Vel=2.22 fps Inflow=10.47 cfs 2.271 af
n=0.050 L=150.0' S=0.0400 '/' Capacity=478.69 cfs Outflow=10.46 cfs 2.268 af

Reach R3.2: Channel Avg. Flow Depth=0.31' Max Vel=1.57 fps Inflow=6.86 cfs 0.672 af
n=0.022 L=460.0' S=0.0043 '/' Capacity=358.68 cfs Outflow=6.47 cfs 0.670 af

Reach R3.3: Wetland Avg. Flow Depth=0.80' Max Vel=1.46 fps Inflow=19.72 cfs 3.125 af
n=0.100 L=356.0' S=0.0225 '/' Capacity=143.29 cfs Outflow=19.57 cfs 3.116 af

Pond C2: 15" HDPE Peak Elev=74.95' Storage=1,272 cf Inflow=6.06 cfs 0.601 af
15.0" Round Culvert n=0.013 L=46.0' S=0.0185 '/' Outflow=5.14 cfs 0.601 af

Pond C3: 2 x 15" HDPE Peak Elev=61.06' Inflow=6.86 cfs 0.672 af
15.0" Round Culvert x 2.00 n=0.013 L=50.0' S=0.0080 '/' Outflow=6.86 cfs 0.672 af

Pond C3.1: 36" Culvert Peak Elev=77.39' Storage=2,371 cf Inflow=19.86 cfs 3.127 af
36.0" Round Culvert w/ 6.0" fill n=0.020 L=55.0' S=0.0200 '/' Outflow=19.72 cfs 3.125 af

Pond P3: Wetland Peak Elev=64.27' Storage=107,524 cf Inflow=26.67 cfs 4.584 af
Outflow=10.47 cfs 2.271 af

Pond T1: USF Peak Elev=67.38' Storage=5,156 cf Inflow=6.26 cfs 0.855 af
Primary=0.07 cfs 0.075 af Secondary=6.10 cfs 0.693 af Outflow=6.18 cfs 0.768 af

Pond T2: USF Peak Elev=77.82' Storage=4,755 cf Inflow=3.69 cfs 0.376 af
Primary=0.03 cfs 0.042 af Secondary=3.27 cfs 0.248 af Outflow=3.30 cfs 0.290 af

Link AP1: Inflow=462.64 cfs 140.334 af
Primary=462.64 cfs 140.334 af

Link AP2: Inflow=5.14 cfs 0.601 af
Primary=5.14 cfs 0.601 af

Link AP3: Inflow=13.69 cfs 3.704 af
Primary=13.69 cfs 3.704 af

Total Runoff Area = 422.972 ac Runoff Volume = 147.146 af Average Runoff Depth = 4.17"
78.44% Pervious = 331.771 ac 21.56% Impervious = 91.201 ac

Summary for Subcatchment 1.1:

Runoff = 6.26 cfs @ 12.49 hrs, Volume= 0.855 af, Depth> 4.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.70"

	Area (sf)	CN	Description
*	14,020	98	New Road Impervious
*	17,500	98	New Lot Impervious
*	22,068	74	New Road Landscaped (HSG C)
*	35,000	74	New Lot Lawn HSG C
	10,779	70	Woods, Good, HSG C
	99,367	81	Weighted Average
	67,847		68.28% Pervious Area
	31,520		31.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.7	150	0.0800	0.08		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
3.9	60	0.0800	0.26		**Sheet Flow, BC** Grass: Short n= 0.150 P2= 3.00"
0.7	76	0.0600	1.71		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.4	193	0.0470	7.17	28.70	**Trap/Vee/Rect Channel Flow, DE** Bot.W=1.00' D=1.00' Z= 3.0 '/' Top.W=7.00' n= 0.030 Earth, grassed & winding
35.7	479	Total			

Summary for Subcatchment 1.2:

Runoff = 9.67 cfs @ 12.33 hrs, Volume= 1.096 af, Depth> 3.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.70"

	Area (sf)	CN	Description
*	2,557	98	New Road Impervious
*	15,000	98	New Lot Impervious
*	30,684	74	New Lanscaped Area, HSG C
	30,159	80	1/2 acre lots, 25% imp, HSG C
	65,757	70	Woods, Good, HSG C
	144,157	76	Weighted Average
	119,060		82.59% Pervious Area
	25,097		17.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	140	0.0140	0.15		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 3.00"
8.1	310	0.0652	0.64		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
0.4	110	0.0110	5.06	141.56	**Trap/Vee/Rect Channel Flow, CD** Bot.W=10.00' D=2.00' Z= 2.0 '/' Top.W=18.00' n= 0.040 Winding stream, pools & shoals
23.8	560	Total			

Summary for Subcatchment 2.1:

Runoff = 2.77 cfs @ 12.32 hrs, Volume= 0.311 af, Depth> 3.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.70"

	Area (sf)	CN	Description
*	2,500	98	New Lot Impervious
*	5,000	74	New Landscaped Area, HSG C
	13,940	80	1/2 acre lots, 25% imp, HSG C
	19,497	70	Woods, Good, HSG C
	40,937	76	Weighted Average
	34,952		85.38% Pervious Area
	5,985		14.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	150	0.0800	0.14		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
5.8	132	0.0230	0.38		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
23.4	282	Total			

Summary for Subcatchment 2.2:

Runoff = 3.69 cfs @ 12.24 hrs, Volume= 0.376 af, Depth> 4.62"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.70"

	Area (sf)	CN	Description
*	10,645	98	New Road Impervious
*	4,500	98	New Lot Impervious
*	21,459	74	New Landscaped Area, HSG C
	5,948	70	Woods, Good, HSG C
	42,552	82	Weighted Average
	27,407		64.41% Pervious Area
	15,145		35.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	50	0.0640	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
0.5	281	0.0340	9.29	130.05	**Trap/Vee/Rect Channel Flow, BC** Bot.W=1.00' D=2.00' Z= 3.0 '/' Top.W=13.00' n= 0.030 Earth, grassed & winding
9.5	127	0.0080	0.22		**Shallow Concentrated Flow, DE** Forest w/Heavy Litter Kv= 2.5 fps
18.0	458	Total			

Summary for Subcatchment 3.1:

Runoff = 19.86 cfs @ 12.66 hrs, Volume= 3.127 af, Depth> 3.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.70"

	Area (sf)	CN	Description
*	14,680	98	Existing Impervious
*	15,500	98	New Lot Impervious
*	0	98	New Road Impervious
	163,537	70	Woods, Good, HSG C
	74,338	77	Woods, Good, HSG D
	111,026	71	Meadow, non-grazed, HSG C
	25,011	78	Meadow, non-grazed, HSG D
*	32,482	74	New Lawn, HSG C
	436,574	74	Weighted Average
	406,394		93.09% Pervious Area
	30,180		6.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.0	150	0.0134	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
11.5	200	0.0134	0.29		**Shallow Concentrated Flow, AB** Forest w/Heavy Litter Kv= 2.5 fps
0.4	300	0.0230	12.95	388.60	**Trap/Vee/Rect Channel Flow, DE** Bot.W=4.00' D=3.00' Z= 2.0 '/' Top.W=16.00' n= 0.025 Earth, clean & winding
47.9	650	Total			

Summary for Subcatchment 3.2:

Runoff = 12.63 cfs @ 12.35 hrs, Volume= 1.468 af, Depth> 4.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.70"

	Area (sf)	CN	Description
	46,211	80	1/2 acre lots, 25% imp, HSG C
*	568	98	Existing Impervious
*	2,812	98	New Road Impervious
	52,712	70	Woods, Good, HSG C
	68,135	77	Woods, Good, HSG D
*	12,779	74	New Landscaped Area, HSG C
*	5,000	98	New Lot Impervious
	188,217	77	Weighted Average
	168,284		89.41% Pervious Area
	19,933		10.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	150	0.1000	0.16		**Sheet Flow, AB**
					Woods: Light underbrush n= 0.400 P2= 3.00"
9.2	195	0.0200	0.35		**Shallow Concentrated Flow, BC**
					Forest w/Heavy Litter Kv= 2.5 fps
25.3	345	Total			

Summary for Subcatchment 4:

Runoff = 7.22 cfs @ 12.28 hrs, Volume= 0.767 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.70"

Area (sf)	CN	Description
70,233	77	Woods, Good, HSG D
25,436	80	1/2 acre lots, 25% imp, HSG C
95,669	78	Weighted Average
89,310		93.35% Pervious Area
6,359		6.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0350	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	65	0.0310	0.44		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
20.2	165	Total			

Summary for Subcatchment OS1: Offsite

Runoff = 460.24 cfs @ 13.72 hrs, Volume= 138.473 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.70"

Area (ac)	CN	Description
200.000	83	1/4 acre lots, 38% imp, HSG C
60.000	79	1 acre lots, 20% imp, HSG C
137.000	72	Woods/grass comb., Good, HSG C
397.000	79	Weighted Average
309.000		77.83% Pervious Area
88.000		22.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
67.8	150	0.0110	0.04		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.00"
21.6	340	0.0110	0.26		**Shallow Concentrated Flow, BC** Forest w/Heavy Litter Kv= 2.5 fps
6.2	272	0.0110	0.73		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
16.6	733	0.0110	0.73		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
23.3	7,066	0.0110	5.06	141.56	**Trap/Vee/Rect Channel Flow, EF** Bot.W=10.00' D=2.00' Z= 2.0 '/' Top.W=18.00' n= 0.040 Winding stream, pools & shoals
135.5	8,561	Total			

Summary for Subcatchment OS2: Offsite

Runoff = 6.86 cfs @ 12.23 hrs, Volume= 0.672 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.70"

Area (sf)	CN	Description
20,802	80	1/2 acre lots, 25% imp, HSG C
63,063	78	Meadow, non-grazed, HSG D
83,865	78	Weighted Average
78,665		93.80% Pervious Area
5,201		6.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	150	0.0100	0.15		**Sheet Flow, AB** Range n= 0.130 P2= 3.00"

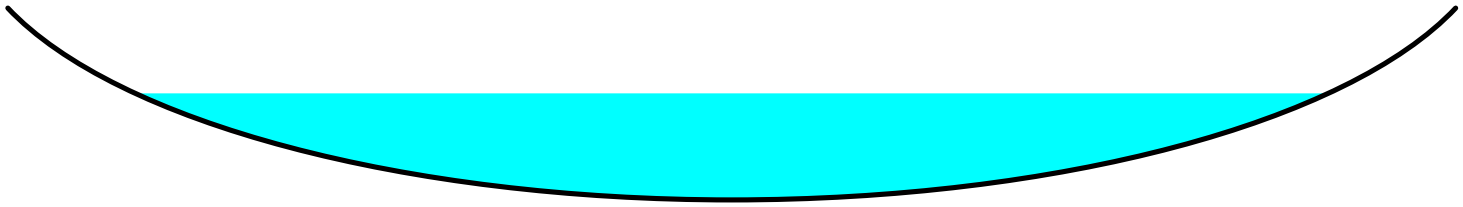
Summary for Reach R1.1:

Inflow Area = 2.281 ac, 31.72% Impervious, Inflow Depth > 4.04" for 100 Year event
Inflow = 6.18 cfs @ 12.54 hrs, Volume= 0.768 af
Outflow = 6.17 cfs @ 12.55 hrs, Volume= 0.768 af, Atten= 0%, Lag= 0.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.49 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.55 fps, Avg. Travel Time= 2.6 min

Peak Storage= 351 cf @ 12.55 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 22.13 cfs

30.00' x 0.50' deep Parabolic Channel, n= 0.035 High grass
Length= 85.0' Slope= 0.0118 '/'
Inlet Invert= 63.00', Outlet Invert= 62.00'



‡

Summary for Reach R1.2:

Inflow Area = 2.281 ac, 31.72% Impervious, Inflow Depth > 4.04" for 100 Year event
Inflow = 6.17 cfs @ 12.55 hrs, Volume= 0.768 af
Outflow = 6.14 cfs @ 12.58 hrs, Volume= 0.765 af, Atten= 0%, Lag= 1.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.76 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 0.55 fps, Avg. Travel Time= 9.2 min

Peak Storage= 1,053 cf @ 12.58 hrs
Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 141.52 cfs

10.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 18.00'
Length= 302.0' Slope= 0.0110 '/'
Inlet Invert= 61.00', Outlet Invert= 57.68'

‡

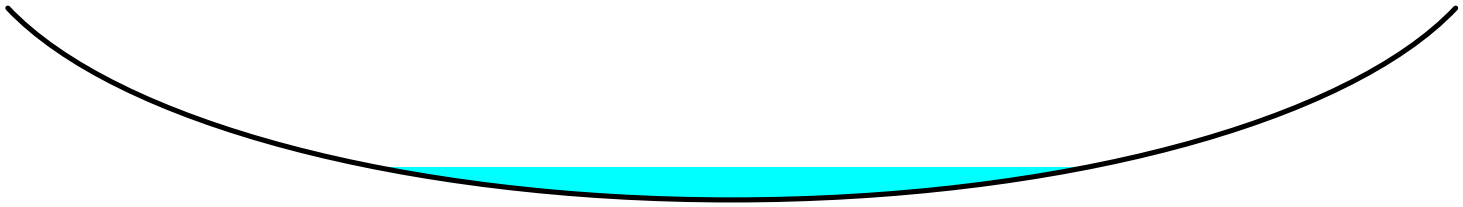
Summary for Reach R3.1: Channel

Inflow Area = 14.343 ac, 8.02% Impervious, Inflow Depth > 1.90" for 100 Year event
Inflow = 10.47 cfs @ 13.43 hrs, Volume= 2.271 af
Outflow = 10.46 cfs @ 13.44 hrs, Volume= 2.268 af, Atten= 0%, Lag= 1.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.22 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.34 fps, Avg. Travel Time= 1.9 min

Peak Storage= 708 cf @ 13.44 hrs
Average Depth at Peak Storage= 0.34'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 478.69 cfs

50.00' x 2.00' deep Parabolic Channel, n= 0.050 Scattered brush, heavy weeds
Length= 150.0' Slope= 0.0400 '/'
Inlet Invert= 63.00', Outlet Invert= 57.00'



‡

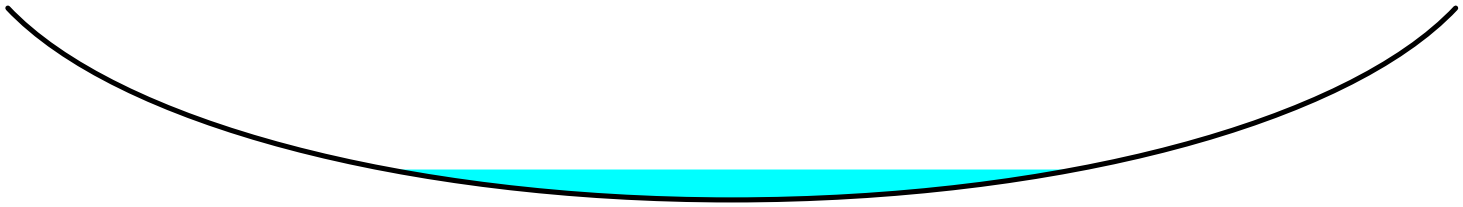
Summary for Reach R3.2: Channel

Inflow Area = 1.925 ac, 6.20% Impervious, Inflow Depth > 4.19" for 100 Year event
Inflow = 6.86 cfs @ 12.23 hrs, Volume= 0.672 af
Outflow = 6.47 cfs @ 12.29 hrs, Volume= 0.670 af, Atten= 6%, Lag= 3.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.57 fps, Min. Travel Time= 4.9 min
Avg. Velocity = 0.59 fps, Avg. Travel Time= 13.0 min

Peak Storage= 1,899 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 358.68 cfs

50.00' x 2.00' deep Parabolic Channel, n= 0.022 Earth, clean & straight
Length= 460.0' Slope= 0.0043 '/'
Inlet Invert= 59.00', Outlet Invert= 57.00'



‡

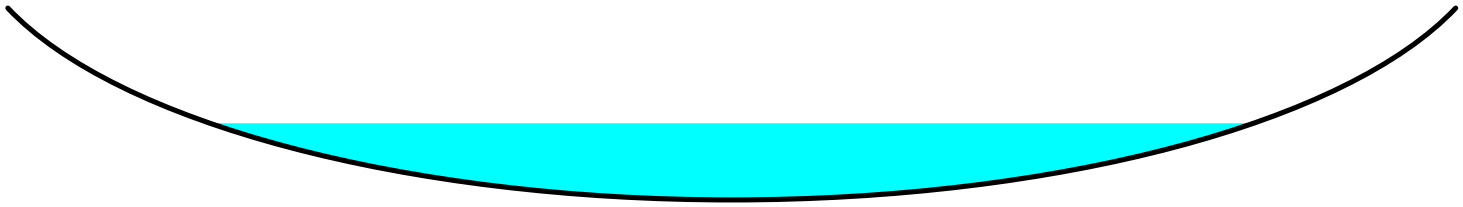
Summary for Reach R3.3: Wetland

Inflow Area = 10.022 ac, 6.91% Impervious, Inflow Depth > 3.74" for 100 Year event
Inflow = 19.72 cfs @ 12.71 hrs, Volume= 3.125 af
Outflow = 19.57 cfs @ 12.76 hrs, Volume= 3.116 af, Atten= 1%, Lag= 2.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.46 fps, Min. Travel Time= 4.1 min
Avg. Velocity = 0.66 fps, Avg. Travel Time= 9.0 min

Peak Storage= 4,776 cf @ 12.76 hrs
Average Depth at Peak Storage= 0.80'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 143.29 cfs

40.00' x 2.00' deep Parabolic Channel, n= 0.100 Very weedy reaches w/pools
Length= 356.0' Slope= 0.0225 '/'
Inlet Invert= 73.00', Outlet Invert= 65.00'



‡

Summary for Pond C2: 15" HDPE

Inflow Area = 1.917 ac, 25.31% Impervious, Inflow Depth > 3.76" for 100 Year event
Inflow = 6.06 cfs @ 12.33 hrs, Volume= 0.601 af
Outflow = 5.14 cfs @ 12.46 hrs, Volume= 0.601 af, Atten= 15%, Lag= 7.9 min
Primary = 5.14 cfs @ 12.46 hrs, Volume= 0.601 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 74.95' @ 12.46 hrs Surf.Area= 1,906 sf Storage= 1,272 cf
Flood Elev= 75.11' Surf.Area= 2,007 sf Storage= 1,372 cf

Plug-Flow detention time= 2.1 min calculated for 0.601 af (100% of inflow)
Center-of-Mass det. time= 1.8 min (847.7 - 845.9)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	1,372 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
73.00	16	14.0	0	0	16
74.00	501	134.0	202	202	1,431
75.00	2,007	244.0	1,170	1,372	4,745

Device	Routing	Invert	Outlet Devices
#1	Primary	73.11'	**15.0" Round Culvert** L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 73.11' / 72.26' S= 0.0185 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=5.13 cfs @ 12.46 hrs HW=74.94' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 5.13 cfs @ 4.18 fps)

Summary for Pond C3: 2 x 15" HDPE

Inflow Area = 1.925 ac, 6.20% Impervious, Inflow Depth > 4.19" for 100 Year event
Inflow = 6.86 cfs @ 12.23 hrs, Volume= 0.672 af
Outflow = 6.86 cfs @ 12.23 hrs, Volume= 0.672 af, Atten= 0%, Lag= 0.0 min
Primary = 6.86 cfs @ 12.23 hrs, Volume= 0.672 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 61.06' @ 12.23 hrs
Flood Elev= 61.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	59.90'	**15.0" Round Culvert X 2.00** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.90' / 59.50' S= 0.0080 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=6.79 cfs @ 12.23 hrs HW=61.05' TW=59.30' (Dynamic Tailwater)
1=Culvert (Inlet Controls 6.79 cfs @ 2.88 fps)

Summary for Pond C3.1: 36" Culvert

Inflow Area = 10.022 ac, 6.91% Impervious, Inflow Depth > 3.74" for 100 Year event
Inflow = 19.86 cfs @ 12.66 hrs, Volume= 3.127 af
Outflow = 19.72 cfs @ 12.71 hrs, Volume= 3.125 af, Atten= 1%, Lag= 2.9 min
Primary = 19.72 cfs @ 12.71 hrs, Volume= 3.125 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 77.39' @ 12.71 hrs Surf.Area= 2,515 sf Storage= 2,371 cf
Flood Elev= 77.50' Surf.Area= 2,715 sf Storage= 2,664 cf

Plug-Flow detention time= 1.9 min calculated for 3.125 af (100% of inflow)
Center-of-Mass det. time= 1.5 min (858.2 - 856.7)

Volume	Invert	Avail.Storage	Storage Description
#1	74.90'	2,664 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
74.90	0	0.0	0	0	0
75.50	296	71.0	59	59	402
77.50	2,715	271.0	2,605	2,664	5,856

Device	Routing	Invert	Outlet Devices
#1	Primary	75.40'	**36.0" Round Culvert w/ 6.0" fill** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 74.90' / 73.80' S= 0.0200 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior

Primary OutFlow Max=19.70 cfs @ 12.71 hrs HW=77.39' TW=73.79' (Dynamic Tailwater)
1=Culvert (Inlet Controls 19.70 cfs @ 3.59 fps)

Summary for Pond P3: Wetland

Inflow Area = 14.343 ac, 8.02% Impervious, Inflow Depth > 3.84" for 100 Year event
Inflow = 26.67 cfs @ 12.61 hrs, Volume= 4.584 af
Outflow = 10.47 cfs @ 13.43 hrs, Volume= 2.271 af, Atten= 61%, Lag= 48.9 min
Primary = 10.47 cfs @ 13.43 hrs, Volume= 2.271 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 64.27' @ 13.43 hrs Surf.Area= 32,903 sf Storage= 107,524 cf

Plug-Flow detention time= 238.0 min calculated for 2.266 af (49% of inflow)
Center-of-Mass det. time= 125.0 min (978.1 - 853.1)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	115,705 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
60.00	22,018	689.0	0	0	22,018
62.00	24,835	718.0	46,825	46,825	25,557
64.00	27,769	747.0	52,577	99,401	29,241
64.50	37,697	836.0	16,303	115,705	40,460

Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=10.44 cfs @ 13.43 hrs HW=64.27' TW=63.34' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 10.44 cfs @ 1.30 fps)

Summary for Pond T1: USF

Inflow Area = 2.281 ac, 31.72% Impervious, Inflow Depth > 4.50" for 100 Year event
Inflow = 6.26 cfs @ 12.49 hrs, Volume= 0.855 af
Outflow = 6.18 cfs @ 12.54 hrs, Volume= 0.768 af, Atten= 1%, Lag= 3.0 min
Primary = 0.07 cfs @ 12.54 hrs, Volume= 0.075 af
Secondary = 6.10 cfs @ 12.54 hrs, Volume= 0.693 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 67.38' @ 12.54 hrs Surf.Area= 4,313 sf Storage= 5,156 cf

Plug-Flow detention time= 71.4 min calculated for 0.767 af (90% of inflow)
Center-of-Mass det. time= 24.9 min (855.6 - 830.7)

Volume	Invert	Avail.Storage	Storage Description
#1	65.50'	5,672 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
65.50	1,779	267.0	0	0	1,779
66.00	2,223	296.0	998	998	3,086
67.00	3,229	370.0	2,710	3,709	7,022
67.50	4,668	374.0	1,963	5,672	7,323

Device	Routing	Invert	Outlet Devices
#1	Primary	65.50'	**0.750 in/hr Exfiltration over Horizontal area**
#2	Secondary	67.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.07 cfs @ 12.54 hrs HW=67.38' TW=63.28' (Dynamic Tailwater)
1=Exfiltration (Exfiltration Controls 0.07 cfs)

Secondary OutFlow Max=6.09 cfs @ 12.54 hrs HW=67.38' TW=63.28' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 6.09 cfs @ 1.58 fps)

Summary for Pond T2: USF

Inflow Area = 0.977 ac, 35.59% Impervious, Inflow Depth > 4.62" for 100 Year event
Inflow = 3.69 cfs @ 12.24 hrs, Volume= 0.376 af
Outflow = 3.30 cfs @ 12.34 hrs, Volume= 0.290 af, Atten= 10%, Lag= 5.6 min
Primary = 0.03 cfs @ 12.34 hrs, Volume= 0.042 af
Secondary = 3.27 cfs @ 12.34 hrs, Volume= 0.248 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 77.82' @ 12.34 hrs Surf.Area= 3,334 sf Storage= 4,755 cf

Plug-Flow detention time= 126.6 min calculated for 0.290 af (77% of inflow)
Center-of-Mass det. time= 46.1 min (860.1 - 813.9)

Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	5,356 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
76.00	1,931	240.0	0	0	1,931
77.50	3,071	270.0	3,719	3,719	3,207
78.00	3,482	281.0	1,637	5,356	3,709

Device	Routing	Invert	Outlet Devices
#1	Primary	76.00'	**0.750 in/hr Exfiltration X 0.60 over Horizontal area**
#2	Secondary	77.50'	**7.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.03 cfs @ 12.34 hrs HW=77.82' TW=74.77' (Dynamic Tailwater)
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Secondary OutFlow Max=3.24 cfs @ 12.34 hrs HW=77.82' TW=74.77' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 3.24 cfs @ 1.44 fps)

Summary for Link AP1:

Inflow Area = 402.591 ac, 22.18% Impervious, Inflow Depth > 4.18" for 100 Year event
Inflow = 462.64 cfs @ 13.72 hrs, Volume= 140.334 af
Primary = 462.64 cfs @ 13.72 hrs, Volume= 140.334 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP2:

Inflow Area = 1.917 ac, 25.31% Impervious, Inflow Depth > 3.76" for 100 Year event
Inflow = 5.14 cfs @ 12.46 hrs, Volume= 0.601 af
Primary = 5.14 cfs @ 12.46 hrs, Volume= 0.601 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP3:

Inflow Area = 18.465 ac, 7.67% Impervious, Inflow Depth > 2.41" for 100 Year event
Inflow = 13.69 cfs @ 12.28 hrs, Volume= 3.704 af
Primary = 13.69 cfs @ 12.28 hrs, Volume= 3.704 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Appendix C:
Stormwater BMP Treatment Calculations and Test Pit Information

TABLE T-1
STORMWATER TREATMENT SUMMARY
OLD BARN ESTATES, FALMOUTH, MAINE

SC	Treatment Method	LOTS	NEW IMPERVIOUS AREA (IA)		NEW LANDSCAPED AREA (LA)		TREATED IMPERVIOUS AREA (TIA)	TREATED LANDSCAPED AREA (TLA)	FINAL DESTINATION	WATER QUALITY VOLUME REQUIRED	WATER QUALITY VOLUME PROVIDED	FILTER AREA REQUIRED (SQ. FT.)	FILTER AREA PROVIDED
			ROAD	LOTS	ROAD	LOTS				(IA x 1" + LA x 0.4")		(IA x 5% + LA x 2%)	
			SQUARE FT				SQUARE FT	SQUARE FT		CUBIC FT	CUBIC FT	SQUARE FT	SQUARE FT
OS1	None		0	0	0	0	0	0	AP1	0	0	0	0
OS2	None		0	0	0	0	0	0	AP3	0	0	0	0
1.1	Dripline Filters (House Only)	7, 8, 9	0	6,000	0	0	6,000	0	AP1	498	500	NA	NA
	Underdrained Soil Filter T1	**5, 6**, 7, 8, 9	14,020	11,500	22,068	35,000	25,520	25,000	AP1	2,943	3,709	1,776	1,779
1.2	Buffer	10, 11, 12	2,557	15,000	684	30,000	15,000	30,000	AP1	NA	NA	NA	NA
2.1	None	1	0	2,500	0	5,000	2,500	0	AP2	NA	NA	NA	NA
2.2	Underdrained Soil Filter T2	**3, 4**	10,645	4,500	12,459	9,000	15,145	21,459	AP2	1,965	3,719	1,186	1,221
3.1	Buffer	**3, 4**, **5**, **6**	0	15,500	1,482	31,000	15,500	31,000	AP3	NA	NA	NA	NA
3.2	Buffer	2	2,812	5,000	2,779	10,000	1,663	1,215	AP3	NA	NA	NA	NA
4.0	None		0	0	0	0	0	0	AP3	NA	NA	NA	NA
Sub Total			30,034	60,000	39,472	120,000	**81,328**	108,674					
Total Developed Area Treated								**190,002**	(TIA + TLA)				

Treatment Area Requirements* (square feet)				
	Linear Portion	Non Linear Portion	Total Treatment Area Required	Treatment Area Provided
Impervious	22,526	57,000	79,526	81,328
Developed	34,753	144,000	178,753	190,002

* Required treatment areas calculated based on Maine DEP requirements of treating 75% of impervious area and 50% of developed area for linear portions and 95% of impervious area and 80% of developed area for non-linear portions of the project.

Prepared By:
Site Design Associates, Inc.
December 28, 2012

STORMWATER BMP BUFFER SIZING CALCULATIONS
Ledgewood Drive Subidivision
Falmouth, Maine

Buffers B1 and B2
Buffer Type: Buffer Downgradient of a Single Family Residential Lot

Per Maine DEP Stormwater BMP Manual – Volume III Section 5.2.5:

Soil Type: HSG C (Loamy Sand)
Slope: < 15%
Buffer Type: Forested

Required Buffer Length of Flow = 50 ft
Buffer Length of Flow Provided = 50 ft

Buffer B3
Buffer Type: Ditch Turnout Buffer

Per Maine DEP Stormwater BMP Manual – Volume III Section 5.2.4:

Soil Type: HSG C (Loamy Sand)
Slope: < 8%
Buffer Type: Forested
Buffer Length of Flow = 60 ft
Contributing Area: 200 ft of road

Required Buffer Flow Length = 60 ft
Buffer Flow Length Provided = 60 ft

Required Level Spreader Length = 20 ft
Level Spreader Length Provided = 20 ft

TABLE T-2
STORMWATER TREATMENT BMP TEST PIT SUMMARY
Old Barn Estates Subdivision
Ice Pond Drive, Portland, Maine

Pond	Test Pit ID	Surface Elevation	Seasonal High Groundwater Elev.	Ledge Elev.	Test Pit Bottom Elev.	Pond U.D. Invert Elev.	Liner Required
T1	S-8	66.8	65.6	NE	60.6	63.20	Yes
	S-9	65.9	64.9	NE	60.4		
	S-10	65.8	64.8	NE	61.0		
T2	S-2	78.8	NE	76.0	76.0	73.67	Yes
	S-3	77.8	74.4	71.8	71.8		
	S-6	79.9	77.4	75.5	75.5		

Test pits explorations conducted by Sweet Associates on February 6, 2013.

NE = Not Encountered

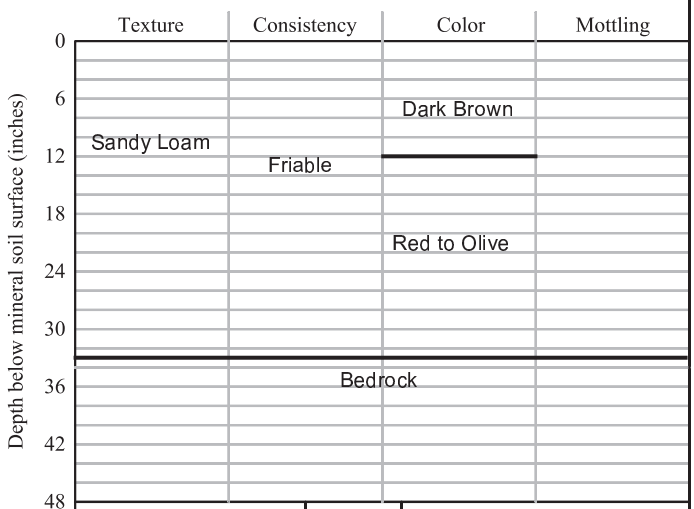
Sweet Associates
155 Gray Road, Falmouth, ME - ph: 207.797.2110 - fax: 207.878-2364

SOIL PROFILE / CLASSIFICATION INFORMATION	DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES

Project Name:	Applicant Name: Tim O'Donovan	Project Location (municipality): Portland

Observation Hole # S-2 ☒ Test Pit ☐ Boring

" Depth of organic horizon above mineral soil



INVESTIGATOR INFORMATION AND SIGNATURE			
Signature:		Date: February 6, 2013	
Name Printed/typed: Richard A. Sweet		Cert/Lic/Reg.# 034	
Title:	■ Licensed Site Evaluator ☐ Certified Geologist	☐ Certified Soil Scientist ☐ Other:	

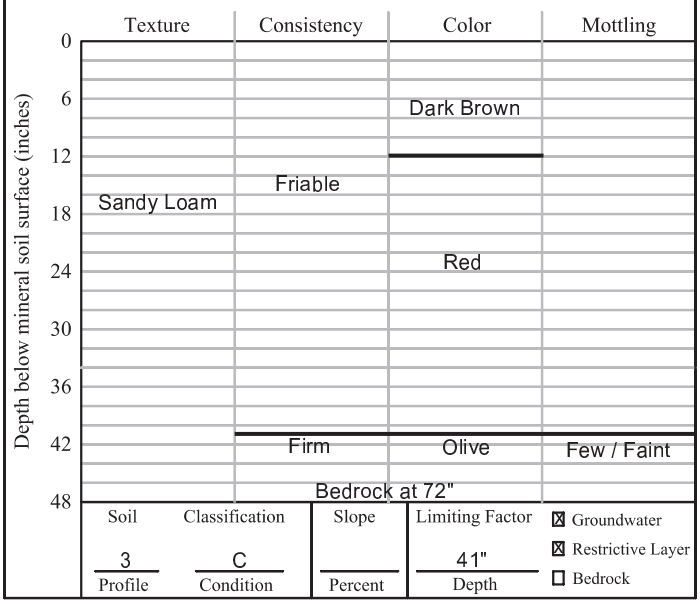
Sweet Associates
155 Gray Road, Falmouth, ME - ph: 207.797.2110 - fax: 207.878-2364

SOIL PROFILE / CLASSIFICATION INFORMATION	DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES

Project Name:	Applicant Name: Tim O'Donovan	Project Location (municipality): Portland

Observation Hole # S-3 ☒ Test Pit ☐ Boring

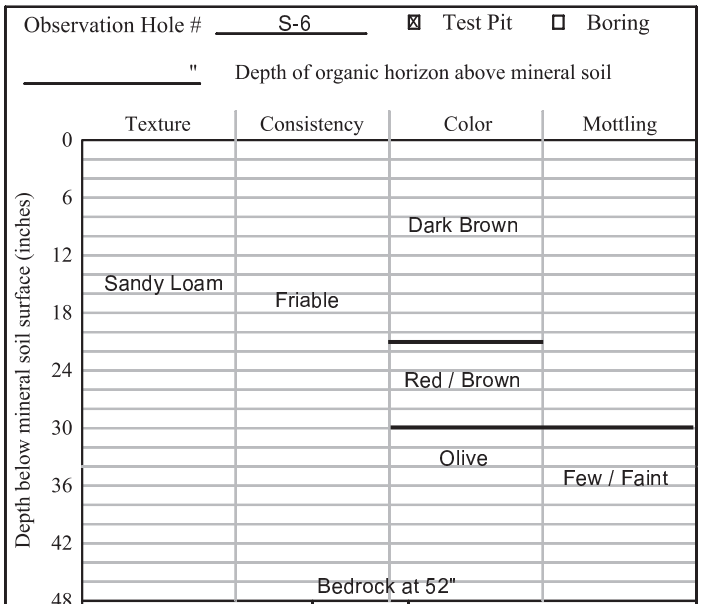
" Depth of organic horizon above mineral soil



Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	
3	C		41"	☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

Observation Hole # S-6 ☒ Test Pit ☐ Boring

" Depth of organic horizon above mineral soil



Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	
2	C		30"	☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

INVESTIGATOR INFORMATION AND SIGNATURE

Signature:	Date: February 6, 2013
Name Printed/typed: Richard A. Sweet	Cert/Lic/Reg.# 034

Title: ■ Licensed Site Evaluator ☐ Certified Soil Scientist
☐ Certified Geologist ☐ Other:

Sweet Associates
155 Gray Road, Falmouth, ME - ph: 207.797.2110 - fax: 207.878-2364

SOIL PROFILE / CLASSIFICATION INFORMATION	DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES

Project Name:	Applicant Name: Tim O'Donovan	Project Location (municipality): Portland

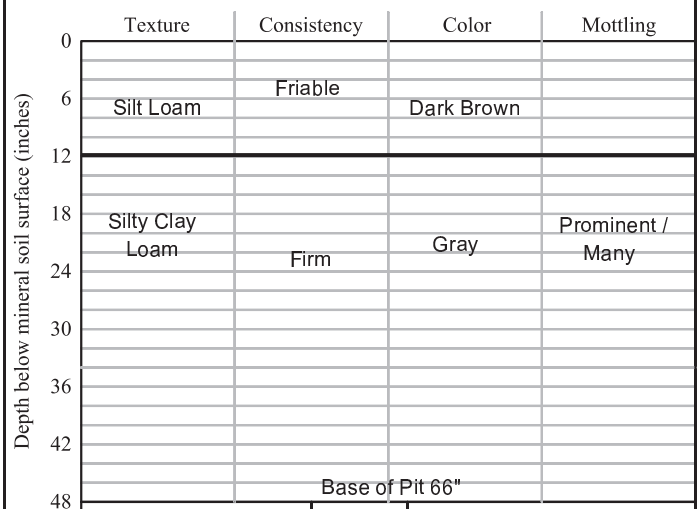
Observation Hole # S-8 ☒ Test Pit ☐ Boring

" Depth of organic horizon above mineral soil

Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	
9	D		15	☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

Observation Hole # S-9 ☒ Test Pit ☐ Boring

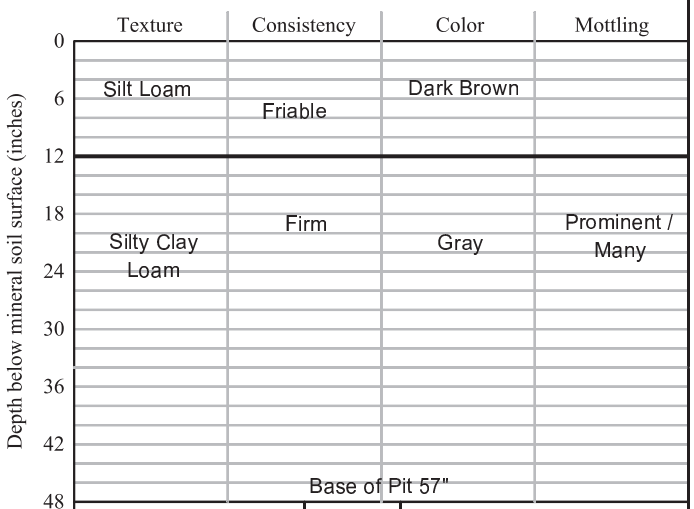
" Depth of organic horizon above mineral soil



Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	
9	D		12"	☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

Observation Hole # S-10 ☒ Test Pit ☐ Boring

" Depth of organic horizon above mineral soil



Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	
9	D		12"	☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

INVESTIGATOR INFORMATION AND SIGNATURE

Signature:	Date: February 6, 2013
Name Printed/typed: Richard A. Sweet	Cert/Lic/Reg.# 034

Title: ■ Licensed Site Evaluator ☐ Certified Soil Scientist
☐ Certified Geologist ☐ Other:

Appendix D:
Inspection & Maintenance Plan

Inspection and Maintenance Plan
For Stormwater Management Facilities

Old Barn Estates
Ice Pond Drive
Falmouth, Maine

January 2013
Rev 1 – February 8, 2013

Stormwater management facilities include paved surfaces, ditches/swales, catch basins, culverts, storm drain pipe, level spreaders, buffers, and grassed underdrain soil filters. During construction activities, the maintenance of all stormwater measures will be the direct responsibility of the Contractor. After acceptance by the Owner, the maintenance of all stormwater management facilities, the establishment of any contract services required to implement the program, and the keeping of records and maintenance log book will be the responsibility of the Owner.

The Owner shall comply with the following standards to meet the City of Portland's Post Construction Stormwater Management Plan requirements in accordance with Chapter 32 of the City Zoning Ordiance:

Any person owning, operating, or otherwise having control over a BMP required by a post construction stormwater management plan shall maintain the BMPs in accordance with the approved plan and shall demonstrate compliance with that plan as follows:

(a) *Inspections.* The owner or operator of a BMP shall hire a qualified post-construction stormwater inspector to at least annually, inspect the BMPs, including but not limited to any parking areas, catch basins, drainage swales, detention basins and ponds, pipes and related structures, in accordance with all municipal and state inspection, cleaning and maintenance requirements of the approved post-construction stormwater management plan.

(b) *Maintenance and repair*. If the BMP requires maintenance, repair or replacement to function as intended by the approved post-construction stormwater management plan, the owner or operator of the BMP shall take corrective action(s) to address the deficiency or deficiencies as soon as possible after the deficiency is discovered and shall provide a record of the deficiency and corrective action(s) to the department of public services ("DPS") in the annual report.

(c) *Annual report.* The owner or operator of a BMP or a qualified post-construction stormwater inspector hired by that person, shall, on or by June 30 of each year, provide a completed and signed certification to DPS in a form provided by DPS, certifying that the person has inspected the BMP(s) and that they are adequately maintained and functioning as intended by the approved

post-construction stormwater management plan, or that they require maintenance or repair, including the record of the deficiency and corrective action(s) taken.

(d) *Filing fee.* Any persons required to file and annual certification under this section shall include with the annual certification a filing fee established by DPS to pay the administrative and technical costs of review of the annual certification.

(e) *Right of entry.* In order to determine compliance with this article and with the post-construction stormwater management plan, DPS may enter upon property at reasonable hours with the consent of the owner, occupant or agent to inspect the BMPs.

At a minimum, the following maintenance activities for each stormwater management system shall be performed on a prescribed schedule.

Paved Surfaces

Accumulations of winter sand along paved surfaces shall be cleared at least once a year, preferably in the spring, and periodically during the year on an as-needed basis, to minimize transportation of sediment during rainfall events. Accumulations on pavement may be removed by pavement sweeping or vacuuming. Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader.

Ditches and Swales

Open swales and ditches shall be inspected twice per year (in spring and fall) to assure that debris and/or sediments do not reduce the effectiveness of the system. Debris and sediments shall be removed at that time. Any sign of erosion or blockage shall be immediately repaired to assure a vigorous growth of vegetation for the stability of the ditches and slopes proper function. Maintenance shall include, but not be limited to, mowing, trimming and removal vegetation in the ditches and slopes as required in order to prevent vegetation from blocking or diverting storm flows, replacement of riprap channel lining to prevent scour of the channel invert, removing vegetation and debris from the culverts.

Vegetated ditches should be mowed at least monthly during the growing season. Larger brush or trees must not be allowed to become established in the channel. Any areas where the vegetation fails will be subject to erosion and should be reseeded and mulched immediately.

Riprap ditches and aprons where stone is displaced should be replaced and chinked to assure stability. With time, additional riprap may be added. Vegetation growing through riprap should be removed on an annual basis.

Catch Basins

All catch basins, and any other field inlets throughout the collection system, shall be inspected twice per year (in spring and fall) to assure that the inlet entry and grates are clear of debris and will accept the intended flows. Any debris and sediments shall be cleared.

Sediment should be removed from these structures when it accumulates within 12 inches of the lowest pipe invert. If the basin outlet is designed with a hood to trap floatable materials (i.e. Snout or Casco Bay trap), check to ensure watertight seal is working. At a minimum, remove floating debris and hydrocarbons at the time of the inspection. The removed material must be disposed of in accordance with the Maine Solid Waste Disposal Rules. Confined space entry safety procedures shall be practiced should entry into these structures be required.

Culverts and Storm Drainage Pipes

Culverts and piped drainage systems shall be inspected on an annual basis to remove any obstructions to flow; remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit; and to repair any erosion damage at the pipe inlet and outlet. Sediment should be removed when its level exceeds 20% of the pipe diameter. This may be accomplished by hydraulic flushing or any mechanical means; however, care should be taken to contain the sediment at the pipe outlet, and not flush the sediments into the detention/infiltration pond areas as this will reduce the ponds capacity and ability to infiltrate runoff, and will hasten the time when the pond must be cleaned or rehabilitated.

Underdrained Soil Filters

Mowing and removal of woody growth – underdrained soil filters are designed to grow water tolerant plantings and mowing is not required in the interior of the structure. However, the external and top slopes of earthen embankments will be mowed up to three times per growing season to control over growth.

Outlet inspection and cleaning – The soil filter outlet consists of a layer of planting loam and sand with a stone and perforated pipe underdrain. Influx of sediments will be limited by sumps on all upstream catch basin structures and vegetated swales. Outlet inspections shall include flushing of the underdrain through the cleanout at the end of the pipe. Trash, sediment and debris shall be removed from the vicinity of the outlet and disposed of at a licensed off-site facility. The basin shall be inspected bi-annually for evidence of excessive retention or rapid release of flow.

If the filter fails to drain within 72 hours, the surface of the pond shall be rototilled to promote aeration of the filter media and vegetation shall be re-established. If aeration of the surface soil fails to promote filtration of impounded water within 72 hours, then the

filter media shall be replaced as necessary. The stone underdrain shall also be replaced at this time, along with the perforated pipe.

Underdrained soil filters shall not be used for snow storage area.

Vehicular equipment used to maintain or rehabilitate underdrained soil filters should work from the basin perimeter and not enter the basin area, as this will compact the soil surface and reduce the design infiltration rate.

Dripline Filters

Dripline filters shall be inspected semi-annually and after heavy rains. The filter shall be cleaned of debris and sediment at the surface of the filter. Stone within the reservoir shall be repaired and replaced as necessary when stones have been dislodged.

Filter material shall be replaced if it fails to drain within 72 hours after a one-inch rainfall event.

Dripline filters are part of the Stormwater management plan for the project. They shall not be paved over or altered in any way. They shall not be used for snow storage area. Gutters may not be installed on the roofline draining to the dripline filters.

Level Spreaders

Level spreaders shall be inspected twice per year (in spring and fall) to assure that debris and/or sediments do not reduce the effectiveness of the system. Debris and sediments shall be removed at that time. Any sign of erosion or blockage shall be immediately repaired to assure a vigorous growth of vegetation and stability of stone berms for the stability of the level spreader for proper function. Maintenance shall include, but not be limited to, mowing, trimming and removal vegetation in the level spreaders as required in order to prevent vegetation from blocking or diverting storm flows, replacement of riprap as necessary to prevent scour of the level lip, removing vegetation and debris from the level spreaders.

Riprap ditches and aprons where stone is displaced should be replaced and chinked to assure stability. With time, additional riprap may be added. Vegetation growing through riprap should be removed on an annual basis.

Vegetated Buffers

Buffers for this project are primarily undisturbed forested buffers. Buffers shall be marked with permanent markers. No trees may be cut or sprayed with biocides except for the normal maintenance of dead, windblown, or damaged trees and for pruning of tree branches below 12’ provided two-thirds of the tree’s canopy is maintained. No undergrowth, ground cover vegetation, leaf litter, organic duff layer or mineral soil may be disturbed except as noted in the “Declaration of Restrictions.”

Buffers shall be inspected yearly. If erosion is observed within the buffer it shall be restabilized and the upgradient distribution structure (i.e. level spreader) shall be inspected for proper functionality.

Disposal

Any sediment or debris removed during maintenance of the stormwater system must be disposed of in accordance with the Maine Solid Waste Disposal Rules.

Recordkeeping

The Owner will keep a written maintenance log that summarizes inspections, maintenance, and any corrective actions taken. The log shall include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean-out of any sediment or debris, the location where the sediment or debris was disposed after removal will be indicated. This log shall be made available to the Maine Department of Environmental Protection upon request.

Sample Inspection Report:

OLD BARN ESTATES
ICE POND ROAD, FALMOUTH, MAINE
STORMWATER FACILITIES INSPECTION REPORT

NAME: _____ SIGNATURE: _____

TITLE: _____ COMPANY: _____

DATE: _____

OBSERVATIONS:

BMP	Defects	Location(s)	Repair/Action Needed	Date/Action taken
Ditches/ Swales	Yes/no			
Roads, Sidewalks and Parking Areas	Yes/no			
Catch Basins	Yes/no			
Pipes and Culverts	Yes/no			
Riprap Aprons	Yes/no			
Grassed Underdrained Soil Filters	Yes/no			
Dripline Filters	Yes/no			
Level Spreaders	Yes/no			
Vegetated Buffers	Yes/no			

Appendix E
Drainage Plans

D-100 – Pre Development Drainage Plan

D-101 – Off-Site Drainage Plan

D-102 – Post Development Drainage Plan

Tc FLOW LINE DATA:

SUBCATCHMENT 1

SEGMENT	LENGTH	SLOPE	FLOW TYPE
A-B	150'	0.026	SHEET FLOW
B-C	360'	0.065	SHALLOW CONCENTRATED FLOW
C-D	110'	0.011	TRAP FLOW

SUBCATCHMENT 2

SEGMENT	LENGTH	SLOPE	FLOW TYPE
A-B	150'	0.073	SHEET FLOW
B-C	60'	0.025	SHALLOW CONCENTRATED FLOW
C-D	90'	0.025	SHALLOW CONCENTRATED FLOW

SUBCATCHMENT 3

SEGMENT	LENGTH	SLOPE	FLOW TYPE
A-B	150'	0.015	SHEET FLOW
B-C	300'	0.013	SHALLOW CONCENTRATED FLOW
C-D	300'	0.023	TRAP FLOW
D-E	440'	0.020	PARABOLIC CHANNEL FLOW

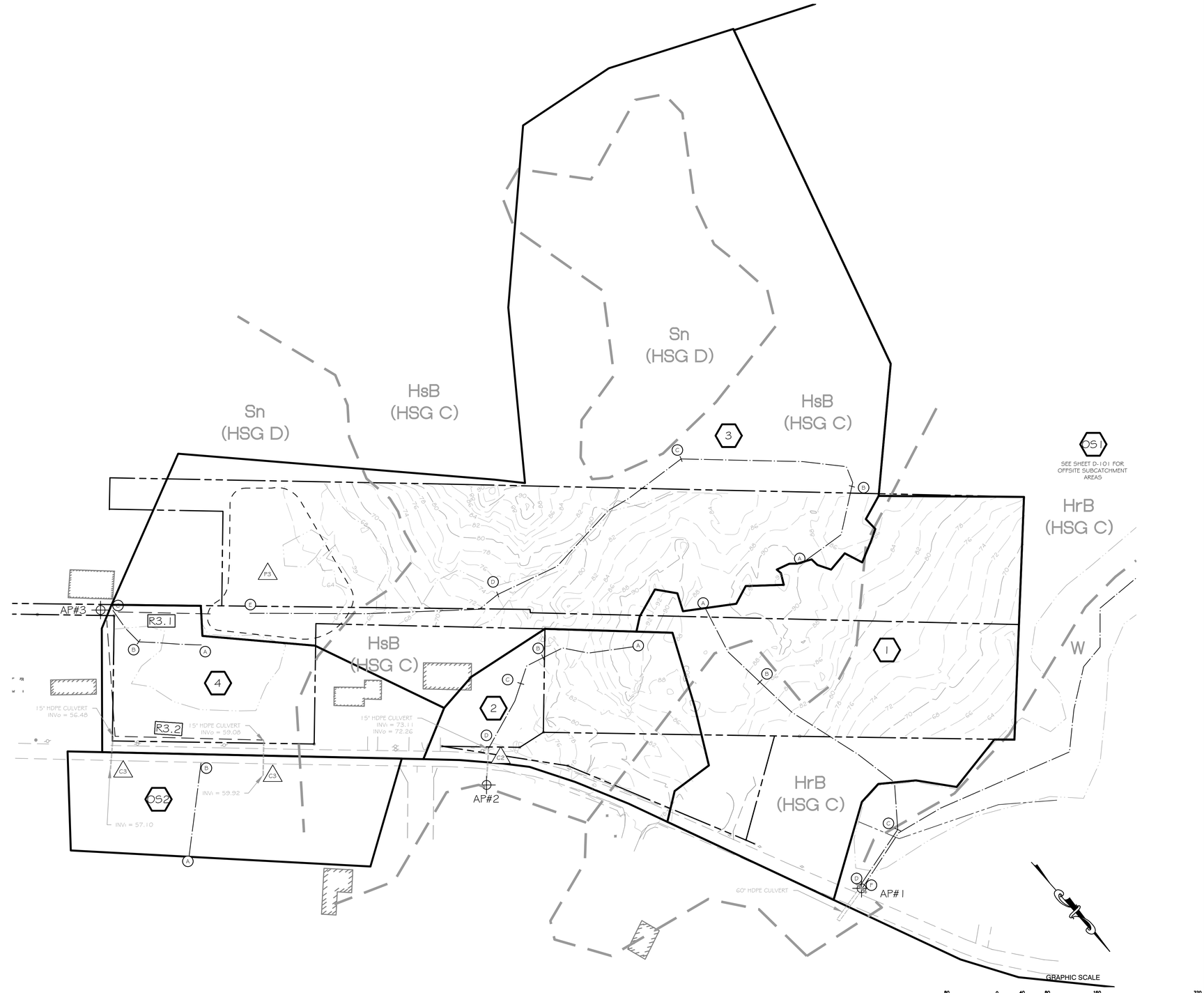
SUBCATCHMENT 4

SEGMENT	LENGTH	SLOPE	FLOW TYPE
A-B	100'	0.035	SHEET FLOW
B-C	65'	0.031	SHALLOW CONCENTRATED FLOW

SOIL LEGEND:

SYMBOL	DESCRIPTION	HYDROLOGIC SOIL GROUP
HsB:	HOLLIS, VERY ROCKY, FINE SANDY LOAM, 3% TO 8% SLOPES	C/D
HrB	HOLLIS, FINE SANDY LOAM, 3% TO 8% SOPES	C/D
Sn	SCANTIC SILT LOAM	D

SOURCE: SOIL SURVEY STAFF, NATURAL RESOURCES CONSERVATION SERVICE, UNITED STATES DEPARTMENT OF AGRICULTURE. WEB SOIL SURVEY. AVAILABLE ONLINE AT HTTP://WEBSOILSURVEY.NRCS.USDA.GOV/. ACCESSED 11/8/12.



DRAINAGE LEGEND

- SUBCATCHMENT BOUNDARY
- 1 — SUBCATCHMENT DESIGNATION
- A — TIME OF CONCENTRATION FLOW
- REACH
- R1 — REACH DESIGNATION
- AP#1 — ANALYSIS POINT
- 1 — POND TEXT
- POND BOUNDARY
- SOIL BOUNDARY

REV.	DATE	STATUS	BY	CHKD.	APPD.
C	2/8/13	ISSUED TO THE CITY OF PORTLAND FOR FINAL APPROVAL	DEPT.	TWS	PBB
B	1/9/13	ISSUED TO THE TOWN OF FALMOUTH FOR PRELIMINARY PLAN REVIEW	DEPT.	PBB	PBB
A	1/1/13	ISSUED FOR CITY OF PORTLAND WORKSHOP	DEPT.	PBB	PBB

STATE OF MAINE — THOMAS W. SAUCIER — NO. 9295 — LICENSED PROFESSIONAL ENGINEER — 02-08-13

LAND DESIGN SOLUTIONS
LAND PLANNING, SITE PLANNING & LANDSCAPE ARCHITECTURE
P.O. Box 316, 160 Longwoods Road, Cumberland, ME 04081 tel:(207) 829-1717

CLIENT:
TPO PROPERTIES, LLC
30 LEDGEWOOD DRIVE, FALMOUTH, MAINE 04104

DESIGN: PBB
DRAWN: DEPT.
CHKD: PBB
DATE: JAN 2013
SCALE: 1" = 80'

OLD BARN ESTATES
1062 OCEAN AVENUE, PORTLAND, MAINE

PRE-DEVELOPMENT DRAINAGE PLAN

PROJ. NO. –
REV. C
DWG. NO. D-100

Drawing Name: V:\2011-027\Projects\2011-027 - Ledgewood Drive Subdivision\CAD\2011-027 - Base | Plot Date / Time: Feb. 8, 13 / 3:05 PM

Tc FLOW LINE DATA:

SUBCATCHMENT OS1

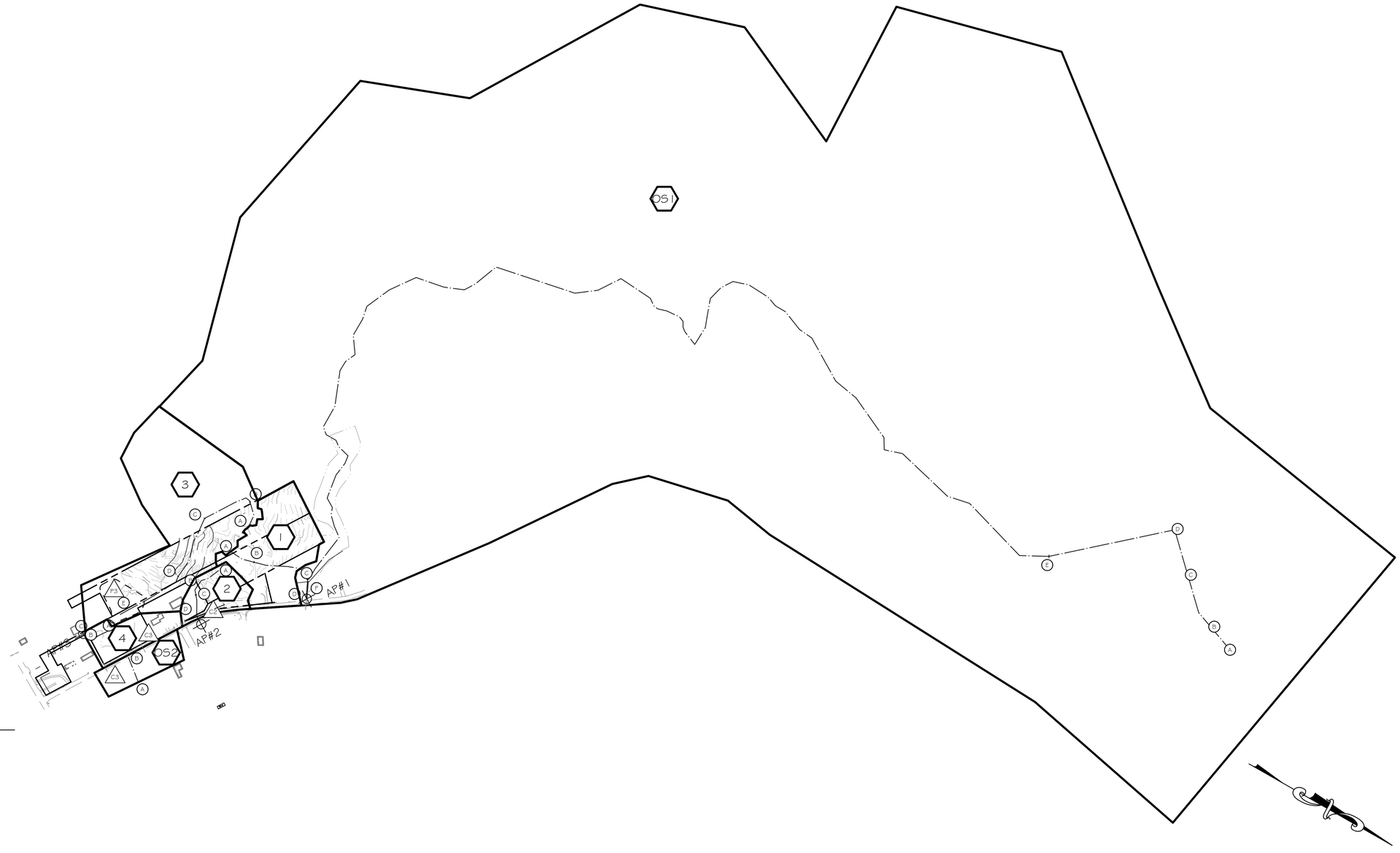
SEGMENT	LENGTH	SLOPE	FLOW TYPE
A-B	150'	0.011	SHEET FLOW
B-C	340'	0.011	SHALLOW CONCENTRATED FLOW
C-D	272'	0.011	SHALLOW CONCENTRATED FLOW
D-E	733'	0.011	SHALLOW CONCENTRATED FLOW
E-F	7,066'	0.011	TRAP FLOW

SUBCATCHMENT OS2

SEGMENT	LENGTH	SLOPE	FLOW TYPE
A-B	150'	0.010	SHEET FLOW

NOTES

1. OFFSITE SOILS ARE ASSUMED TO BE CLASSIFIED AS HYDROLOGIC SOIL GROUP C.
2. OFFSITE SUBCATCHMENTS WERE DELINEATED BASED ON A COMBINATION OF USGS TOPOGRAPHICAL MAPS DATED 2011, AERIAL PHOTOGRAPHY DATED 2012, AND FIELD RECONAISSANCE.



DRAINAGE LEGEND

- SUBCATCHMENT BOUNDARY
- SUBCATCHMENT DESIGNATION
- TIME OF CONCENTRATION FLOW
- REACH
- REACH DESIGNATION
- ANALYSIS POINT (AP#1)
- POND TEXT

GRAPHIC SCALE

300 0 150 300 600 1200

1 inch = 300 ft.

REV.	DATE	STATUS	BY	CHKD.	APPD.
C	2/8/13	ISSUED TO THE CITY OF PORTLAND FOR FINAL APPROVAL	DEPT.	TWS	PBB
B	1/9/13	ISSUED TO THE TOWN OF FALMOUTH FOR PRELIMINARY PLAN REVIEW	DEPT.	PBB	PBB
A	1/1/13	ISSUED FOR CITY OF PORTLAND WORKSHOP	DEPT.	PBB	PBB

STATE OF MAINE — THOMAS W. SAUCIER — NO. 9095 — LICENSED PROFESSIONAL ENGINEER — 02-28-13

LAND DESIGN SOLUTIONS
LAND PLANNING, SITE PLANNING & LANDSCAPE ARCHITECTURE
P.O. Box 316, 160 Longwoods Road, Cumberland, ME 04081 tel:(207) 829-1717

CLIENT:
TPO PROPERTIES, LLC
30 LEDGEWOOD DRIVE, FALMOUTH, MAINE 04104

DESIGN: PBB
DRAWN: DEPT.
CHKD: PBB
DATE: JAN 2013
SCALE: 1" = 300'

OLD BARN ESTATES
1062 OCEAN AVENUE, PORTLAND, MAINE

OFF-SITE SUBCATCHMENT PLAN

PROJ. NO. –
REV. C
DWG. NO. D-101

Drawing Name: \\Sbr-02\Projects\201 - Ledgewood Drive Subdivision\CAD\201 - Base | Plot Date / Time: Feb. 8, 13 / 2:58 PM

Tc FLOW LINE DATA:

SUBCATCHMENT 1.1

SEGMENT	LENGTH	SLOPE	FLOW TYPE
A-B	150'	0.080	SHEET FLOW
B-C	60'	0.080	SHEET FLOW
C-D	76'	0.060	SHALLOW CONCENTRATED FLOW
D-E	193'	0.047	TRAP FLOW

SUBCATCHMENT 1.2

SEGMENT	LENGTH	SLOPE	FLOW TYPE
A-B	150'	0.050	SHEET FLOW
B-C	266'	0.065	SHALLOW CONCENTRATED FLOW

SUBCATCHMENT 2.1

SEGMENT	LENGTH	SLOPE	FLOW TYPE
A-B	150'	0.080	SHEET FLOW
B-C	132'	0.023	SHALLOW CONCENTRATED FLOW

SUBCATCHMENT 2.2

SEGMENT	LENGTH	SLOPE	FLOW TYPE
A-B	50'	0.064	SHEET FLOW
B-C	281'	0.034	TRAP FLOW
C-D	127'	0.008	SHALLOW CONCENTRATED FLOW

SUBCATCHMENT 2.3

SEGMENT	LENGTH	SLOPE	FLOW TYPE
A-B	30'	0.133	SHEET FLOW
B-C	90'	0.033	SHEET FLOW
C-D	40'	0.075	SHALLOW CONCENTRATED FLOW

SUBCATCHMENT 3.1

SEGMENT	LENGTH	SLOPE	FLOW TYPE
A-B	150'	0.134	SHEET FLOW
B-C	200'	0.134	SHALLOW CONCENTRATED FLOW
C-D	300'	0.023	TRAP FLOW

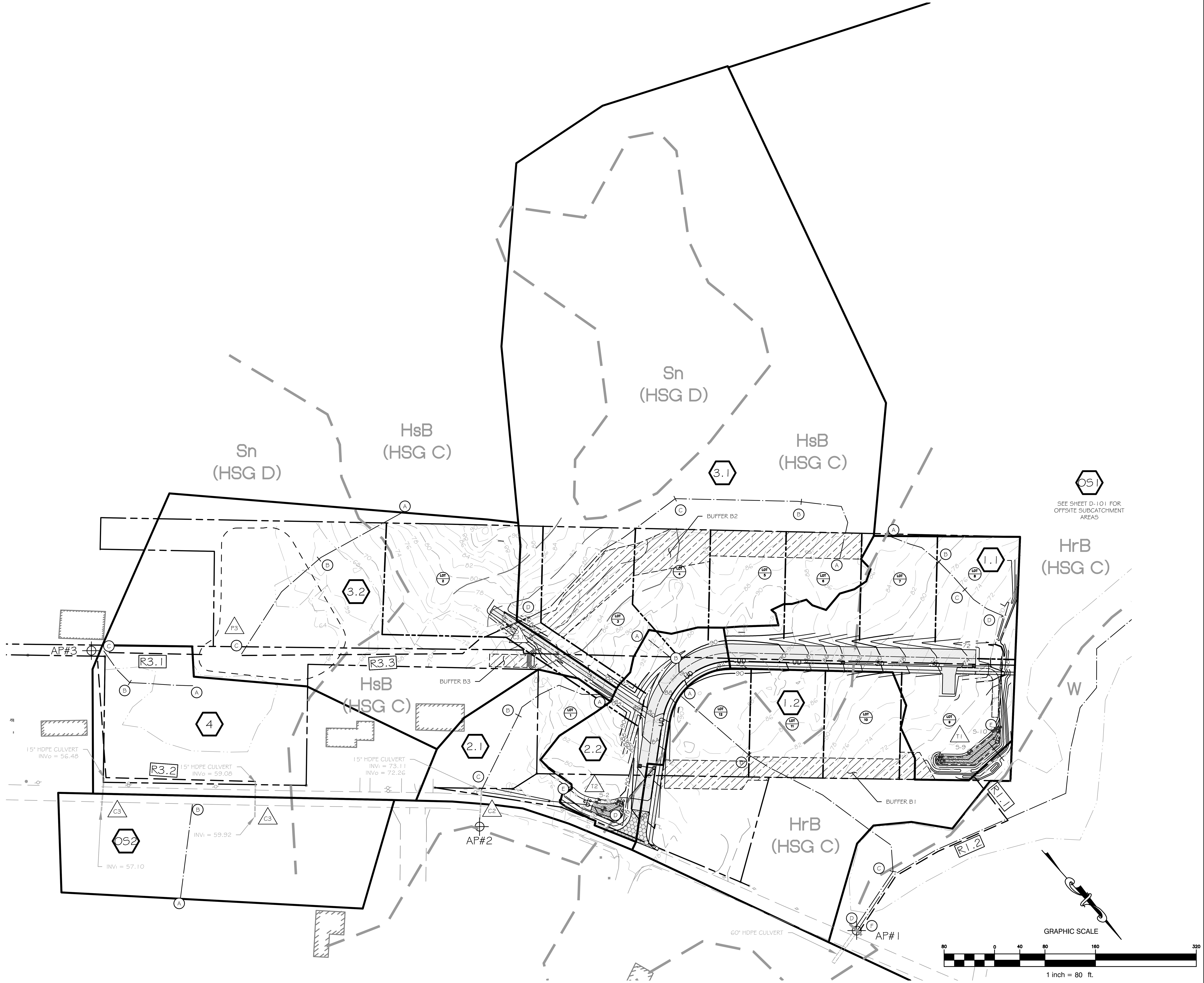
SUBCATCHMENT 3.2

SEGMENT	LENGTH	SLOPE	FLOW TYPE
A-B	150'	0.047	SHEET FLOW
B-C	159'	0.047	SHALLOW CONCENTRATED FLOW
C-D	133'	0.110	SHALLOW CONCENTRATED FLOW
D-E	62'	0.065	SHALLOW CONCENTRATED FLOW
D-F	329'	0.015	PARABOLIC CHANNEL FLOW

SOIL LEGEND:

SYMBOL	DESCRIPTION	HYDROLOGIC SOIL GROUP
HsB:	HOLLIS, VERY ROCKY, FINE SANDY LOAM, 3% TO 8% SLOPES	C/D
HrB	HOLLIS, FINE SANDY LOAM, 3% TO 8% SOPES	C/D
Sn	SCANTIC SILT LOAM	D

SOURCE: SOIL SURVEY STAFF, NATURAL RESOURCES CONSERVATION SERVICE, UNITED STATES DEPARTMENT OF AGRICULTURE. WEB SOIL SURVEY. AVAILABLE ONLINE AT HTTP://WEBSOILSURVEY.NRCS.USDA.GOV/. ACCESSED 11/8/12.



DRAINAGE LEGEND

	SUBCATCHMENT BOUNDARY
1	SUBCATCHMENT DESIGNATION
A	TIME OF CONCENTRATION FLOW
	REACH
R1	REACH DESIGNATION
AP#1	ANALYSIS POINT
1	POND TEXT
	POND BOUNDARY
	SOIL BOUNDARY

REV.	DATE	STATUS	BY	CHKD.	APPD.	REV.	DATE	STATUS	BY	CHKD.	APPD.
C	2/8/13	ISSUED TO THE CITY OF PORTLAND FOR FINAL APPROVAL	DEPT.	TWS	PBB						
B	1/9/13	ISSUED TO THE TOWN OF FALMOUTH FOR PRELIMINARY PLAN REVIEW	DEPT.	PBB	PBB						
A	1/1/12	ISSUED FOR CITY OF PORTLAND WORKSHOP									

STATE OF MAINE
THOMAS W. SAUCIER
NO. 6095
LICENSED
PROFESSIONAL ENGINEER
02-08-13

LAND DESIGN SOLUTIONS
LAND PLANNING, SITE PLANNING & LANDSCAPE ARCHITECTURE
P.O. Box 316, 160 Longwoods Road, Cumberland, ME 04081 tel:(207) 934-1717

CLIENT:
TPO PROPERTIES, LLC
30 LEDGEWOOD DRIVE, FALMOUTH, MAINE 04104

DESIGN: PBB
DRAWN: DEPT.
CHKD: PBB
DATE: JAN 2013
SCALE: 1" = 80'

OLD BARN ESTATES
1062 OCEAN AVENUE, PORTLAND, MAINE

POST DEVELOPMENT DRAINAGE PLAN

PROJ. NO. –
DWG. NO. D-102
REV. C