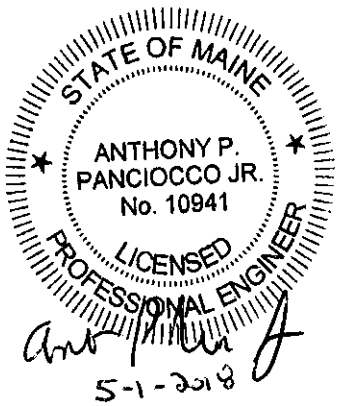
CAPISIC MEADOWS SUBDIVISION
BANCROFT STREET
PORTLAND, MAINE

STORMWATER MANAGEMENT REPORT
MAY 2018

Prepared for:

WB Group, Inc.
130 Bancroft Street
Portland, ME 04101



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Project # 41041

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1) PROJECT DESCRIPTION

This Stormwater Management Report has been prepared for WB Group, Inc., to present the stormwater runoff results for a proposed 7 lot residential subdivision located off Bancroft Street in Portland. The properties are identified on the City of Portland Tax Assessor's Map 193, Block E, parcels 19, 25, 26, 39 & 40. The property occupies approximately 2.93 acres.

The site generally drains in a southwesterly direction to a drainage easement at the southerly edge of the property. Runoff is conveyed around residential properties to an open ended culvert inlet at the corner of Bancroft Street and Capisic Street. At this point runoff enters the drainage infrastructure in Capisic Street and is conveyed westerly down Capisic to a discharge point at Capisic Pond. Capisic Pond is tributary to the Fore River

There is a large offsite watershed to the east, which includes a portion of Redlon Park Subdivision that directs runoff onto the project property. The offsite runoff is conveyed across the subject property through drainage ways to the culvert inlet at the intersection of Capisic and Bancroft Streets.

The development of this site will require Maine Department of Environmental Protection (MDEP) Tier I wetland fill permit, for wetland fills in the amount of 11,318 S.F. Though this project is tributary to Capisic Pond it is not located in the Capisic Brook Watershed, as such this project is not located in an Urban Impaired Stream Watershed. See attached Capisic Brook Watershed Management Plan map with our project identified.

The development of the site will result in the following:

Proposed new impervious area (on previously vegetated surface)	= 0.62 acres
Proposed developed area	= 2.27 acres

2) STORMWATER NARRATIVE

2.1 SITE LOCATION

The project site is located at 130 Bancroft Street in Portland. The project has frontage on Bancroft Street and a new road access will be provided from Bancroft Street. The property is currently mostly lawn area, and woodlands.

2.2 RECEIVING WATERS

Runoff from the project drains southwesterly across the property to an open culvert inlet. Runoff is then conveyed within the drainage infrastructure in Capisic Street to Capisic Pond. Capisic Pond is tributary to the Fore River.

2.3 HISTORIC FLOODING

The project site is not located with a floodplain as indicated on the Flood Insurance Rate Maps for the City of Portland Maine, Panel 12 of 17, Community panel number 230051 0012 C dated December 8, 1998 and Panel 13 of 17, Community panel number 230051 0013 B dated July 17, 1986.

2.4 METHODOLOGY AND MODELING ASSUMPTIONS

Runoff and routing calculations have been performed for the watershed areas affected by the proposed development. Times of concentration and runoff curve number calculations Service (NRCS) Technical Release 55, (TR-55). Time of concentration calculations have been amended where the values given by the TR-55 method is less than six minutes. In these cases a standard minimum value of six minutes has been used to keep this parameter within the acceptable working range of the model. Each Tc path and corresponding length and slope is identified in the pre and post development drainage area plan. The TR-20 based HydroCAD (version 10.0) modeling software has been utilized to perform the complex runoff and routing calculations.

Design rainfall has been modeled using the SCS Type III hydrograph for 24-hour duration storm events. The rainfall depth for each return period is taken from the Stormwater Management for Maine: Best Management Practices, Appendix H. The rainfall depth values utilized in the stormwater model are indicated in the table below.

24-Hour Rainfall Depths for Cumberland County			
Stormwater Management for Maine: Best Management Practices Appendix H			
Frequency	2-Year	10-Year	25-Year
Rainfall Depth	3.1	4.6	5.8

2.5 SOILS

Soil types in the area of the project were identified using the NRCS Web Soil Survey. The curve numbers (CN) utilized in this analysis relate to the ground cover that was observed on the site. Soils identified on the site (or within close proximity) are identified in the Table below. These soil boundaries have been identified on the Pre and Post Development Watershed Maps. Additionally, onsite wetland areas were modeled as Hydrologic Soil group D soils.

Soil Types	Symbol	HSG
Belgrade very fine sandy loam, 0%-8% slopes	BgB	B
Hollis fine sandy loam, 3%-8% slopes	HrB	D
Walpole fine sandy loam	Wa	A/D
Windsor loamy sand, 0%-8% slopes	WmB	A

2.6 PERMITTING REQUIREMENTS

The City of Portland Technical Manual Section 5 Stormwater Management Plans for New Development states that, "Except as provided in below, the following development proposals shall submit a stormwater management plan pursuant to the regulations of Maine DEP Chapter 500 Stormwater Management Rules, including General and Flooding standards": Since this project is a subdivision that will create more than 1,000 square feet of new impervious area and will create more than 10,000 square feet of new non-impervious developed area it will be required to provide a stormwater management plan.

As this project will not create one or more acres of new impervious surface area, review by the MDEP under the Stormwater Management Law, Stormwater Permit is not required. As such the project will be required to meet the MDEP's (Chapter 500 Stormwater Management Rules), Basic Standards.

The project will require a Tier I NRPA wetland fill permit for wetland impacts in the amount of 11,318 square feet.

Basic Standards: The basic standards require that grading and other construction activities on the site do not impede or otherwise alter drainage ways to create an unreasonable adverse impact on a protected natural resource. The basic standards will be met by the implementation of an Erosion and Sedimentation Control Plan addressing erosion and sediment during construction and post-construction stabilization of the site.

The Erosion and Sedimentation Control Plan was developed following Best Management Practice (BMP) guidelines and has been placed directly on the design plans for reference during construction.

General Standards: The general standards consist of Best Management Practice (BMP) standards. The BMP standards require a project's stormwater management system to include treatment measures that will mitigate the increased frequency and duration of channel erosive flows due to runoff from smaller storms, provide for effective treatment of pollutants in stormwater, and mitigate potential temperature impacts. This must be achieved by using one or more MDEP approved methods to control runoff from no less than 95% of the proposed impervious area and no less than 80% of the proposed developed area associated with a project.

The project will meet the linear portion requirement of MDEP Chapter 500 which states," For a linear portion of a project, treatment may be reduced to no less than 75% of the linear portion's impervious are and no less than 50% of the linear portion's developed area".

As this project will not create one acre or more of new impervious surface area, it will not be subject to MDEP Stormwater Permit Review. The project will be required to meet the Chapter 500 General and Flooding Standards per City of Portland Technical manual.

Flooding Standard: MDEP requires that projects which create 3 acres or more of impervious area and 20 acres or more of developed area or otherwise require review pursuant to the Site Location of Development Law must control the peak flow of runoff from the site to pre-development rates during the 2-year, 10-year and 25-year, 24-hour storms. As this project does not meet the above criteria, the Flooding Standard does not apply for MDEP approvals.

As part of the City of Portland's Technical manual the project will be required to meet the flooding standard.

2.7 PROPOSED BMPS

Two Filterra treatment units have been proposed at the low point of the proposed roadway to treat runoff from new roadway surface. The units will have an internal bypass to divert larger storms to an adjacent detention basin for flooding control. The Filterras have been sized in accordance with MDEP Chapter 500 rules.

The owner of the property is not intending to build the houses on this project and as such is not required to provide water quality treatment for the lot impervious areas. The lot impervious areas were included in the modeling to properly model runoff from the site.

2.8 PROJECT IMPACTS

The development of this project will result in the creation of approximately 0.62 acres of new impervious surface area and 2.27 acres of developed area.

Additionally, the project will result in approximately 11,318 square feet of wetland impacts as a result of the proposed roadway and lot grading.

3) STORMWATER QUANTITY ANALYSIS

3.1 PRE-DEVELOPMENT CONDITIONS

Under pre-development conditions the site is modeled with five Subcatchment areas (See Plan Set for Pre-Development Drainage Area Plan) three onsite Subcatchment areas and two offsite Subcatchment areas. The offsite areas direct offsite runoff onto the project property. The onsite and offsite Subcatchment areas drain to four points of analysis, Study Point 1, Study point 2, Study Point 3 and Study Point 4 . The onsite analysis encompasses approximately 13.78 acres.

3.2 POST- DEVELOPMENT CONDITIONS

Under the post-development condition the site area is further divided further into 8 subcatchment areas to allow for the effects of localized storage to be calculated. The runoff

from the subcatchment areas drains to the same four points of analysis, Study Point 1, Study Point 2, Study Point 3 and Study Point 4. The offsite analysis encompasses approximately 13.78 acres of drainage area. As such, a direct comparison can be made of the pre-development and post-development runoff values at each Study Point.

The watershed areas and times of concentration of the post-development watersheds vary from the existing conditions based on the proposed site development and grading. The Table below summarizes the results of the hydrologic analysis of the project under pre-development and post-development conditions.

3.3 STORMWATER QUANTITY SUMMARY

Stormwater Runoff Summary Table Pre-Development vs. Post-Development										
Study Point	**Total Watershed Area (Ac)**		**Avg. Weighted Curve No. (Cn)**		**Peak Rates of Runoff (cfs)**					
					2-Year		**10-Year**		**25-Year**	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**
SP-1	1.98	2.02	80	80	6.0	**3.4**	11.7	**6.8**	16.4	**8.4**
SP-2	2.99	2.95	64	71	6.7	**5.7**	15.0	**14.5**	22.9	**21.0**
SP-3	4.95	4.95	81	81	4.7	**4.7**	9.0	**9.0**	12.6	**12.6**
SP-4	3.86	3.86	55	55	0.2	**0.2**	1.6	**1.6**	3.3	**3.3**

4) STORMWATER QUALITY ANALYSIS

Water quality treatment is provided for runoff from the majority of the new Roadway areas associated with the project. Two proposed Filterra treatment units provide for 85% of the new roadway impervious area and 85% of the new developed area. The proposed treatment meets the Chapter 500 treatment requirements for the project site.

5) CONCLUSIONS

The runoff and routing calculations demonstrate that the development will result in a decrease in the peak rate of runoff at Study Points SP-1 and Study Point SP-2 during the 2-year, 10-year and 25-year storm events.

Study Point 3 and Study Point 4 remain unchanged from the pre to post development condition.

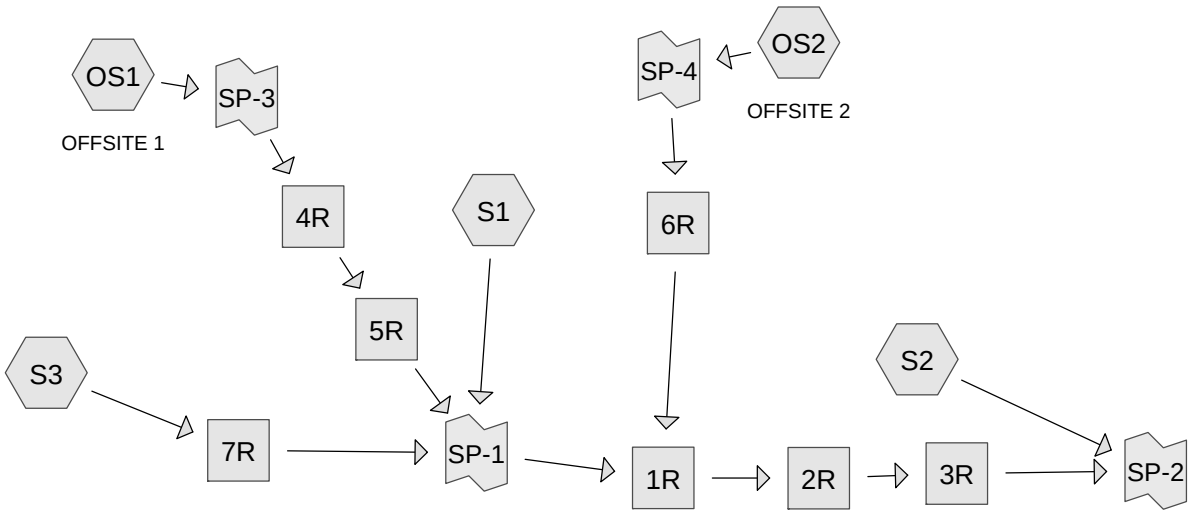
Stormwater runoff from this site will be treated to meet the MDEP Basic and General Standards for stormwater quality treatment for the project site. The project will provide treatment for 85% of the new roadway impervious areas and 85% of the new roadways developed area, meeting Chapter 500 Stormwater requirements.

The proposed project is designed to fit the topography and natural features of the site to the maximum extent practical. Stormwater runoff from the development will be captured, detained and treated in a series of BMPs and discharged to the same locations as the pre-development conditions.

An Erosion and Sedimentation Control Plan will be implemented to address erosion and sediment control during construction and the post-construction stabilization of the site. These construction requirements have been developed following BMP guidelines and have been place directly on the design plans for construction reference.

APPENDIX A

PRE-DEVELOPMENT HYDROCAD OUTPUT



Subcat Reach Pond Link

Routing Diagram for 41041 PRE
Prepared by Microsoft, Printed 4/30/2018

Summary for Subcatchment OS1: OFFSITE 1

Runoff = 4.7 cfs @ 12.40 hrs, Volume= 0.574 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (ac)	CN	Description
0.943	98	Paved parking, HSG D
0.405	80	>75% Grass cover, Good, HSG D
3.603	77	Woods, Good, HSG D
4.951	81	Weighted Average
4.008		80.95% Pervious Area
0.943		19.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	75	0.0530	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.2	81	0.0490	1.11		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	118	0.1180	1.72		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
13.6	483	0.0140	0.59		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
27.6	757	Total			

Summary for Subcatchment OS2: OFFSITE 2

Runoff = 0.2 cfs @ 12.66 hrs, Volume= 0.071 af, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (ac)	CN	Description
0.582	98	Paved parking, HSG D
1.923	30	Woods, Good, HSG A
0.969	77	Woods, Good, HSG D
0.231	39	>75% Grass cover, Good, HSG A
0.157	80	>75% Grass cover, Good, HSG D
3.862	55	Weighted Average
3.280		84.93% Pervious Area
0.582		15.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	75	0.0730	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.9	85	0.0940	1.53		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
15.3	544	0.0140	0.59		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
26.5	704	Total			

Summary for Subcatchment S1:

Runoff = 1.4 cfs @ 12.20 hrs, Volume= 0.133 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (ac)	CN	Description
0.194	98	Paved parking, HSG D
0.010	39	>75% Grass cover, Good, HSG A
0.277	80	>75% Grass cover, Good, HSG D
0.668	77	Woods, Good, HSG D
1.149	81	Weighted Average
0.955		83.12% Pervious Area
0.194		16.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	75	0.0800	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
3.0	117	0.0170	0.65		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.5	50	0.0200	1.84	5.76	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=10.00' D=0.25' Z= 10.0 '/' Top.W=15.00' n= 0.040
0.7	121	0.0240	2.69	8.42	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=10.00' D=0.25' Z= 10.0 '/' Top.W=15.00' n= 0.030
14.2	363	Total			

Summary for Subcatchment S2:

Runoff = 0.9 cfs @ 12.32 hrs, Volume= 0.128 af, Depth= 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.10"

	Area (ac)	CN	Description
*	0.108	98	Exposed Ledge, HSG A
	0.092	98	Paved parking, HSG D
	0.297	39	>75% Grass cover, Good, HSG A
	0.508	80	>75% Grass cover, Good, HSG D
	0.693	30	Woods, Good, HSG A
	1.295	77	Woods, Good, HSG D
	2.993	64	Weighted Average
	2.793		93.32% Pervious Area
	0.200		6.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	75	0.0800	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.7	111	0.0450	1.06		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.0	128	0.0290	2.15	5.10	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=7.00' D=0.25' Z= 10.0 '/' Top.W=12.00' n= 0.040
0.5	59	0.0160	1.90		**Shallow Concentrated Flow, D-E** Grassed Waterway Kv= 15.0 fps
3.4	184	0.0050	0.90	2.37	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=8.00' D=0.25' Z= 10.0 '/' Top.W=13.00' n= 0.040
0.9	123	0.0080	2.40	7.79	**Trap/Vee/Rect Channel Flow, F-G** Bot.W=5.00' D=0.50' Z= 3.0 '/' Top.W=8.00' n= 0.030
17.5	680	Total			

Summary for Subcatchment S3:

Runoff = 0.9 cfs @ 12.22 hrs, Volume= 0.083 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (ac)	CN	Description
0.159	80	>75% Grass cover, Good, HSG D
0.673	77	Woods, Good, HSG D
0.832	78	Weighted Average
0.832		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	75	0.0530	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
2.4	121	0.0280	0.84		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	77	0.0064	1.20		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
15.2	273	Total			

Summary for Reach 1R:

Inflow Area = 10.794 ac, 15.93% Impervious, Inflow Depth = 0.96" for 2-YR event
Inflow = 6.0 cfs @ 12.44 hrs, Volume= 0.862 af
Outflow = 6.0 cfs @ 12.47 hrs, Volume= 0.862 af, Atten= 0%, Lag= 1.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.52 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 3.2 min

Peak Storage= 388 cf @ 12.45 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 123.7 cfs

20.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 98.0' Slope= 0.0102 '/'
Inlet Invert= 57.00', Outlet Invert= 56.00'

‡

Summary for Reach 2R:

Inflow Area = 10.794 ac, 15.93% Impervious, Inflow Depth = 0.96" for 2-YR event
Inflow = 6.0 cfs @ 12.47 hrs, Volume= 0.862 af
Outflow = 6.0 cfs @ 12.51 hrs, Volume= 0.862 af, Atten= 0%, Lag= 2.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.74 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 0.98 fps, Avg. Travel Time= 3.5 min

Peak Storage= 447 cf @ 12.49 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 1.00' Flow Area= 18.0 sf, Capacity= 116.0 cfs

8.00' x 1.00' deep channel, n= 0.012 Concrete pipe, finished
Side Slope Z-value= 10.0 '/' Top Width= 28.00'
Length= 204.0' Slope= 0.0049 '/'
Inlet Invert= 56.00', Outlet Invert= 55.00'

‡

Summary for Reach 3R:

Inflow Area = 10.794 ac, 15.93% Impervious, Inflow Depth = 0.96" for 2-YR event
Inflow = 6.0 cfs @ 12.51 hrs, Volume= 0.862 af
Outflow = 6.0 cfs @ 12.53 hrs, Volume= 0.862 af, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.35 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.81 fps, Avg. Travel Time= 2.1 min

Peak Storage= 262 cf @ 12.52 hrs
Average Depth at Peak Storage= 0.41'
Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 31.0 cfs

5.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 103.0' Slope= 0.0097 '/'
Inlet Invert= 55.00', Outlet Invert= 54.00'

‡

Summary for Reach 4R:

Inflow Area = 4.951 ac, 19.05% Impervious, Inflow Depth = 1.39" for 2-YR event
Inflow = 4.7 cfs @ 12.40 hrs, Volume= 0.574 af
Outflow = 4.6 cfs @ 12.45 hrs, Volume= 0.574 af, Atten= 1%, Lag= 3.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.53 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 5.2 min

Peak Storage= 488 cf @ 12.42 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 0.50' Flow Area= 6.5 sf, Capacity= 13.7 cfs

8.00' x 0.50' deep channel, n= 0.040
Side Slope Z-value= 10.0 '/' Top Width= 18.00'
Length= 160.0' Slope= 0.0125 '/'
Inlet Invert= 64.00', Outlet Invert= 62.00'

‡

Summary for Reach 5R:

Inflow Area = 4.951 ac, 19.05% Impervious, Inflow Depth = 1.39" for 2-YR event
Inflow = 4.6 cfs @ 12.45 hrs, Volume= 0.574 af
Outflow = 4.6 cfs @ 12.49 hrs, Volume= 0.574 af, Atten= 1%, Lag= 2.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.55 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.49 fps, Avg. Travel Time= 4.2 min

Peak Storage= 368 cf @ 12.46 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 0.50' Flow Area= 22.5 sf, Capacity= 117.9 cfs

40.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 123.0' Slope= 0.0325 '/'
Inlet Invert= 62.00', Outlet Invert= 58.00'

‡

Summary for Reach 6R:

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 0.22" for 2-YR event
Inflow = 0.2 cfs @ 12.66 hrs, Volume= 0.071 af
Outflow = 0.2 cfs @ 12.88 hrs, Volume= 0.071 af, Atten= 5%, Lag= 13.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.63 fps, Min. Travel Time= 7.5 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 13.4 min

Peak Storage= 106 cf @ 12.76 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 1.00' Flow Area= 11.0 sf, Capacity= 45.5 cfs

8.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 283.0' Slope= 0.0177 '/'
Inlet Invert= 63.00', Outlet Invert= 58.00'

‡

Summary for Reach 7R:

Inflow Area = 0.832 ac, 0.00% Impervious, Inflow Depth = 1.20" for 2-YR event
Inflow = 0.9 cfs @ 12.22 hrs, Volume= 0.083 af
Outflow = 0.8 cfs @ 12.27 hrs, Volume= 0.083 af, Atten= 2%, Lag= 3.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.99 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 0.31 fps, Avg. Travel Time= 5.5 min

Peak Storage= 87 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.04'
Bank-Full Depth= 0.25' Flow Area= 6.3 sf, Capacity= 18.7 cfs

20.00' x 0.25' deep channel, n= 0.030 Short grass
Side Slope Z-value= 20.0 '/' Top Width= 30.00'
Length= 102.0' Slope= 0.0294 '/'
Inlet Invert= 60.00', Outlet Invert= 57.00'

‡

Summary for Link SP-1:

Inflow Area = 6.932 ac, 16.40% Impervious, Inflow Depth = 1.37" for 2-YR event
Inflow = 6.0 cfs @ 12.44 hrs, Volume= 0.790 af
Primary = 6.0 cfs @ 12.44 hrs, Volume= 0.790 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-2:

Inflow Area = 13.787 ac, 13.92% Impervious, Inflow Depth = 0.86" for 2-YR event
Inflow = 6.7 cfs @ 12.51 hrs, Volume= 0.990 af
Primary = 6.7 cfs @ 12.51 hrs, Volume= 0.990 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-3:

Inflow Area = 4.951 ac, 19.05% Impervious, Inflow Depth = 1.39" for 2-YR event
Inflow = 4.7 cfs @ 12.40 hrs, Volume= 0.574 af
Primary = 4.7 cfs @ 12.40 hrs, Volume= 0.574 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-4:

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 0.22" for 2-YR event
Inflow = 0.2 cfs @ 12.66 hrs, Volume= 0.071 af
Primary = 0.2 cfs @ 12.66 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment OS1: OFFSITE 1

Runoff = 9.0 cfs @ 12.38 hrs, Volume= 1.087 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (ac)	CN	Description
0.943	98	Paved parking, HSG D
0.405	80	>75% Grass cover, Good, HSG D
3.603	77	Woods, Good, HSG D
4.951	81	Weighted Average
4.008		80.95% Pervious Area
0.943		19.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	75	0.0530	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.2	81	0.0490	1.11		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	118	0.1180	1.72		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
13.6	483	0.0140	0.59		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
27.6	757	Total			

Summary for Subcatchment OS2: OFFSITE 2

Runoff = 1.6 cfs @ 12.47 hrs, Volume= 0.254 af, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (ac)	CN	Description
0.582	98	Paved parking, HSG D
1.923	30	Woods, Good, HSG A
0.969	77	Woods, Good, HSG D
0.231	39	>75% Grass cover, Good, HSG A
0.157	80	>75% Grass cover, Good, HSG D
3.862	55	Weighted Average
3.280		84.93% Pervious Area
0.582		15.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	75	0.0730	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.9	85	0.0940	1.53		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
15.3	544	0.0140	0.59		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
26.5	704	Total			

Summary for Subcatchment S1:

Runoff = 2.7 cfs @ 12.20 hrs, Volume= 0.252 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (ac)	CN	Description
0.194	98	Paved parking, HSG D
0.010	39	>75% Grass cover, Good, HSG A
0.277	80	>75% Grass cover, Good, HSG D
0.668	77	Woods, Good, HSG D
1.149	81	Weighted Average
0.955		83.12% Pervious Area
0.194		16.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	75	0.0800	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
3.0	117	0.0170	0.65		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.5	50	0.0200	1.84	5.76	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=10.00' D=0.25' Z= 10.0 '/' Top.W=15.00' n= 0.040
0.7	121	0.0240	2.69	8.42	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=10.00' D=0.25' Z= 10.0 '/' Top.W=15.00' n= 0.030
14.2	363	Total			

Summary for Subcatchment S2:

Runoff = 3.0 cfs @ 12.27 hrs, Volume= 0.331 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.60"

	Area (ac)	CN	Description
*	0.108	98	Exposed Ledge, HSG A
	0.092	98	Paved parking, HSG D
	0.297	39	>75% Grass cover, Good, HSG A
	0.508	80	>75% Grass cover, Good, HSG D
	0.693	30	Woods, Good, HSG A
	1.295	77	Woods, Good, HSG D
	2.993	64	Weighted Average
	2.793		93.32% Pervious Area
	0.200		6.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	75	0.0800	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.7	111	0.0450	1.06		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.0	128	0.0290	2.15	5.10	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=7.00' D=0.25' Z= 10.0 '/' Top.W=12.00' n= 0.040
0.5	59	0.0160	1.90		**Shallow Concentrated Flow, D-E** Grassed Waterway Kv= 15.0 fps
3.4	184	0.0050	0.90	2.37	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=8.00' D=0.25' Z= 10.0 '/' Top.W=13.00' n= 0.040
0.9	123	0.0080	2.40	7.79	**Trap/Vee/Rect Channel Flow, F-G** Bot.W=5.00' D=0.50' Z= 3.0 '/' Top.W=8.00' n= 0.030
17.5	680	Total			

Summary for Subcatchment S3:

Runoff = 1.7 cfs @ 12.21 hrs, Volume= 0.165 af, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (ac)	CN	Description
0.159	80	>75% Grass cover, Good, HSG D
0.673	77	Woods, Good, HSG D
0.832	78	Weighted Average
0.832		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	75	0.0530	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
2.4	121	0.0280	0.84		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	77	0.0064	1.20		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
15.2	273	Total			

Summary for Reach 1R:

Inflow Area = 10.794 ac, 15.93% Impervious, Inflow Depth = 1.95" for 10-YR event
Inflow = 12.9 cfs @ 12.43 hrs, Volume= 1.758 af
Outflow = 12.9 cfs @ 12.46 hrs, Volume= 1.758 af, Atten= 0%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.00 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.63 fps, Avg. Travel Time= 2.6 min

Peak Storage= 634 cf @ 12.44 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 123.7 cfs

20.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 98.0' Slope= 0.0102 '/'
Inlet Invert= 57.00', Outlet Invert= 56.00'

‡

Summary for Reach 2R:

Inflow Area = 10.794 ac, 15.93% Impervious, Inflow Depth = 1.95" for 10-YR event
Inflow = 12.9 cfs @ 12.46 hrs, Volume= 1.758 af
Outflow = 12.8 cfs @ 12.49 hrs, Volume= 1.758 af, Atten= 0%, Lag= 1.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.47 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.19 fps, Avg. Travel Time= 2.9 min

Peak Storage= 756 cf @ 12.47 hrs
Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 1.00' Flow Area= 18.0 sf, Capacity= 116.0 cfs

8.00' x 1.00' deep channel, n= 0.012 Concrete pipe, finished
Side Slope Z-value= 10.0 '/' Top Width= 28.00'
Length= 204.0' Slope= 0.0049 '/'
Inlet Invert= 56.00', Outlet Invert= 55.00'

‡

Summary for Reach 3R:

Inflow Area = 10.794 ac, 15.93% Impervious, Inflow Depth = 1.95" for 10-YR event
Inflow = 12.8 cfs @ 12.49 hrs, Volume= 1.758 af
Outflow = 12.8 cfs @ 12.50 hrs, Volume= 1.758 af, Atten= 0%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.99 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.99 fps, Avg. Travel Time= 1.7 min

Peak Storage= 442 cf @ 12.49 hrs
Average Depth at Peak Storage= 0.62'
Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 31.0 cfs

5.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 103.0' Slope= 0.0097 '/'
Inlet Invert= 55.00', Outlet Invert= 54.00'

‡

Summary for Reach 4R:

Inflow Area = 4.951 ac, 19.05% Impervious, Inflow Depth = 2.63" for 10-YR event
Inflow = 9.0 cfs @ 12.38 hrs, Volume= 1.087 af
Outflow = 8.9 cfs @ 12.43 hrs, Volume= 1.087 af, Atten= 1%, Lag= 2.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.86 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 4.4 min

Peak Storage= 770 cf @ 12.40 hrs
Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 0.50' Flow Area= 6.5 sf, Capacity= 13.7 cfs

8.00' x 0.50' deep channel, n= 0.040
Side Slope Z-value= 10.0 '/' Top Width= 18.00'
Length= 160.0' Slope= 0.0125 '/'
Inlet Invert= 64.00', Outlet Invert= 62.00'

‡

Summary for Reach 5R:

Inflow Area = 4.951 ac, 19.05% Impervious, Inflow Depth = 2.63" for 10-YR event
Inflow = 8.9 cfs @ 12.43 hrs, Volume= 1.087 af
Outflow = 8.9 cfs @ 12.46 hrs, Volume= 1.087 af, Atten= 0%, Lag= 1.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.00 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.59 fps, Avg. Travel Time= 3.5 min

Peak Storage= 548 cf @ 12.44 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 0.50' Flow Area= 22.5 sf, Capacity= 117.9 cfs

40.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 123.0' Slope= 0.0325 '/'
Inlet Invert= 62.00', Outlet Invert= 58.00'

‡

Summary for Reach 6R:

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 0.79" for 10-YR event
Inflow = 1.6 cfs @ 12.47 hrs, Volume= 0.254 af
Outflow = 1.6 cfs @ 12.57 hrs, Volume= 0.254 af, Atten= 1%, Lag= 6.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.31 fps, Min. Travel Time= 3.6 min
Avg. Velocity = 0.52 fps, Avg. Travel Time= 9.1 min

Peak Storage= 345 cf @ 12.51 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 1.00' Flow Area= 11.0 sf, Capacity= 45.5 cfs

8.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 283.0' Slope= 0.0177 '/'
Inlet Invert= 63.00', Outlet Invert= 58.00'

‡

Summary for Reach 7R:

Inflow Area = 0.832 ac, 0.00% Impervious, Inflow Depth = 2.38" for 10-YR event
Inflow = 1.7 cfs @ 12.21 hrs, Volume= 0.165 af
Outflow = 1.7 cfs @ 12.25 hrs, Volume= 0.165 af, Atten= 2%, Lag= 2.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.29 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.38 fps, Avg. Travel Time= 4.5 min

Peak Storage= 136 cf @ 12.23 hrs
Average Depth at Peak Storage= 0.06'
Bank-Full Depth= 0.25' Flow Area= 6.3 sf, Capacity= 18.7 cfs

20.00' x 0.25' deep channel, n= 0.030 Short grass
Side Slope Z-value= 20.0 '/' Top Width= 30.00'
Length= 102.0' Slope= 0.0294 '/'
Inlet Invert= 60.00', Outlet Invert= 57.00'

‡

Summary for Link SP-1:

Inflow Area = 6.932 ac, 16.40% Impervious, Inflow Depth = 2.60" for 10-YR event
Inflow = 11.7 cfs @ 12.40 hrs, Volume= 1.504 af
Primary = 11.7 cfs @ 12.40 hrs, Volume= 1.504 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-2:

Inflow Area = 13.787 ac, 13.92% Impervious, Inflow Depth = 1.82" for 10-YR event
Inflow = 15.0 cfs @ 12.47 hrs, Volume= 2.089 af
Primary = 15.0 cfs @ 12.47 hrs, Volume= 2.089 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-3:

Inflow Area = 4.951 ac, 19.05% Impervious, Inflow Depth = 2.63" for 10-YR event
Inflow = 9.0 cfs @ 12.38 hrs, Volume= 1.087 af
Primary = 9.0 cfs @ 12.38 hrs, Volume= 1.087 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-4:

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 0.79" for 10-YR event
Inflow = 1.6 cfs @ 12.47 hrs, Volume= 0.254 af
Primary = 1.6 cfs @ 12.47 hrs, Volume= 0.254 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment OS1: OFFSITE 1

Runoff = 12.6 cfs @ 12.38 hrs, Volume= 1.527 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (ac)	CN	Description
0.943	98	Paved parking, HSG D
0.405	80	>75% Grass cover, Good, HSG D
3.603	77	Woods, Good, HSG D
4.951	81	Weighted Average
4.008		80.95% Pervious Area
0.943		19.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	75	0.0530	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.2	81	0.0490	1.11		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	118	0.1180	1.72		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
13.6	483	0.0140	0.59		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
27.6	757	Total			

Summary for Subcatchment OS2: OFFSITE 2

Runoff = 3.3 cfs @ 12.43 hrs, Volume= 0.452 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (ac)	CN	Description
0.582	98	Paved parking, HSG D
1.923	30	Woods, Good, HSG A
0.969	77	Woods, Good, HSG D
0.231	39	>75% Grass cover, Good, HSG A
0.157	80	>75% Grass cover, Good, HSG D
3.862	55	Weighted Average
3.280		84.93% Pervious Area
0.582		15.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	75	0.0730	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.9	85	0.0940	1.53		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
15.3	544	0.0140	0.59		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
26.5	704	Total			

Summary for Subcatchment S1:

Runoff = 3.8 cfs @ 12.20 hrs, Volume= 0.354 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (ac)	CN	Description
0.194	98	Paved parking, HSG D
0.010	39	>75% Grass cover, Good, HSG A
0.277	80	>75% Grass cover, Good, HSG D
0.668	77	Woods, Good, HSG D
1.149	81	Weighted Average
0.955		83.12% Pervious Area
0.194		16.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	75	0.0800	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
3.0	117	0.0170	0.65		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.5	50	0.0200	1.84	5.76	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=10.00' D=0.25' Z= 10.0 '/' Top.W=15.00' n= 0.040
0.7	121	0.0240	2.69	8.42	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=10.00' D=0.25' Z= 10.0 '/' Top.W=15.00' n= 0.030
14.2	363	Total			

Summary for Subcatchment S2:

Runoff = 5.1 cfs @ 12.26 hrs, Volume= 0.529 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.80"

	Area (ac)	CN	Description
*	0.108	98	Exposed Ledge, HSG A
	0.092	98	Paved parking, HSG D
	0.297	39	>75% Grass cover, Good, HSG A
	0.508	80	>75% Grass cover, Good, HSG D
	0.693	30	Woods, Good, HSG A
	1.295	77	Woods, Good, HSG D
	2.993	64	Weighted Average
	2.793		93.32% Pervious Area
	0.200		6.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	75	0.0800	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.7	111	0.0450	1.06		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.0	128	0.0290	2.15	5.10	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=7.00' D=0.25' Z= 10.0 '/' Top.W=12.00' n= 0.040
0.5	59	0.0160	1.90		**Shallow Concentrated Flow, D-E** Grassed Waterway Kv= 15.0 fps
3.4	184	0.0050	0.90	2.37	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=8.00' D=0.25' Z= 10.0 '/' Top.W=13.00' n= 0.040
0.9	123	0.0080	2.40	7.79	**Trap/Vee/Rect Channel Flow, F-G** Bot.W=5.00' D=0.50' Z= 3.0 '/' Top.W=8.00' n= 0.030
17.5	680	Total			

Summary for Subcatchment S3:

Runoff = 2.5 cfs @ 12.21 hrs, Volume= 0.236 af, Depth= 3.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (ac)	CN	Description
0.159	80	>75% Grass cover, Good, HSG D
0.673	77	Woods, Good, HSG D
0.832	78	Weighted Average
0.832		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	75	0.0530	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
2.4	121	0.0280	0.84		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	77	0.0064	1.20		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
15.2	273	Total			

Summary for Reach 1R:

Inflow Area = 10.794 ac, 15.93% Impervious, Inflow Depth = 2.86" for 25-YR event
Inflow = 19.4 cfs @ 12.42 hrs, Volume= 2.570 af
Outflow = 19.4 cfs @ 12.44 hrs, Volume= 2.570 af, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.29 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.70 fps, Avg. Travel Time= 2.3 min

Peak Storage= 829 cf @ 12.42 hrs
Average Depth at Peak Storage= 0.36'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 123.7 cfs

20.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 98.0' Slope= 0.0102 '/'
Inlet Invert= 57.00', Outlet Invert= 56.00'

‡

Summary for Reach 2R:

Inflow Area = 10.794 ac, 15.93% Impervious, Inflow Depth = 2.86" for 25-YR event
Inflow = 19.4 cfs @ 12.44 hrs, Volume= 2.570 af
Outflow = 19.3 cfs @ 12.46 hrs, Volume= 2.570 af, Atten= 0%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.92 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.32 fps, Avg. Travel Time= 2.6 min

Peak Storage= 1,006 cf @ 12.45 hrs
Average Depth at Peak Storage= 0.41'
Bank-Full Depth= 1.00' Flow Area= 18.0 sf, Capacity= 116.0 cfs

8.00' x 1.00' deep channel, n= 0.012 Concrete pipe, finished
Side Slope Z-value= 10.0 '/' Top Width= 28.00'
Length= 204.0' Slope= 0.0049 '/'
Inlet Invert= 56.00', Outlet Invert= 55.00'

‡

Summary for Reach 3R:

Inflow Area = 10.794 ac, 15.93% Impervious, Inflow Depth = 2.86" for 25-YR event
Inflow = 19.3 cfs @ 12.46 hrs, Volume= 2.570 af
Outflow = 19.2 cfs @ 12.48 hrs, Volume= 2.570 af, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.38 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.10 fps, Avg. Travel Time= 1.6 min

Peak Storage= 588 cf @ 12.47 hrs
Average Depth at Peak Storage= 0.78'
Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 31.0 cfs

5.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 103.0' Slope= 0.0097 '/'
Inlet Invert= 55.00', Outlet Invert= 54.00'

‡

Summary for Reach 4R:

Inflow Area = 4.951 ac, 19.05% Impervious, Inflow Depth = 3.70" for 25-YR event
Inflow = 12.6 cfs @ 12.38 hrs, Volume= 1.527 af
Outflow = 12.5 cfs @ 12.42 hrs, Volume= 1.527 af, Atten= 1%, Lag= 2.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.05 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.67 fps, Avg. Travel Time= 4.0 min

Peak Storage= 978 cf @ 12.39 hrs
Average Depth at Peak Storage= 0.48'
Bank-Full Depth= 0.50' Flow Area= 6.5 sf, Capacity= 13.7 cfs

8.00' x 0.50' deep channel, n= 0.040
Side Slope Z-value= 10.0 '/' Top Width= 18.00'
Length= 160.0' Slope= 0.0125 '/'
Inlet Invert= 64.00', Outlet Invert= 62.00'

‡

Summary for Reach 5R:

Inflow Area = 4.951 ac, 19.05% Impervious, Inflow Depth = 3.70" for 25-YR event
Inflow = 12.5 cfs @ 12.42 hrs, Volume= 1.527 af
Outflow = 12.4 cfs @ 12.44 hrs, Volume= 1.527 af, Atten= 1%, Lag= 1.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.27 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.65 fps, Avg. Travel Time= 3.2 min

Peak Storage= 674 cf @ 12.43 hrs
Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 0.50' Flow Area= 22.5 sf, Capacity= 117.9 cfs

40.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 123.0' Slope= 0.0325 '/'
Inlet Invert= 62.00', Outlet Invert= 58.00'

‡

Summary for Reach 6R:

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 1.40" for 25-YR event
Inflow = 3.3 cfs @ 12.43 hrs, Volume= 0.452 af
Outflow = 3.3 cfs @ 12.51 hrs, Volume= 0.452 af, Atten= 1%, Lag= 4.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.71 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 7.7 min

Peak Storage= 544 cf @ 12.46 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 1.00' Flow Area= 11.0 sf, Capacity= 45.5 cfs

8.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 283.0' Slope= 0.0177 '/'
Inlet Invert= 63.00', Outlet Invert= 58.00'

‡

Summary for Reach 7R:

Inflow Area = 0.832 ac, 0.00% Impervious, Inflow Depth = 3.40" for 25-YR event
Inflow = 2.5 cfs @ 12.21 hrs, Volume= 0.236 af
Outflow = 2.4 cfs @ 12.25 hrs, Volume= 0.236 af, Atten= 2%, Lag= 2.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.47 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 4.1 min

Peak Storage= 171 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 0.25' Flow Area= 6.3 sf, Capacity= 18.7 cfs

20.00' x 0.25' deep channel, n= 0.030 Short grass
Side Slope Z-value= 20.0 '/' Top Width= 30.00'
Length= 102.0' Slope= 0.0294 '/'
Inlet Invert= 60.00', Outlet Invert= 57.00'

‡

Summary for Link SP-1:

Inflow Area = 6.932 ac, 16.40% Impervious, Inflow Depth = 3.67" for 25-YR event
Inflow = 16.4 cfs @ 12.39 hrs, Volume= 2.118 af
Primary = 16.4 cfs @ 12.39 hrs, Volume= 2.118 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-2:

Inflow Area = 13.787 ac, 13.92% Impervious, Inflow Depth = 2.70" for 25-YR event
Inflow = 22.9 cfs @ 12.44 hrs, Volume= 3.099 af
Primary = 22.9 cfs @ 12.44 hrs, Volume= 3.099 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-3:

Inflow Area = 4.951 ac, 19.05% Impervious, Inflow Depth = 3.70" for 25-YR event
Inflow = 12.6 cfs @ 12.38 hrs, Volume= 1.527 af
Primary = 12.6 cfs @ 12.38 hrs, Volume= 1.527 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

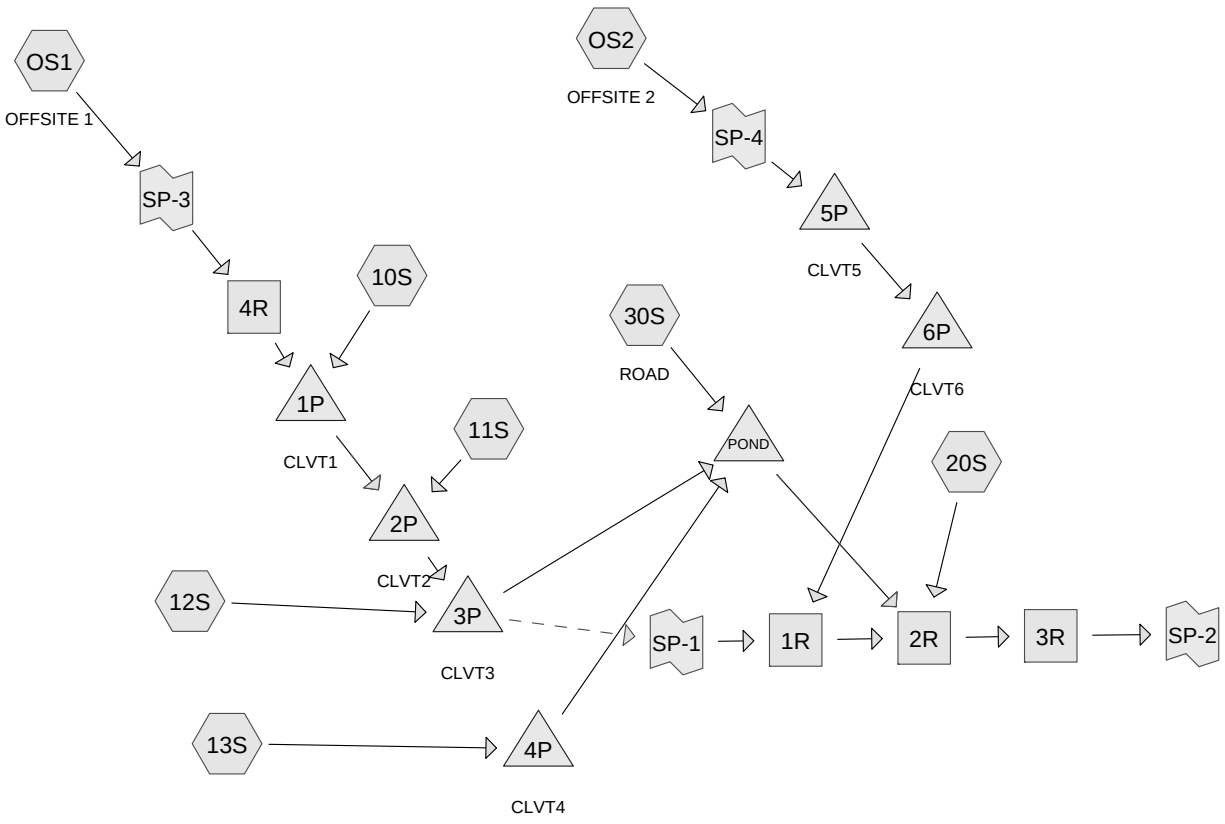
Summary for Link SP-4:

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 1.40" for 25-YR event
Inflow = 3.3 cfs @ 12.43 hrs, Volume= 0.452 af
Primary = 3.3 cfs @ 12.43 hrs, Volume= 0.452 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

APPENDIX B

POST DEVELOPMENT HYDROCAD OUTPUT



Subcat Reach Pond Link

Routing Diagram for 41041 POST
Prepared by Microsoft, Printed 4/30/2018

Summary for Subcatchment 10S:

Runoff = 1.0 cfs @ 12.10 hrs, Volume= 0.073 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (ac)	CN	Description
0.066	98	Paved parking, HSG D
0.256	77	Woods, Good, HSG D
0.310	80	>75% Grass cover, Good, HSG D
0.632	81	Weighted Average
0.566		89.56% Pervious Area
0.066		10.44% Impervious Area

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

Summary for Subcatchment 11S:

Runoff = 0.3 cfs @ 12.09 hrs, Volume= 0.021 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (ac)	CN	Description
0.042	98	Paved parking, HSG D
0.109	80	>75% Grass cover, Good, HSG D
0.151	85	Weighted Average
0.109		72.19% Pervious Area
0.042		27.81% Impervious Area

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

Summary for Subcatchment 12S:

Runoff = 1.0 cfs @ 12.22 hrs, Volume= 0.101 af, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
1,699	98	Paved parking, HSG D
19,994	80	>75% Grass cover, Good, HSG D
20,038	77	Woods, Good, HSG D
41,731	79	Weighted Average
40,032		95.93% Pervious Area
1,699		4.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	75	0.0530	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
2.4	121	0.0280	0.84		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	77	0.0064	1.20		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
15.2	273	Total			

Summary for Subcatchment 13S:

Runoff = 0.4 cfs @ 12.10 hrs, Volume= 0.028 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (ac)	CN	Description
0.007	98	Paved parking, HSG A
0.060	98	Paved parking, HSG D
0.043	39	>75% Grass cover, Good, HSG A
0.172	80	>75% Grass cover, Good, HSG D
0.282	78	Weighted Average
0.215		76.24% Pervious Area
0.067		23.76% Impervious Area

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

Summary for Subcatchment 20S:

Runoff = 1.2 cfs @ 12.27 hrs, Volume= 0.139 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.10"

	Area (ac)	CN	Description
*	0.065	98	Existing Impervious, HSG D
*	0.108	98	Exposed Ledge, HSG A
	0.025	98	Paved parking, HSG A
	0.105	98	Paved parking, HSG D
	0.064	39	>75% Grass cover, Good, HSG A
	0.908	80	>75% Grass cover, Good, HSG D
	0.555	30	Woods, Good, HSG A
	0.468	77	Woods, Good, HSG D
	2.298	69	Weighted Average
	1.995		86.81% Pervious Area
	0.303		13.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	75	0.0800	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	103	0.0480	3.29		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
0.1	39	0.0250	10.18	17.99	**Pipe Channel, C-D** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
1.6	59	0.0160	0.63		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
0.0	33	0.0300	11.15	19.71	**Pipe Channel, E-F** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
0.3	69	0.0290	4.57	14.84	**Trap/Vee/Rect Channel Flow, F-G** Bot.W=5.00' D=0.50' Z= 3.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
3.4	184	0.0050	0.90	2.37	**Trap/Vee/Rect Channel Flow, G-H** Bot.W=8.00' D=0.25' Z= 10.0 '/' Top.W=13.00' n= 0.040
0.9	123	0.0080	2.40	7.79	**Trap/Vee/Rect Channel Flow, H-I** Bot.W=5.00' D=0.50' Z= 3.0 '/' Top.W=8.00' n= 0.030
16.8	685	Total			

Summary for Subcatchment 30S: ROAD

Runoff = 1.0 cfs @ 12.10 hrs, Volume= 0.076 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
	6,229	98	Paved parking, HSG A
	7,937	98	Paved parking, HSG D
*	1,181	98	Existing Impervious
	6,215	39	>75% Grass cover, Good, HSG A
	6,882	80	>75% Grass cover, Good, HSG D
	28,444	81	Weighted Average
	13,097		46.04% Pervious Area
	15,347		53.96% Impervious Area

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

Summary for Subcatchment OS1: OFFSITE 1

Runoff = 4.7 cfs @ 12.40 hrs, Volume= 0.574 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (ac)	CN	Description
0.943	98	Paved parking, HSG D
0.405	80	>75% Grass cover, Good, HSG D
3.603	77	Woods, Good, HSG D
4.951	81	Weighted Average
4.008		80.95% Pervious Area
0.943		19.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	75	0.0530	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.2	81	0.0490	1.11		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	118	0.1180	1.72		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
13.6	483	0.0140	0.59		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
27.6	757	Total			

Summary for Subcatchment OS2: OFFSITE 2

Runoff = 0.2 cfs @ 12.66 hrs, Volume= 0.071 af, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (ac)	CN	Description
0.582	98	Paved parking, HSG D
1.923	30	Woods, Good, HSG A
0.969	77	Woods, Good, HSG D
0.231	39	>75% Grass cover, Good, HSG A
0.157	80	>75% Grass cover, Good, HSG D
3.862	55	Weighted Average
3.280		84.93% Pervious Area
0.582		15.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	75	0.0730	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.9	85	0.0940	1.53		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
15.3	544	0.0140	0.59		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
26.5	704	Total			

Summary for Reach 1R:

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 1.54" for 2-YR event
Inflow = 3.6 cfs @ 12.57 hrs, Volume= 0.494 af
Outflow = 3.6 cfs @ 12.58 hrs, Volume= 0.494 af, Atten= 0%, Lag= 0.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.25 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.39 fps, Avg. Travel Time= 4.2 min

Peak Storage= 278 cf @ 12.58 hrs
Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 123.7 cfs

20.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 98.0' Slope= 0.0102 '/'
Inlet Invert= 57.00', Outlet Invert= 56.00'

‡

Summary for Reach 2R:

Inflow Area = 13.787 ac, 17.37% Impervious, Inflow Depth = 0.94" for 2-YR event
Inflow = 5.7 cfs @ 12.55 hrs, Volume= 1.081 af
Outflow = 5.7 cfs @ 12.56 hrs, Volume= 1.081 af, Atten= 0%, Lag= 0.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.69 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.72 fps, Avg. Travel Time= 4.7 min

Peak Storage= 430 cf @ 12.56 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 1.00' Flow Area= 18.0 sf, Capacity= 116.0 cfs

8.00' x 1.00' deep channel, n= 0.012 Concrete pipe, finished
Side Slope Z-value= 10.0 '/' Top Width= 28.00'
Length= 204.0' Slope= 0.0049 '/'
Inlet Invert= 56.00', Outlet Invert= 55.00'

‡

Summary for Reach 3R:

Inflow Area = 13.787 ac, 17.37% Impervious, Inflow Depth = 0.94" for 2-YR event
Inflow = 5.7 cfs @ 12.56 hrs, Volume= 1.081 af
Outflow = 5.7 cfs @ 12.57 hrs, Volume= 1.081 af, Atten= 0%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.31 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.55 fps, Avg. Travel Time= 3.1 min

Peak Storage= 253 cf @ 12.57 hrs
Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 31.0 cfs

5.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 103.0' Slope= 0.0097 '/'
Inlet Invert= 55.00', Outlet Invert= 54.00'

‡

Summary for Reach 4R:

Inflow Area = 4.951 ac, 19.05% Impervious, Inflow Depth = 1.39" for 2-YR event
Inflow = 4.7 cfs @ 12.40 hrs, Volume= 0.574 af
Outflow = 4.7 cfs @ 12.42 hrs, Volume= 0.574 af, Atten= 0%, Lag= 1.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.53 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 5.2 min

Peak Storage= 488 cf @ 12.42 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 0.50' Flow Area= 6.5 sf, Capacity= 13.7 cfs

8.00' x 0.50' deep channel, n= 0.040
Side Slope Z-value= 10.0 '/' Top Width= 18.00'
Length= 160.0' Slope= 0.0125 '/'
Inlet Invert= 64.00', Outlet Invert= 64.00'

‡

Summary for Pond 1P: CLVT1

Inflow Area = 5.583 ac, 18.07% Impervious, Inflow Depth = 1.39" for 2-YR event
Inflow = 5.0 cfs @ 12.40 hrs, Volume= 0.647 af
Outflow = 5.0 cfs @ 12.41 hrs, Volume= 0.647 af, Atten= 0%, Lag= 0.4 min
Primary = 5.0 cfs @ 12.41 hrs, Volume= 0.647 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 61.65' @ 12.41 hrs Surf.Area= 186 sf Storage= 153 cf
Flood Elev= 64.10' Surf.Area= 4,565 sf Storage= 4,337 cf

Plug-Flow detention time= 1.4 min calculated for 0.646 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (862.7 - 861.8)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	4,337 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
60.00	34	0	0
61.00	92	63	63
62.00	237	165	228
63.00	1,708	973	1,200
64.00	4,565	3,137	4,337

Device	Routing	Invert	Outlet Devices
#1	Primary	60.50'	**24.0" Round Culvert** L= 51.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 60.50' / 60.20' S= 0.0059 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=5.0 cfs @ 12.41 hrs HW=61.65' TW=60.91' (Dynamic Tailwater)
1=Culvert (Barrel Controls 5.0 cfs @ 3.87 fps)

Summary for Pond 2P: CLVT2

Inflow Area = 5.734 ac, 18.33% Impervious, Inflow Depth = 1.40" for 2-YR event
Inflow = 5.1 cfs @ 12.41 hrs, Volume= 0.668 af
Outflow = 5.0 cfs @ 12.46 hrs, Volume= 0.667 af, Atten= 2%, Lag= 3.0 min
Primary = 5.0 cfs @ 12.46 hrs, Volume= 0.667 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 60.92' @ 12.46 hrs Surf.Area= 1,317 sf Storage= 710 cf
Flood Elev= 62.10' Surf.Area= 1,750 sf Storage= 2,405 cf

Plug-Flow detention time= 3.5 min calculated for 0.667 af (100% of inflow)
Center-of-Mass det. time= 2.0 min (863.6 - 861.6)

Volume	Invert	Avail.Storage	Storage Description
#1	59.00'	2,405 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.00	28	0	0
60.00	94	61	61
61.00	1,422	758	819
62.00	1,750	1,586	2,405

Device	Routing	Invert	Outlet Devices
#1	Primary	59.75'	**24.0" Round Culvert** L= 45.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.75' / 59.50' S= 0.0056 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=5.0 cfs @ 12.46 hrs HW=60.92' TW=58.50' (Dynamic Tailwater)
1=Culvert (Barrel Controls 5.0 cfs @ 3.79 fps)

Summary for Pond 3P: CLVT3

Inflow Area = 6.692 ac, 16.29% Impervious, Inflow Depth = 1.38" for 2-YR event
Inflow = 5.7 cfs @ 12.43 hrs, Volume= 0.767 af
Outflow = 5.7 cfs @ 12.43 hrs, Volume= 0.767 af, Atten= 0%, Lag= 0.0 min
Primary = 2.7 cfs @ 12.36 hrs, Volume= 0.345 af
Secondary = 3.4 cfs @ 12.55 hrs, Volume= 0.423 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 58.51' @ 12.55 hrs Surf.Area= 94 sf Storage= 1 cf
Flood Elev= 60.10' Surf.Area= 1,755 sf Storage= 1,813 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (862.6 - 862.6)

Volume	Invert	Avail.Storage	Storage Description
#1	58.50'	1,813 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.50	66	0	0
59.00	1,225	323	323
60.00	1,755	1,490	1,813

Device	Routing	Invert	Outlet Devices
#1	Primary	57.50'	**18.0" Round Culvert SD-4** L= 85.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 57.50' / 57.00' S= 0.0059 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	57.50'	**18.0" Round Culvert SD-5** L= 72.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 57.50' / 57.00' S= 0.0069 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=2.9 cfs @ 12.36 hrs HW=58.50' TW=57.96' (Dynamic Tailwater)
↑—**1=Culvert SD-4** (Outlet Controls 2.9 cfs @ 3.29 fps)

Secondary OutFlow Max=3.4 cfs @ 12.55 hrs HW=58.51' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert SD-5** (Inlet Controls 3.4 cfs @ 2.70 fps)

Summary for Pond 4P: CLVT4

Inflow Area = 0.282 ac, 23.76% Impervious, Inflow Depth = 1.20" for 2-YR event
Inflow = 0.4 cfs @ 12.10 hrs, Volume= 0.028 af
Outflow = 0.3 cfs @ 12.14 hrs, Volume= 0.028 af, Atten= 11%, Lag= 2.8 min
Primary = 0.3 cfs @ 12.14 hrs, Volume= 0.028 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 58.40' @ 12.79 hrs Surf.Area= 476 sf Storage= 109 cf
Flood Elev= 60.10' Surf.Area= 3,087 sf Storage= 2,672 cf

Plug-Flow detention time= 8.3 min calculated for 0.028 af (100% of inflow)
Center-of-Mass det. time= 8.4 min (859.4 - 850.9)

Volume	Invert	Avail.Storage	Storage Description
#1	58.00'	2,672 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.00	74	0	0
59.00	1,091	583	583
60.00	3,087	2,089	2,672

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**15.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 58.00' / 57.50' S= 0.0063 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.3 cfs @ 12.14 hrs HW=58.30' TW=57.20' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.3 cfs @ 1.47 fps)

Summary for Pond 5P: CLVT5

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 0.22" for 2-YR event
Inflow = 0.2 cfs @ 12.66 hrs, Volume= 0.071 af
Outflow = 0.2 cfs @ 12.72 hrs, Volume= 0.071 af, Atten= 2%, Lag= 3.5 min
Primary = 0.2 cfs @ 12.72 hrs, Volume= 0.071 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 61.24' @ 12.72 hrs Surf.Area= 371 sf Storage= 59 cf
Flood Elev= 63.50' Surf.Area= 3,428 sf Storage= 2,935 cf

Plug-Flow detention time= 6.2 min calculated for 0.071 af (100% of inflow)
Center-of-Mass det. time= 5.6 min (986.9 - 981.3)

Volume	Invert	Avail.Storage	Storage Description
#1	61.00'	2,935 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
61.00	119	0	0
62.00	1,161	640	640
63.00	3,428	2,295	2,935

Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	**18.0" Round Culvert** L= 39.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 61.00' / 60.50' S= 0.0128 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=0.2 cfs @ 12.72 hrs HW=61.24' TW=59.25' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.2 cfs @ 1.32 fps)

Summary for Pond 6P: CLVT6

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 0.22" for 2-YR event
Inflow = 0.2 cfs @ 12.72 hrs, Volume= 0.071 af
Outflow = 0.2 cfs @ 12.79 hrs, Volume= 0.071 af, Atten= 3%, Lag= 4.3 min
Primary = 0.2 cfs @ 12.79 hrs, Volume= 0.071 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 59.25' @ 12.79 hrs Surf.Area= 394 sf Storage= 69 cf
Flood Elev= 62.00' Surf.Area= 3,749 sf Storage= 5,819 cf

Plug-Flow detention time= 6.8 min calculated for 0.071 af (100% of inflow)
Center-of-Mass det. time= 6.9 min (993.8 - 986.9)

Volume	Invert	Avail.Storage	Storage Description
#1	59.00'	5,819 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.00	154	0	0
60.00	1,105	630	630
61.00	2,762	1,934	2,563
62.00	3,749	3,256	5,819

Device	Routing	Invert	Outlet Devices
#1	Primary	59.00'	**15.0" Round Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.00' / 58.00' S= 0.0303 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.2 cfs @ 12.79 hrs HW=59.25' TW=57.11' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.2 cfs @ 1.35 fps)

Summary for Pond POND:

Inflow Area = 7.627 ac, 19.79% Impervious, Inflow Depth = 0.71" for 2-YR event
Inflow = 3.3 cfs @ 12.34 hrs, Volume= 0.448 af
Outflow = 1.4 cfs @ 12.66 hrs, Volume= 0.448 af, Atten= 59%, Lag= 19.1 min
Primary = 1.4 cfs @ 12.66 hrs, Volume= 0.448 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 58.41' @ 12.66 hrs Surf.Area= 2,691 sf Storage= 4,730 cf

Plug-Flow detention time= 40.6 min calculated for 0.448 af (100% of inflow)
Center-of-Mass det. time= 40.7 min (907.9 - 867.2)

Volume	Invert	Avail.Storage	Storage Description
#1	56.00'	10,585 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
56.00	1,307	0	0
57.00	1,829	1,568	1,568
58.00	2,423	2,126	3,694
59.00	3,084	2,754	6,448
60.20	3,812	4,138	10,585

Device	Routing	Invert	Outlet Devices
#1	Primary	56.00'	**15.0" Round Culvert** L= 35.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 56.00' / 55.50' S= 0.0143 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	59.20'	**8.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#3	Device 1	56.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	58.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.4 cfs @ 12.66 hrs HW=58.40' TW=56.20' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.4 cfs of 6.2 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 1.4 cfs @ 7.07 fps)
  └**4=Sharp-Crested Rectangular Weir** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=56.00' TW=56.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Link SP-1:

Inflow	=	3.4 cfs @	12.55 hrs,	Volume=	0.423 af
Primary	=	3.4 cfs @	12.55 hrs,	Volume=	0.423 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-2:

Inflow Area = 13.787 ac, 17.37% Impervious, Inflow Depth = 0.94" for 2-YR event
Inflow = 5.7 cfs @ 12.57 hrs, Volume= 1.081 af
Primary = 5.7 cfs @ 12.57 hrs, Volume= 1.081 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-3:

Inflow Area = 4.951 ac, 19.05% Impervious, Inflow Depth = 1.39" for 2-YR event
Inflow = 4.7 cfs @ 12.40 hrs, Volume= 0.574 af
Primary = 4.7 cfs @ 12.40 hrs, Volume= 0.574 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-4:

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 0.22" for 2-YR event
Inflow = 0.2 cfs @ 12.66 hrs, Volume= 0.071 af
Primary = 0.2 cfs @ 12.66 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 10S:

Runoff = 1.9 cfs @ 12.09 hrs, Volume= 0.139 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (ac)	CN	Description
0.066	98	Paved parking, HSG D
0.256	77	Woods, Good, HSG D
0.310	80	>75% Grass cover, Good, HSG D
0.632	81	Weighted Average
0.566		89.56% Pervious Area
0.066		10.44% Impervious Area

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

Summary for Subcatchment 11S:

Runoff = 0.5 cfs @ 12.09 hrs, Volume= 0.038 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (ac)	CN	Description
0.042	98	Paved parking, HSG D
0.109	80	>75% Grass cover, Good, HSG D
0.151	85	Weighted Average
0.109		72.19% Pervious Area
0.042		27.81% Impervious Area

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

Summary for Subcatchment 12S:

Runoff = 2.1 cfs @ 12.21 hrs, Volume= 0.196 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
1,699	98	Paved parking, HSG D
19,994	80	>75% Grass cover, Good, HSG D
20,038	77	Woods, Good, HSG D
41,731	79	Weighted Average
40,032		95.93% Pervious Area
1,699		4.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	75	0.0530	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
2.4	121	0.0280	0.84		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	77	0.0064	1.20		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
15.2	273	Total			

Summary for Subcatchment 13S:

Runoff = 0.8 cfs @ 12.09 hrs, Volume= 0.056 af, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (ac)	CN	Description
0.007	98	Paved parking, HSG A
0.060	98	Paved parking, HSG D
0.043	39	>75% Grass cover, Good, HSG A
0.172	80	>75% Grass cover, Good, HSG D
0.282	78	Weighted Average
0.215		76.24% Pervious Area
0.067		23.76% Impervious Area

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

Summary for Subcatchment 20S:

Runoff = 3.1 cfs @ 12.25 hrs, Volume= 0.320 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.60"

	Area (ac)	CN	Description
*	0.065	98	Existing Impervious, HSG D
*	0.108	98	Exposed Ledge, HSG A
	0.025	98	Paved parking, HSG A
	0.105	98	Paved parking, HSG D
	0.064	39	>75% Grass cover, Good, HSG A
	0.908	80	>75% Grass cover, Good, HSG D
	0.555	30	Woods, Good, HSG A
	0.468	77	Woods, Good, HSG D
	2.298	69	Weighted Average
	1.995		86.81% Pervious Area
	0.303		13.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	75	0.0800	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	103	0.0480	3.29		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
0.1	39	0.0250	10.18	17.99	**Pipe Channel, C-D** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
1.6	59	0.0160	0.63		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
0.0	33	0.0300	11.15	19.71	**Pipe Channel, E-F** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
0.3	69	0.0290	4.57	14.84	**Trap/Vee/Rect Channel Flow, F-G** Bot.W=5.00' D=0.50' Z= 3.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
3.4	184	0.0050	0.90	2.37	**Trap/Vee/Rect Channel Flow, G-H** Bot.W=8.00' D=0.25' Z= 10.0 '/' Top.W=13.00' n= 0.040
0.9	123	0.0080	2.40	7.79	**Trap/Vee/Rect Channel Flow, H-I** Bot.W=5.00' D=0.50' Z= 3.0 '/' Top.W=8.00' n= 0.030
16.8	685	Total			

Summary for Subcatchment 30S: ROAD

Runoff = 2.0 cfs @ 12.09 hrs, Volume= 0.143 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
	6,229	98	Paved parking, HSG A
	7,937	98	Paved parking, HSG D
*	1,181	98	Existing Impervious
	6,215	39	>75% Grass cover, Good, HSG A
	6,882	80	>75% Grass cover, Good, HSG D
	28,444	81	Weighted Average
	13,097		46.04% Pervious Area
	15,347		53.96% Impervious Area

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

Summary for Subcatchment OS1: OFFSITE 1

Runoff = 9.0 cfs @ 12.38 hrs, Volume= 1.087 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (ac)	CN	Description
0.943	98	Paved parking, HSG D
0.405	80	>75% Grass cover, Good, HSG D
3.603	77	Woods, Good, HSG D
4.951	81	Weighted Average
4.008		80.95% Pervious Area
0.943		19.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	75	0.0530	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.2	81	0.0490	1.11		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	118	0.1180	1.72		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
13.6	483	0.0140	0.59		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
27.6	757	Total			

Summary for Subcatchment OS2: OFFSITE 2

Runoff = 1.6 cfs @ 12.47 hrs, Volume= 0.254 af, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (ac)	CN	Description
0.582	98	Paved parking, HSG D
1.923	30	Woods, Good, HSG A
0.969	77	Woods, Good, HSG D
0.231	39	>75% Grass cover, Good, HSG A
0.157	80	>75% Grass cover, Good, HSG D
3.862	55	Weighted Average
3.280		84.93% Pervious Area
0.582		15.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	75	0.0730	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.9	85	0.0940	1.53		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
15.3	544	0.0140	0.59		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
26.5	704	Total			

Summary for Reach 1R:

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 3.53" for 10-YR event
Inflow = 8.3 cfs @ 12.52 hrs, Volume= 1.135 af
Outflow = 8.3 cfs @ 12.53 hrs, Volume= 1.135 af, Atten= 0%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.70 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.48 fps, Avg. Travel Time= 3.4 min

Peak Storage= 475 cf @ 12.53 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 123.7 cfs

20.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 98.0' Slope= 0.0102 '/'
Inlet Invert= 57.00', Outlet Invert= 56.00'

‡

Summary for Reach 2R:

Inflow Area = 13.787 ac, 17.37% Impervious, Inflow Depth = 1.94" for 10-YR event
Inflow = 14.5 cfs @ 12.48 hrs, Volume= 2.231 af
Outflow = 14.5 cfs @ 12.49 hrs, Volume= 2.231 af, Atten= 0%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.60 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.85 fps, Avg. Travel Time= 4.0 min

Peak Storage= 821 cf @ 12.49 hrs
Average Depth at Peak Storage= 0.35'
Bank-Full Depth= 1.00' Flow Area= 18.0 sf, Capacity= 116.0 cfs

8.00' x 1.00' deep channel, n= 0.012 Concrete pipe, finished
Side Slope Z-value= 10.0 '/' Top Width= 28.00'
Length= 204.0' Slope= 0.0049 '/'
Inlet Invert= 56.00', Outlet Invert= 55.00'

‡

Summary for Reach 3R:

Inflow Area = 13.787 ac, 17.37% Impervious, Inflow Depth = 1.94" for 10-YR event
Inflow = 14.5 cfs @ 12.49 hrs, Volume= 2.231 af
Outflow = 14.5 cfs @ 12.49 hrs, Volume= 2.231 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.10 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.66 fps, Avg. Travel Time= 2.6 min

Peak Storage= 481 cf @ 12.49 hrs
Average Depth at Peak Storage= 0.67'
Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 31.0 cfs

5.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 103.0' Slope= 0.0097 '/'
Inlet Invert= 55.00', Outlet Invert= 54.00'

‡

Summary for Reach 4R:

Inflow Area = 4.951 ac, 19.05% Impervious, Inflow Depth = 2.63" for 10-YR event
Inflow = 9.0 cfs @ 12.38 hrs, Volume= 1.087 af
Outflow = 8.9 cfs @ 12.40 hrs, Volume= 1.087 af, Atten= 0%, Lag= 1.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.86 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 4.4 min

Peak Storage= 770 cf @ 12.40 hrs
Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 0.50' Flow Area= 6.5 sf, Capacity= 13.7 cfs

8.00' x 0.50' deep channel, n= 0.040
Side Slope Z-value= 10.0 '/' Top Width= 18.00'
Length= 160.0' Slope= 0.0125 '/'
Inlet Invert= 64.00', Outlet Invert= 62.00'

‡

Summary for Pond 1P: CLVT1

Inflow Area = 5.583 ac, 18.07% Impervious, Inflow Depth = 2.63" for 10-YR event
Inflow = 9.6 cfs @ 12.39 hrs, Volume= 1.226 af
Outflow = 9.6 cfs @ 12.40 hrs, Volume= 1.225 af, Atten= 0%, Lag= 0.8 min
Primary = 9.6 cfs @ 12.40 hrs, Volume= 1.225 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 62.22' @ 12.42 hrs Surf.Area= 564 sf Storage= 316 cf
Flood Elev= 64.10' Surf.Area= 4,565 sf Storage= 4,337 cf

Plug-Flow detention time= 1.8 min calculated for 1.225 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (843.5 - 842.8)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	4,337 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
60.00	34	0	0
61.00	92	63	63
62.00	237	165	228
63.00	1,708	973	1,200
64.00	4,565	3,137	4,337

Device	Routing	Invert	Outlet Devices
#1	Primary	60.50'	**24.0" Round Culvert** L= 51.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 60.50' / 60.20' S= 0.0059 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=9.4 cfs @ 12.40 hrs HW=62.22' TW=61.47' (Dynamic Tailwater)
1=Culvert (Inlet Controls 9.4 cfs @ 3.28 fps)

Summary for Pond 2P: CLVT2

Inflow Area = 5.734 ac, 18.33% Impervious, Inflow Depth = 2.64" for 10-YR event
Inflow = 9.8 cfs @ 12.40 hrs, Volume= 1.263 af
Outflow = 9.6 cfs @ 12.45 hrs, Volume= 1.262 af, Atten= 2%, Lag= 3.1 min
Primary = 9.6 cfs @ 12.45 hrs, Volume= 1.262 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 61.49' @ 12.45 hrs Surf.Area= 1,584 sf Storage= 1,562 cf
Flood Elev= 62.10' Surf.Area= 1,750 sf Storage= 2,405 cf

Plug-Flow detention time= 2.5 min calculated for 1.261 af (100% of inflow)
Center-of-Mass det. time= 2.1 min (844.6 - 842.6)

Volume	Invert	Avail.Storage	Storage Description
#1	59.00'	2,405 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.00	28	0	0
60.00	94	61	61
61.00	1,422	758	819
62.00	1,750	1,586	2,405

Device	Routing	Invert	Outlet Devices
#1	Primary	59.75'	**24.0" Round Culvert** L= 45.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.75' / 59.50' S= 0.0056 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=9.6 cfs @ 12.45 hrs HW=61.49' TW=59.26' (Dynamic Tailwater)
1=Culvert (Barrel Controls 9.6 cfs @ 4.39 fps)

Summary for Pond 3P: CLVT3

Inflow Area = 6.692 ac, 16.29% Impervious, Inflow Depth = 2.62" for 10-YR event
Inflow = 10.8 cfs @ 12.42 hrs, Volume= 1.459 af
Outflow = 10.6 cfs @ 12.47 hrs, Volume= 1.459 af, Atten= 2%, Lag= 2.8 min
Primary = 3.8 cfs @ 12.46 hrs, Volume= 0.577 af
Secondary = 6.8 cfs @ 12.49 hrs, Volume= 0.881 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 59.27' @ 12.49 hrs Surf.Area= 1,367 sf Storage= 671 cf
Flood Elev= 60.10' Surf.Area= 1,755 sf Storage= 1,813 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.3 min (843.9 - 843.6)

Volume	Invert	Avail.Storage	Storage Description
#1	58.50'	1,813 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.50	66	0	0
59.00	1,225	323	323
60.00	1,755	1,490	1,813

Device	Routing	Invert	Outlet Devices
#1	Primary	57.50'	**18.0" Round Culvert SD-4** L= 85.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 57.50' / 57.00' S= 0.0059 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	57.50'	**18.0" Round Culvert SD-5** L= 72.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 57.50' / 57.00' S= 0.0069 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=3.7 cfs @ 12.46 hrs HW=59.26' TW=58.95' (Dynamic Tailwater)
↑—**1=Culvert SD-4** (Inlet Controls 3.7 cfs @ 2.11 fps)

Secondary OutFlow Max=6.8 cfs @ 12.49 hrs HW=59.27' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert SD-5** (Inlet Controls 6.8 cfs @ 3.83 fps)

Summary for Pond 4P: CLVT4

Inflow Area = 0.282 ac, 23.76% Impervious, Inflow Depth = 2.38" for 10-YR event
Inflow = 0.8 cfs @ 12.09 hrs, Volume= 0.056 af
Outflow = 0.7 cfs @ 12.12 hrs, Volume= 0.056 af, Atten= 14%, Lag= 1.5 min
Primary = 0.7 cfs @ 12.12 hrs, Volume= 0.056 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 58.94' @ 12.63 hrs Surf.Area= 1,026 sf Storage= 515 cf
Flood Elev= 60.10' Surf.Area= 3,087 sf Storage= 2,672 cf

Plug-Flow detention time= 13.3 min calculated for 0.056 af (100% of inflow)
Center-of-Mass det. time= 13.3 min (844.2 - 830.9)

Volume	Invert	Avail.Storage	Storage Description
#1	58.00'	2,672 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.00	74	0	0
59.00	1,091	583	583
60.00	3,087	2,089	2,672

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**15.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 58.00' / 57.50' S= 0.0063 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.5 cfs @ 12.12 hrs HW=58.43' TW=58.14' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.5 cfs @ 1.94 fps)

Summary for Pond 5P: CLVT5

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 0.79" for 10-YR event
Inflow = 1.6 cfs @ 12.47 hrs, Volume= 0.254 af
Outflow = 1.6 cfs @ 12.53 hrs, Volume= 0.254 af, Atten= 2%, Lag= 3.3 min
Primary = 1.6 cfs @ 12.53 hrs, Volume= 0.254 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 61.65' @ 12.53 hrs Surf.Area= 795 sf Storage= 297 cf
Flood Elev= 63.50' Surf.Area= 3,428 sf Storage= 2,935 cf

Plug-Flow detention time= 4.6 min calculated for 0.254 af (100% of inflow)
Center-of-Mass det. time= 3.9 min (924.0 - 920.1)

Volume	Invert	Avail.Storage	Storage Description
#1	61.00'	2,935 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
61.00	119	0	0
62.00	1,161	640	640
63.00	3,428	2,295	2,935

Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	**18.0" Round Culvert** L= 39.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 61.00' / 60.50' S= 0.0128 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=1.6 cfs @ 12.53 hrs HW=61.65' TW=59.68' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.6 cfs @ 2.16 fps)

Summary for Pond 6P: CLVT6

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 0.79" for 10-YR event
Inflow = 1.6 cfs @ 12.53 hrs, Volume= 0.254 af
Outflow = 1.6 cfs @ 12.59 hrs, Volume= 0.254 af, Atten= 2%, Lag= 3.9 min
Primary = 1.6 cfs @ 12.59 hrs, Volume= 0.254 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 59.69' @ 12.59 hrs Surf.Area= 810 sf Storage= 333 cf
Flood Elev= 62.00' Surf.Area= 3,749 sf Storage= 5,819 cf

Plug-Flow detention time= 4.6 min calculated for 0.253 af (100% of inflow)
Center-of-Mass det. time= 4.7 min (928.7 - 924.0)

Volume	Invert	Avail.Storage	Storage Description
#1	59.00'	5,819 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.00	154	0	0
60.00	1,105	630	630
61.00	2,762	1,934	2,563
62.00	3,749	3,256	5,819

Device	Routing	Invert	Outlet Devices
#1	Primary	59.00'	**15.0" Round Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.00' / 58.00' S= 0.0303 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.5 cfs @ 12.59 hrs HW=59.69' TW=57.22' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.5 cfs @ 2.23 fps)

Summary for Pond POND:

Inflow Area = 7.627 ac, 19.79% Impervious, Inflow Depth = 1.22" for 10-YR event
Inflow = 6.0 cfs @ 12.12 hrs, Volume= 0.776 af
Outflow = 4.3 cfs @ 12.50 hrs, Volume= 0.776 af, Atten= 29%, Lag= 22.7 min
Primary = 4.3 cfs @ 12.50 hrs, Volume= 0.776 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 58.96' @ 12.50 hrs Surf.Area= 3,055 sf Storage= 6,315 cf

Plug-Flow detention time= 36.6 min calculated for 0.775 af (100% of inflow)
Center-of-Mass det. time= 36.8 min (891.6 - 854.8)

Volume	Invert	Avail.Storage	Storage Description
#1	56.00'	10,585 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
56.00	1,307	0	0
57.00	1,829	1,568	1,568
58.00	2,423	2,126	3,694
59.00	3,084	2,754	6,448
60.20	3,812	4,138	10,585

Device	Routing	Invert	Outlet Devices
#1	Primary	56.00'	**15.0" Round Culvert** L= 35.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 56.00' / 55.50' S= 0.0143 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	59.20'	**8.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#3	Device 1	56.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	58.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=4.3 cfs @ 12.50 hrs HW=58.96' TW=56.35' (Dynamic Tailwater)
└**1=Culvert** (Passes 4.3 cfs of 7.1 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 1.5 cfs @ 7.77 fps)
  └**4=Sharp-Crested Rectangular Weir** (Weir Controls 2.7 cfs @ 1.95 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=56.00' TW=56.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Link SP-1:

Inflow	=	6.8 cfs @	12.49 hrs,	Volume=	0.881 af
Primary	=	6.8 cfs @	12.49 hrs,	Volume=	0.881 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-2:

Inflow Area = 13.787 ac, 17.37% Impervious, Inflow Depth = 1.94" for 10-YR event
Inflow = 14.5 cfs @ 12.49 hrs, Volume= 2.231 af
Primary = 14.5 cfs @ 12.49 hrs, Volume= 2.231 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-3:

Inflow Area = 4.951 ac, 19.05% Impervious, Inflow Depth = 2.63" for 10-YR event
Inflow = 9.0 cfs @ 12.38 hrs, Volume= 1.087 af
Primary = 9.0 cfs @ 12.38 hrs, Volume= 1.087 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-4:

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 0.79" for 10-YR event
Inflow = 1.6 cfs @ 12.47 hrs, Volume= 0.254 af
Primary = 1.6 cfs @ 12.47 hrs, Volume= 0.254 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 10S:

Runoff = 2.7 cfs @ 12.09 hrs, Volume= 0.195 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (ac)	CN	Description
0.066	98	Paved parking, HSG D
0.256	77	Woods, Good, HSG D
0.310	80	>75% Grass cover, Good, HSG D
0.632	81	Weighted Average
0.566		89.56% Pervious Area
0.066		10.44% Impervious Area

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

Summary for Subcatchment 11S:

Runoff = 0.7 cfs @ 12.09 hrs, Volume= 0.052 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (ac)	CN	Description
0.042	98	Paved parking, HSG D
0.109	80	>75% Grass cover, Good, HSG D
0.151	85	Weighted Average
0.109		72.19% Pervious Area
0.042		27.81% Impervious Area

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

Summary for Subcatchment 12S:

Runoff = 2.9 cfs @ 12.21 hrs, Volume= 0.280 af, Depth= 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
1,699	98	Paved parking, HSG D
19,994	80	>75% Grass cover, Good, HSG D
20,038	77	Woods, Good, HSG D
41,731	79	Weighted Average
40,032		95.93% Pervious Area
1,699		4.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	75	0.0530	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
2.4	121	0.0280	0.84		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	77	0.0064	1.20		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
15.2	273	Total			

Summary for Subcatchment 13S:

Runoff = 1.1 cfs @ 12.09 hrs, Volume= 0.080 af, Depth= 3.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (ac)	CN	Description
0.007	98	Paved parking, HSG A
0.060	98	Paved parking, HSG D
0.043	39	>75% Grass cover, Good, HSG A
0.172	80	>75% Grass cover, Good, HSG D
0.282	78	Weighted Average
0.215		76.24% Pervious Area
0.067		23.76% Impervious Area

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

Summary for Subcatchment 20S:

Runoff = 4.9 cfs @ 12.24 hrs, Volume= 0.490 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.80"

	Area (ac)	CN	Description
*	0.065	98	Existing Impervious, HSG D
*	0.108	98	Exposed Ledge, HSG A
	0.025	98	Paved parking, HSG A
	0.105	98	Paved parking, HSG D
	0.064	39	>75% Grass cover, Good, HSG A
	0.908	80	>75% Grass cover, Good, HSG D
	0.555	30	Woods, Good, HSG A
	0.468	77	Woods, Good, HSG D
	2.298	69	Weighted Average
	1.995		86.81% Pervious Area
	0.303		13.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	75	0.0800	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	103	0.0480	3.29		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
0.1	39	0.0250	10.18	17.99	**Pipe Channel, C-D** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
1.6	59	0.0160	0.63		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
0.0	33	0.0300	11.15	19.71	**Pipe Channel, E-F** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
0.3	69	0.0290	4.57	14.84	**Trap/Vee/Rect Channel Flow, F-G** Bot.W=5.00' D=0.50' Z= 3.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
3.4	184	0.0050	0.90	2.37	**Trap/Vee/Rect Channel Flow, G-H** Bot.W=8.00' D=0.25' Z= 10.0 '/' Top.W=13.00' n= 0.040
0.9	123	0.0080	2.40	7.79	**Trap/Vee/Rect Channel Flow, H-I** Bot.W=5.00' D=0.50' Z= 3.0 '/' Top.W=8.00' n= 0.030
16.8	685	Total			

Summary for Subcatchment 30S: ROAD

Runoff = 2.8 cfs @ 12.09 hrs, Volume= 0.201 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.80"

	Area (sf)	CN	Description
	6,229	98	Paved parking, HSG A
	7,937	98	Paved parking, HSG D
*	1,181	98	Existing Impervious
	6,215	39	>75% Grass cover, Good, HSG A
	6,882	80	>75% Grass cover, Good, HSG D
	28,444	81	Weighted Average
	13,097		46.04% Pervious Area
	15,347		53.96% Impervious Area

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

Summary for Subcatchment OS1: OFFSITE 1

Runoff = 12.6 cfs @ 12.38 hrs, Volume= 1.527 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (ac)	CN	Description
0.943	98	Paved parking, HSG D
0.405	80	>75% Grass cover, Good, HSG D
3.603	77	Woods, Good, HSG D
4.951	81	Weighted Average
4.008		80.95% Pervious Area
0.943		19.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	75	0.0530	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.2	81	0.0490	1.11		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	118	0.1180	1.72		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
13.6	483	0.0140	0.59		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
27.6	757	Total			

Summary for Subcatchment OS2: OFFSITE 2

Runoff = 3.3 cfs @ 12.43 hrs, Volume= 0.452 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (ac)	CN	Description
0.582	98	Paved parking, HSG D
1.923	30	Woods, Good, HSG A
0.969	77	Woods, Good, HSG D
0.231	39	>75% Grass cover, Good, HSG A
0.157	80	>75% Grass cover, Good, HSG D
3.862	55	Weighted Average
3.280		84.93% Pervious Area
0.582		15.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	75	0.0730	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.9	85	0.0940	1.53		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
15.3	544	0.0140	0.59		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
26.5	704	Total			

Summary for Reach 1R:

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 5.22" for 25-YR event
Inflow = 11.5 cfs @ 12.54 hrs, Volume= 1.680 af
Outflow = 11.5 cfs @ 12.55 hrs, Volume= 1.680 af, Atten= 0%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.92 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 3.1 min

Peak Storage= 589 cf @ 12.55 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 123.7 cfs

20.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 98.0' Slope= 0.0102 '/'
Inlet Invert= 57.00', Outlet Invert= 56.00'

‡

Summary for Reach 2R:

Inflow Area = 13.787 ac, 17.37% Impervious, Inflow Depth = 2.85" for 25-YR event
Inflow = 21.0 cfs @ 12.46 hrs, Volume= 3.275 af
Outflow = 21.0 cfs @ 12.47 hrs, Volume= 3.275 af, Atten= 0%, Lag= 0.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.02 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.93 fps, Avg. Travel Time= 3.7 min

Peak Storage= 1,067 cf @ 12.47 hrs
Average Depth at Peak Storage= 0.43'
Bank-Full Depth= 1.00' Flow Area= 18.0 sf, Capacity= 116.0 cfs

8.00' x 1.00' deep channel, n= 0.012 Concrete pipe, finished
Side Slope Z-value= 10.0 '/' Top Width= 28.00'
Length= 204.0' Slope= 0.0049 '/'
Inlet Invert= 56.00', Outlet Invert= 55.00'

‡

Summary for Reach 3R:

Inflow Area = 13.787 ac, 17.37% Impervious, Inflow Depth = 2.85" for 25-YR event
Inflow = 21.0 cfs @ 12.47 hrs, Volume= 3.275 af
Outflow = 21.0 cfs @ 12.47 hrs, Volume= 3.275 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.46 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.73 fps, Avg. Travel Time= 2.3 min

Peak Storage= 625 cf @ 12.47 hrs
Average Depth at Peak Storage= 0.82'
Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 31.0 cfs

5.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 103.0' Slope= 0.0097 '/'
Inlet Invert= 55.00', Outlet Invert= 54.00'

‡

Summary for Reach 4R:

Inflow Area = 4.951 ac, 19.05% Impervious, Inflow Depth = 3.70" for 25-YR event
Inflow = 12.6 cfs @ 12.38 hrs, Volume= 1.527 af
Outflow = 12.5 cfs @ 12.39 hrs, Volume= 1.527 af, Atten= 0%, Lag= 1.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.05 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.67 fps, Avg. Travel Time= 4.0 min

Peak Storage= 978 cf @ 12.39 hrs
Average Depth at Peak Storage= 0.48'
Bank-Full Depth= 0.50' Flow Area= 6.5 sf, Capacity= 13.7 cfs

8.00' x 0.50' deep channel, n= 0.040
Side Slope Z-value= 10.0 '/' Top Width= 18.00'
Length= 160.0' Slope= 0.0125 '/'
Inlet Invert= 64.00', Outlet Invert= 62.00'

‡

Summary for Pond 1P: CLVT1

Inflow Area = 5.583 ac, 18.07% Impervious, Inflow Depth = 3.70" for 25-YR event
Inflow = 13.5 cfs @ 12.38 hrs, Volume= 1.722 af
Outflow = 12.6 cfs @ 12.45 hrs, Volume= 1.722 af, Atten= 6%, Lag= 4.0 min
Primary = 12.6 cfs @ 12.45 hrs, Volume= 1.722 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 62.95' @ 12.48 hrs Surf.Area= 1,638 sf Storage= 1,120 cf
Flood Elev= 64.10' Surf.Area= 4,565 sf Storage= 4,337 cf

Plug-Flow detention time= 1.1 min calculated for 1.720 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (833.7 - 832.8)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	4,337 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
60.00	34	0	0
61.00	92	63	63
62.00	237	165	228
63.00	1,708	973	1,200
64.00	4,565	3,137	4,337

Device	Routing	Invert	Outlet Devices
#1	Primary	60.50'	**24.0" Round Culvert** L= 51.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 60.50' / 60.20' S= 0.0059 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=12.4 cfs @ 12.45 hrs HW=62.93' TW=61.86' (Dynamic Tailwater)
1=Culvert (Inlet Controls 12.4 cfs @ 3.94 fps)

Summary for Pond 2P: CLVT2

Inflow Area = 5.734 ac, 18.33% Impervious, Inflow Depth = 3.71" for 25-YR event
Inflow = 12.8 cfs @ 12.44 hrs, Volume= 1.774 af
Outflow = 12.6 cfs @ 12.49 hrs, Volume= 1.773 af, Atten= 1%, Lag= 3.2 min
Primary = 12.6 cfs @ 12.49 hrs, Volume= 1.773 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 61.87' @ 12.49 hrs Surf.Area= 1,709 sf Storage= 2,187 cf
Flood Elev= 62.10' Surf.Area= 1,750 sf Storage= 2,405 cf

Plug-Flow detention time= 3.2 min calculated for 1.773 af (100% of inflow)
Center-of-Mass det. time= 2.2 min (834.9 - 832.8)

Volume	Invert	Avail.Storage	Storage Description
#1	59.00'	2,405 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.00	28	0	0
60.00	94	61	61
61.00	1,422	758	819
62.00	1,750	1,586	2,405

Device	Routing	Invert	Outlet Devices
#1	Primary	59.75'	**24.0" Round Culvert** L= 45.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.75' / 59.50' S= 0.0056 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=12.6 cfs @ 12.49 hrs HW=61.87' TW=59.83' (Dynamic Tailwater)
1=Culvert (Barrel Controls 12.6 cfs @ 4.71 fps)

Summary for Pond 3P: CLVT3

Inflow Area = 6.692 ac, 16.29% Impervious, Inflow Depth = 3.68" for 25-YR event
Inflow = 14.3 cfs @ 12.44 hrs, Volume= 2.052 af
Outflow = 14.1 cfs @ 12.51 hrs, Volume= 2.052 af, Atten= 2%, Lag= 4.1 min
Primary = 5.6 cfs @ 12.50 hrs, Volume= 0.824 af
Secondary = 8.4 cfs @ 12.51 hrs, Volume= 1.228 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 59.83' @ 12.51 hrs Surf.Area= 1,665 sf Storage= 1,521 cf
Flood Elev= 60.10' Surf.Area= 1,755 sf Storage= 1,813 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.6 min (834.4 - 833.8)

Volume	Invert	Avail.Storage	Storage Description
#1	58.50'	1,813 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.50	66	0	0
59.00	1,225	323	323
60.00	1,755	1,490	1,813

Device	Routing	Invert	Outlet Devices
#1	Primary	57.50'	**18.0" Round Culvert SD-4** L= 85.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 57.50' / 57.00' S= 0.0059 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	57.50'	**18.0" Round Culvert SD-5** L= 72.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 57.50' / 57.00' S= 0.0069 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=5.6 cfs @ 12.50 hrs HW=59.83' TW=59.13' (Dynamic Tailwater)
↑—**1=Culvert SD-4** (Inlet Controls 5.6 cfs @ 3.17 fps)

Secondary OutFlow Max=8.4 cfs @ 12.51 hrs HW=59.83' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert SD-5** (Inlet Controls 8.4 cfs @ 4.77 fps)

Summary for Pond 4P: CLVT4

Inflow Area = 0.282 ac, 23.76% Impervious, Inflow Depth = 3.40" for 25-YR event
Inflow = 1.1 cfs @ 12.09 hrs, Volume= 0.080 af
Outflow = 0.7 cfs @ 12.08 hrs, Volume= 0.080 af, Atten= 37%, Lag= 0.0 min
Primary = 0.7 cfs @ 12.08 hrs, Volume= 0.080 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 59.14' @ 12.54 hrs Surf.Area= 1,362 sf Storage= 749 cf
Flood Elev= 60.10' Surf.Area= 3,087 sf Storage= 2,672 cf

Plug-Flow detention time= 16.0 min calculated for 0.080 af (100% of inflow)
Center-of-Mass det. time= 15.3 min (835.9 - 820.6)

Volume	Invert	Avail.Storage	Storage Description
#1	58.00'	2,672 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.00	74	0	0
59.00	1,091	583	583
60.00	3,087	2,089	2,672

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**15.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 58.00' / 57.50' S= 0.0063 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.0 cfs @ 12.08 hrs HW=58.53' TW=58.59' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.0 cfs)

Summary for Pond 5P: CLVT5

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 1.40" for 25-YR event
Inflow = 3.3 cfs @ 12.43 hrs, Volume= 0.452 af
Outflow = 3.2 cfs @ 12.49 hrs, Volume= 0.452 af, Atten= 2%, Lag= 3.7 min
Primary = 3.2 cfs @ 12.49 hrs, Volume= 0.452 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 61.98' @ 12.49 hrs Surf.Area= 1,137 sf Storage= 613 cf
Flood Elev= 63.50' Surf.Area= 3,428 sf Storage= 2,935 cf

Plug-Flow detention time= 3.6 min calculated for 0.451 af (100% of inflow)
Center-of-Mass det. time= 3.6 min (902.3 - 898.8)

Volume	Invert	Avail.Storage	Storage Description
#1	61.00'	2,935 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
61.00	119	0	0
62.00	1,161	640	640
63.00	3,428	2,295	2,935

Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	**18.0" Round Culvert** L= 39.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 61.00' / 60.50' S= 0.0128 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=3.2 cfs @ 12.49 hrs HW=61.98' TW=60.04' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.2 cfs @ 2.65 fps)

Summary for Pond 6P: CLVT6

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 1.40" for 25-YR event
Inflow = 3.2 cfs @ 12.49 hrs, Volume= 0.452 af
Outflow = 3.1 cfs @ 12.57 hrs, Volume= 0.452 af, Atten= 4%, Lag= 4.8 min
Primary = 3.1 cfs @ 12.57 hrs, Volume= 0.452 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 60.07' @ 12.57 hrs Surf.Area= 1,225 sf Storage= 714 cf
Flood Elev= 62.00' Surf.Area= 3,749 sf Storage= 5,819 cf

Plug-Flow detention time= 4.7 min calculated for 0.452 af (100% of inflow)
Center-of-Mass det. time= 4.2 min (906.6 - 902.3)

Volume	Invert	Avail.Storage	Storage Description
#1	59.00'	5,819 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.00	154	0	0
60.00	1,105	630	630
61.00	2,762	1,934	2,563
62.00	3,749	3,256	5,819

Device	Routing	Invert	Outlet Devices
#1	Primary	59.00'	**15.0" Round Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.00' / 58.00' S= 0.0303 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=3.1 cfs @ 12.57 hrs HW=60.07' TW=57.26' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.1 cfs @ 2.78 fps)

Summary for Pond POND:

Inflow Area = 7.627 ac, 19.79% Impervious, Inflow Depth = 1.74" for 25-YR event
Inflow = 6.9 cfs @ 12.09 hrs, Volume= 1.106 af
Outflow = 6.5 cfs @ 12.49 hrs, Volume= 1.105 af, Atten= 6%, Lag= 23.9 min
Primary = 6.5 cfs @ 12.49 hrs, Volume= 1.105 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 59.13' @ 12.49 hrs Surf.Area= 3,165 sf Storage= 6,863 cf

Plug-Flow detention time= 32.5 min calculated for 1.104 af (100% of inflow)
Center-of-Mass det. time= 32.8 min (874.3 - 841.6)

Volume	Invert	Avail.Storage	Storage Description
#1	56.00'	10,585 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
56.00	1,307	0	0
57.00	1,829	1,568	1,568
58.00	2,423	2,126	3,694
59.00	3,084	2,754	6,448
60.20	3,812	4,138	10,585

Device	Routing	Invert	Outlet Devices
#1	Primary	56.00'	**15.0" Round Culvert** L= 35.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 56.00' / 55.50' S= 0.0143 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	59.20'	**8.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#3	Device 1	56.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	58.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=6.5 cfs @ 12.49 hrs HW=59.13' TW=56.43' (Dynamic Tailwater)
└**1=Culvert** (Passes 6.5 cfs of 7.4 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 1.6 cfs @ 7.92 fps)
  └**4=Sharp-Crested Rectangular Weir** (Weir Controls 4.9 cfs @ 2.39 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=56.00' TW=56.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Link SP-1:

Inflow	=	8.4 cfs @	12.51 hrs, Volume=	1.228 af
Primary	=	8.4 cfs @	12.51 hrs, Volume=	1.228 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-2:

Inflow Area = 13.787 ac, 17.37% Impervious, Inflow Depth = 2.85" for 25-YR event
Inflow = 21.0 cfs @ 12.47 hrs, Volume= 3.275 af
Primary = 21.0 cfs @ 12.47 hrs, Volume= 3.275 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-3:

Inflow Area = 4.951 ac, 19.05% Impervious, Inflow Depth = 3.70" for 25-YR event
Inflow = 12.6 cfs @ 12.38 hrs, Volume= 1.527 af
Primary = 12.6 cfs @ 12.38 hrs, Volume= 1.527 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-4:

Inflow Area = 3.862 ac, 15.07% Impervious, Inflow Depth = 1.40" for 25-YR event
Inflow = 3.3 cfs @ 12.43 hrs, Volume= 0.452 af
Primary = 3.3 cfs @ 12.43 hrs, Volume= 0.452 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

APPENDIX C

STORMWATER QUALITY CALCULATIONS

Capisic Meadows
Project No. 41041

TABLE 1
MDEP WATER QUALITY VOLUME CALCULATIONS
IMPERVIOUS AREA / DEVELOPED AREA SUMMARY

Subcatchment ID	Description	Lot Impervious	Lot Undisturbed	Lot Developed	Start Station	End Station	Row Length (ft)	ROW Width (ft)	Road Paved Width (ft)	Walk Width (ft)	Esplande Width (ft)	ROW Impervious (ft)	ROW Landscaped (ft)	New Imp Area (s.f.)	Subtotals	New Developed Area	Subtotals
	STA 0+00 - 0+62.78				0	62.78	62.78	50	28	5	17	2072	1067	2072		3139	
	STA 0+62.78 - 4+02				62.78	402	339.22	50	28	5	17	11194	5767	11194		16961	
	Hammerhead											900	0	900		900	
														Subtotal	14166	Subtotal	21000

Total New Impervious Area =	**14,166**
Min Treatment Area (75%) =	**10,625**

Total New Developed Area =	**21,000**
Min Treatment Area (50%) =	**10,500**

Capisic Meadows
Project No. 41041

TABLE 2
CAPISIC MEADOWS
IMPERVIOUS AREA / DEVELOPED AREA
TREATMENT SUMMARY

Description	Lot Impervious	Lot Developed	ROW Impervious (ft)	ROW Landscaped (ft)	New imp area (S.F.)	Landscaped AREA (acre)	Receives Treatment (Yes/No)	IMP AREA TREATED	DEVELOPED AREA TREATED
STA 0+00 - 0+62.78			2071.74	1067.26	2072	1067	N	0	0
STA 0+62.78 - 4+02			11194.26	5766.74	11194	5767	YES	11194	16961
Hammerhead			900	0	900	0	YES	900	900
					14166	**6834**		**12094**	**17861**

TOTAL NEW IMPERVIOUS AREA	**14166**
TOTAL NEW IMPERVIOUS AREA REQUIRING TREATMENT	**10,625**
TOTAL NEW IMPERVIOUS ARE RECEIVING TREATMENT	**12094**
% OF NEW IMPERVIOUS AREA RECEIVING TREATMENT	**85%**

TOTAL NEW DEVELOPED AREA	**21000**
TOTAL NEW DEVELOPED AREA REQUIRING TREATMENT	**10,500**
TOTAL NEW DEVELOPED AREA RECEIVING TREATMENT	**17861**
% OF NEW DEVELOPED AREA RECEIVING TREATMENT	**85%**

APPENDIX D

MAINTENANCE PLAN AND LOG

41041

INSPECTION, MAINTENANCE, AND HOUSEKEEPING PLAN

Capisic Meadows Subdivision
Bancroft Street
Portland, Maine

Introduction

The following plan outlines the anticipated inspection and maintenance procedures for the erosion and sedimentation controls as well as stormwater management devices for the project site. Also, this plan outlines several housekeeping requirements that shall be followed during and after construction. These procedures should be followed in order to ensure the intended function of the designed measures and to prevent unreasonable adverse impacts to the surrounding environment.

The procedures outlined in this inspection and maintenance plan are provided as an overview of the anticipated practices to be used on this site. In some instances, additional measures may be required due to unexpected conditions. For additional detail on any of the erosion and sedimentation control measures or stormwater management devices to be utilized on this project, refer to the most recently revised edition of the "Maine Erosion and Sedimentation Control BMP" manual and/or the "Stormwater Management for Maine: Best Management Practices" manual as published by the Maine Department of Environmental Protection (MDEP).

During Construction

1. **Inspection:** During the construction process, it is the Contractor's responsibility to comply with the inspection and maintenance procedures outlined in this section. These responsibilities include inspecting disturbed and impervious areas, erosion control measures, materials storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site. These areas shall be inspected at least once a week as well as before and after a storm event, and prior to completing permanent stabilization measures. A person with knowledge of erosion and stormwater control, including the standards and conditions in any applicable permits, shall conduct the inspections.

2. **Maintenance:** All measures shall be maintained in an effective operating condition until areas are permanently stabilized. If Best Management Practices (BMPs) need to be maintained or modified, additional BMPs are necessary, or other corrective action is needed, implementation must be completed within 7 calendar days and prior to any storm event (rainfall).

3. **Documentation:** A log summarizing the inspections and any corrective action taken must be maintained on-site. The log must include the name(s) and qualifications of the person

making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of erosion and sedimentation controls, material storage areas, and vehicle access points to the site. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to the appropriate regulatory agency upon request. The permittee shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.

4. **Specific Inspection and Maintenance Tasks:** The following is a list of erosion control and stormwater management measures and the specific inspection and maintenance tasks to be performed during construction.

A. Sediment Barriers:

- Hay bale barriers, silt fences, and filter berms shall be inspected immediately after each rainfall and at least daily during prolonged rainfall.
- If the fabric on a silt fence or filter barrier should decompose or become ineffective prior to the end of the expected usable life and the barrier is still necessary, it shall be replaced.
- Sediment deposits should be removed after each storm event. They must be removed before deposits reach approximately one-half the height of the barrier.
- Filter berms shall be reshaped as needed.
- Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required should be dressed to conform to the existing grade, prepared, and seeded.

B. Riprap Materials:

- Once a riprap installation has been completed, it should require very little maintenance. It shall, however, be inspected periodically to determine if high flows have caused scour beneath the riprap or dislodged any of the stone.

C. Erosion Control Blankets:

- Inspect these reinforced areas semi-annually and after significant rainfall events for slumping, sliding, seepage, and scour. Pay close attention to unreinforced areas adjacent to the erosion control blankets, which may experience accelerated erosion.
- Review all applicable inspection and maintenance procedures recommended by the specific blanket manufacturer. These tasks shall be included in addition to the requirements of this plan.

D. Stone Check Dams:

- Inspect the center of the dam to make sure it is lower than the edges. Erosion caused by high flows around the edges of the dam must be corrected.
- Sediment accumulation shall be removed prior to reaching half of the original design height.
- Areas beneath stone check dams must be seeded and mulched upon removal.

E. Temporary Storm Drain Inlet Protection:

- The inlet protection structure shall be inspected before each rain event and repaired as necessary.
- Sediment shall be removed and the storm drain sediment barrier restored to its original dimensions when the sediment has accumulated to half of the design depth of the trap.
- Structures shall be removed upon permanent stabilization of the tributary area.
- Upon removal of the structure, all accumulated sediments downstream of the structure shall be cleaned from the storm drain system.

F. Stabilized Construction Entrances/Exits:

- The exit shall be maintained in a condition that will prevent tracking of sediment onto public rights-of-way.
- When the control pad becomes ineffective, the stone shall be removed along with the collected soil material. The entrance should then be reconstructed.
- Areas that have received mud-tracking or sediment deposits shall be swept or washed. Washing shall be done on an area stabilized with aggregate, which drains into an approved sediment-trapping device (not into storm drains, ditches, or waterways).

G. Temporary Seed and Mulch:

- Mulched areas should be inspected after rain events to check for rill erosion.
- If less than 90% of the soil surface is covered by mulch, additional mulch shall be applied in bare areas.
- In applications where seeding and mulch have been applied in conjunction with erosion control blankets, the blankets must be inspected after rain events for dislocation or undercutting.
- Mulch shall continue to be reapplied until 95% of the soil surface has established temporary vegetative cover.

Stabilized Temporary Drainage Swales:

- Sediment accumulation in the swale shall be removed once the cross section

of the swale is reduced by 25%.

- The swales shall be inspected after rainfall events. Any evidence of sloughing of the side slopes or channel erosion shall be repaired and corrective action should be taken to prevent reoccurrence of the problem.
- In addition to the stabilized lining of the channel (i.e. erosion control blankets), stone check dams may be needed to further reduce channel velocity.

5. **Housekeeping:** The following general performance standards apply to the proposed project.

   A. Spill prevention: Controls must be used to prevent pollutants from being discharged from materials on-site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.

   B. Groundwater protection: During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors, accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

   C. Fugitive sediment and dust: Actions must be taken to insure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control.

   D. Debris and other materials: Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

   E. Trench or foundation dewatering: Trench dewatering is the removal of water from trenches, foundations, cofferdams, ponds, and other areas within the construction area that retain water after excavation. In most cases, the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved.

After Construction

1. **Inspection:** After construction, it is the responsibility of the owner or assigned heirs to comply with the inspection and maintenance procedures outlined in this section. All

measures must be maintained in effective operating condition. A person with knowledge of erosion and stormwater control, including the standards and conditions in all applicable permits, shall conduct the inspections.

2. **Specific Inspection and Maintenance Tasks:** The following is a list of permanent erosion control and stormwater management measures and the inspection and maintenance tasks to be performed after construction.

A. Vegetated Areas:

- Inspect vegetated areas, particularly slopes and embankments, early in the growing season or after heavy rains to identify active or potential erosion problems.
- Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

B. Ditches, Swales, and Other Open Channels:

- Inspect ditches, swales and other open stormwater channels in the spring, in the late fall, and after heavy rains to remove any obstructions to flow. Remove accumulated sediments and debris, remove woody vegetative growth that could obstruct flow, and repair any erosion of the ditch lining.
- Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity.
- Any woody vegetation growing through riprap linings must also be removed. Repair any slumping side slopes as soon as practicable.
- If the ditch has a riprap lining, replace riprap in areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones have dislodged.

C. Culverts:

- Inspect culverts in the spring, in the late fall, and after heavy rains to remove any obstructions to flow.
- Remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit.
- Inspect and repair any erosion damage at the culvert's inlet and outlet.

D. Catch Basins:

- Inspect and, if required, clean-out catch basins at least once a year, preferably in early spring.
- Clean out must include the removal and legal disposal of accumulated

sediments and debris at the bottom of the basin, at any inlet grates, at any inflow channels to the basin, and at any pipes between basins.

- If the basin outlet is designed to trap floatable materials, then remove the floating debris and any floating oils (using oil-absorptive pads).

E. Winter Sanding:

- Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring.
- Accumulations on pavement may be removed by pavement sweeping.
- 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 or other acceptable method.

1. **Documentation:** A log summarizing the inspections and any corrective action taken must be maintained. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of controls. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to the appropriate regulatory agency upon request. A sample "Stormwater Inspection and Maintenance Form" has been included as Attachment 1 of this Inspection, Maintenance, and Housekeeping Plan.

2. **Duration of Maintenance:** Perform maintenance as described and required for any associated permits unless and until the system is formally accepted by a municipality or quasi-municipal district, or is placed under the jurisdiction of a legally created association that will be responsible for the maintenance of the system.

Capisic Meadows

BMP MAINTENANCE LOG PAGE____

BMP STRUCTURE	INSPECTOR (NAME)	WORK PERFORMED	DATE PERFORMED	COMMENTS
Filterra Units				
Catchbasin				
Vegetated Areas				
Sweep Roadway				
Grassed Swales				
Rip Rap				
Other				
Additional Comments:				

Operation & Maintenance (OM) Manual v01

filterra®

Bioretention Systems

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Table of Contents

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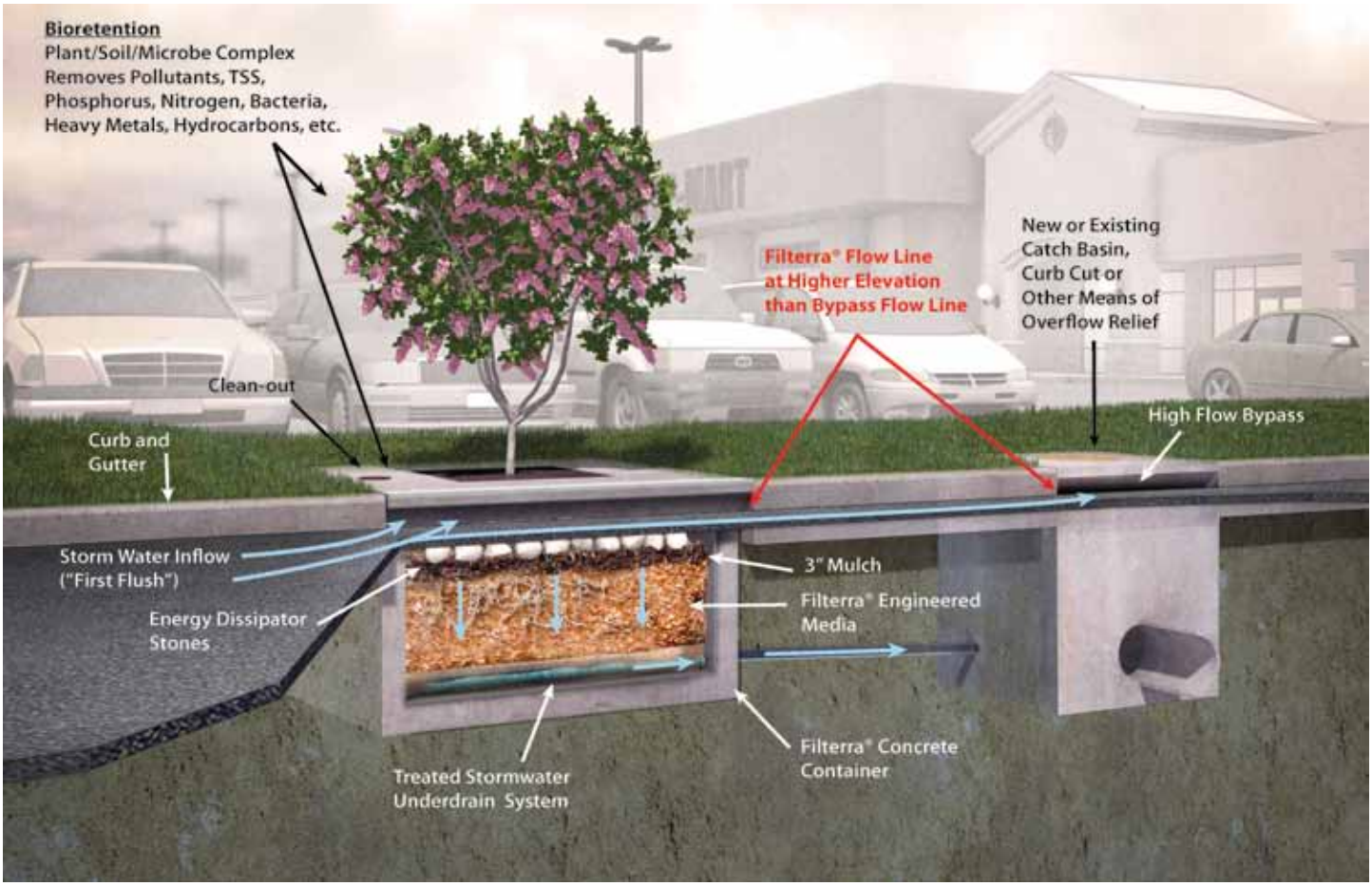
General Description

The following general specifications describe the general operations and maintenance requirements for the Contech Engineered Solutions LLC stormwater bioretention filtration system, the Filterra. The system utilizes physical, chemical and biological mechanisms of a soil, plant and microbe complex to remove pollutants typically found in urban stormwater runoff. The treatment system is a fully equipped, pre-constructed drop-in place unit designed for applications in the urban landscape to treat contaminated runoff.



Stormwater flows through a specially designed filter media mixture contained in a landscaped concrete container. The mixture immobilizes pollutants which are then decomposed, volatilized and incorporated into the biomass of the Filterra system's micro/macro fauna and flora. Stormwater runoff flows through the media and into an underdrain system at the bottom of the container, where the treated water is discharged. Higher flows bypass the Filterra to a downstream inlet or outfall. Maintenance is a simple, inexpensive and safe operation that does not require confined space access, pumping or vacuum equipment or specialized tools. Properly trained landscape personnel can effectively maintain Filterra Stormwater systems by following instructions in this manual.

Basic Operations

Filterra is a bioretention system in a concrete box. Contaminated stormwater runoff enters the filter box through the curb inlet spreading over the 3-inch layer of mulch on the surface of the filter media. As the water passes through the mulch layer, most of the larger sediment particles and heavy metals are removed through sedimentation and chemical reactions with the organic material in the mulch. Water passes through the soil media where the finer particles are removed and other chemical reactions take place to immobilize and capture pollutants in the soil media. The cleansed water passes into an underdrain and flows to a pipe system or other appropriate discharge point. Once the pollutants are in the soil, the bacteria begin to break down and metabolize the materials and the plants begin to uptake and metabolize the pollutants. Some pollutants such as heavy metals, which are chemically bound to organic particles in the mulch, are released over time as the organic matter decomposes to release the metals to the feeder roots of the plants and the cells of the bacteria in the soil where they remain and are recycled. Other pollutants such as phosphorus are chemically bound to the soil particles and released slowly back to the plants and bacteria and used in their metabolic processes. Nitrogen goes through a very complex variety of biochemical processes where it can ultimately end up in the plant/bacteria biomass, turned to nitrogen gas or dissolves back into the water column as nitrates depending on soil temperature, pH and the availability of oxygen. The pollutants ultimately are retained in the mulch, soil and biomass with some passing out of the system into the air or back into the water.

Design and Installation

Each project presents different scopes for the use of Filterra systems. To ensure the safe and specified function of the stormwater BMP, Contech reviews each application before supply. Information and help may be provided to the design engineer during the planning process. Correct Filterra box sizing (by rainfall region) is essential to predict pollutant removal rates for a given area. The engineer shall submit calculations for approval by the local jurisdiction. The contractor is responsible for the correct installation of Filterra units as shown in approved plans. A comprehensive installation manual is available at www.conteches.com.

Maintenance

Why Maintain?

All stormwater treatment systems require maintenance for effective operation. This necessity is often incorporated in your property's permitting process as a legally binding BMP maintenance agreement.

- Avoid legal challenges from your jurisdiction's maintenance enforcement program.
- Prolong the expected lifespan of your Filterra media.
- Avoid more costly media replacement.
- Help reduce pollutant loads leaving your property.

Simple maintenance of the Filterra is required to continue effective pollutant removal from stormwater runoff before discharge into downstream waters. This procedure will also extend the longevity of the living biofilter system. The unit will recycle and accumulate pollutants within the biomass, but is also subjected to other materials entering the throat. This may include trash, silt and leaves etc. which will be contained within the void below the top grate and above the mulch layer. Too much silt may inhibit the Filterra's® flow rate, which is the reason for site stabilization before activation. Regular replacement of the mulch stops accumulation of such sediment.

When to Maintain?

Contech includes a 1-year maintenance plan with each system purchase. Annual included maintenance consists of a maximum of two (2) scheduled visits. Additional maintenance may be necessary depending on sediment and trash loading (by Owner or at additional cost). The start of the maintenance plan begins when the system is activated for full operation. Full operation is defined as the unit installed, curb and gutter and transitions in place and activation (by Supplier) when mulch and plant are added and temporary throat protection removed.

Activation cannot be carried out until the site is fully stabilized (full landscaping, grass cover, final paving and street sweeping completed). Maintenance visits are scheduled seasonally; the spring visit aims to clean up after winter loads including salts and sands while the fall visit helps the system by removing excessive leaf litter.

It has been found that in regions which receive between 30-50 inches of annual rainfall, (2) two visits are generally required; regions with less rainfall often only require (1) one visit per annum. Varying land uses can affect maintenance frequency; e.g. some fast food restaurants require more frequent trash removal. Contributing drainage areas which are subject to new development wherein the recommended erosion and sediment control measures have not been implemented may require additional maintenance visits.

Some sites may be subjected to extreme sediment or trash loads, requiring more frequent maintenance visits. This is the reason for detailed notes of maintenance actions per unit, helping the Supplier and Owner predict future maintenance frequencies, reflecting individual site conditions.

Owners must promptly notify the (maintenance) Supplier of any damage to the plant(s), which constitute(s) an integral part of the bioretention technology. Owners should also advise other landscape or maintenance contractors to leave all maintenance to the Supplier (i.e. no pruning or fertilizing).

Exclusion of Services

It is the responsibility of the owner to provide adequate irrigation when necessary to the plant of the Filterra system.

Clean up due to major contamination such as oils, chemicals, toxic spills, etc. will result in additional costs and are not covered under the Supplier maintenance contract. Should a major contamination event occur the Owner must block off the outlet pipe of the Filterra (where the cleaned runoff drains to, such as drop inlet) and block off the throat of the Filterra. The Supplier should be informed immediately.

Maintenance Visit Summary

Each maintenance visit consists of the following simple tasks (detailed instructions below).

1. Inspection of Filterra and surrounding area
2. Removal of tree grate and erosion control stones
3. Removal of debris, trash and mulch
4. Mulch replacement
5. Plant health evaluation and pruning or replacement as necessary
6. Clean area around Filterra
7. Complete paperwork

Maintenance Tools, Safety Equipment and Supplies

Ideal tools include: camera, bucket, shovel, broom, pruners, hoe/rake, and tape measure. Appropriate Personal Protective Equipment (PPE) should be used in accordance with local or company procedures. This may include impervious gloves where the type of trash is unknown, high visibility clothing and barricades when working in close proximity to traffic and also safety hats and shoes. A T-Bar or crowbar should be used for moving the tree grates (up to 170 lbs ea.). Most visits require minor trash removal and a full replacement of mulch. See below for actual number of bagged mulch that is required in each unit size. Mulch should be a double shredded, hardwood variety; do not use colored or dyed mulch. Some visits may require additional Filterra engineered soil media available from the Supplier.

Box Length	Box Width	Filter Surface Area (ft^2)	Volume at 3" (ft^3)	# of 2 ft^3 Mulch Bags
4	4	4	4	2
6	4	6	6	3
8	4	8	8	4
6	6	9	9	5
8	6	12	12	6
10	6	15	15	8
12	6	18	18	9
13	7	23	23	12

Maintenance Visit Procedure

Keep sufficient documentation of maintenance actions to predict location specific maintenance frequencies and needs. An example Maintenance Report is included in this manual.

1. Inspection of Filterra and surrounding area

- Record individual unit before maintenance with photograph (numbered). Record on Maintenance Report (see example in this document) the following:

Record on Maintenance Report the following:

Standing Water	yes | no
Damage to Box Structure	yes | no
Damage to Grate	yes | no
Is Bypass Clear	yes | no

If yes answered to any of these observations, record with close-up photograph (numbered).

2. Removal of tree grate and erosion control stones

- Remove cast iron grates for access into Filterra box.
- Dig out silt (if any) and mulch and remove trash & foreign items.

Record on Maintenance Report the following:

Silt/Clay	yes | no
Cups/ Bags	yes | no
Leaves	yes | no
# of Buckets Removed	_____

3. Removal of debris, trash and mulch

- After removal of mulch and debris, measure distance from the top of the Filterra engineered media soil to the bottom of the top slab. If this distance is greater than 12", add Filterra media (not top soil or other) to recharge to a 9" distance

Record on Maintenance Report the following:

Distance of Bottom of Top Slab (inches)	_____
# of Buckets of Media Added	_____

4. Mulch replacement

- Please see mulch specifications.
- Add double shredded mulch evenly across the entire unit to a depth of 3".
- Ensure correct repositioning of erosion control stones by the Filterra inlet to allow for entry of trash during a storm event.
- Replace Filterra grates correctly using appropriate lifting or moving tools, taking care not to damage the plant.

5. Plant health evaluation and pruning or replacement as necessary

- Examine the plant's health and replace if dead.
- Prune as necessary to encourage growth in the correct directions

Record on Maintenance Report the following:

Height above Grate	(Feet)
Width at Widest Point	(feet)
Health	alive | dead
Damage to Plant	yes | no
Plant Replaced	yes | no

6. Clean area around Filterra

- Clean area around unit and remove all refuse to be disposed of appropriately.

7. Complete paperwork

- Deliver Maintenance Report and photographs to appropriate location (normally Contech during maintenance contract period).
- Some jurisdictions may require submission of maintenance reports in accordance with approvals. It is the responsibility of the Owner to comply with local regulations.

Maintenance Checklist

Drainage System Failure	Problem	Conditions to Check	Condition that Should Exist	Actions
Inlet	Excessive sediment or trash accumulation.	Accumulated sediments or trash impair free flow of water into Filterra.	Inlet should be free of obstructions allowing free distributed flow of water into Filterra.	Sediments and/or trash should be removed.
Mulch Cover	Trash and floatable debris accumulation.	Excessive trash and/or debris accumulation.	Minimal trash or other debris on mulch cover.	Trash and debris should be removed and mulch cover raked level. Ensure bark nugget mulch is not used.
Mulch Cover	"Ponding" of water on mulch cover.	"Ponding" in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils.	Stormwater should drain freely and evenly through mulch cover.	Recommend contact manufacturer and replace mulch as a minimum.
Vegetation	Plants not growing or in poor condition.	Soil/mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants.	Plants should be healthy and pest free.	Contact manufacturer for advice.
Vegetation	Plant growth excessive.	Plants should be appropriate to the species and location of Filterra.		Trim/prune plants in accordance with typical landscaping and safety needs.
Structure	Structure has visible cracks.	Cracks wider than 1/2 inch or evidence of soil particles entering the structure through the cracks.		Vault should be repaired.
Maintenance is ideally to be performed twice annually.				

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Revised 3/2/2016

APPENDIX E

Filterra Sizing Calculations

Contech Engineered Solutions LLC
7037 Ridge Road, Suite 350
Hanover, MD 21076
Phone: (866) 740-3318
Fax: (866) 376-8511
www.ContechES.com

Tony Panciocco
Northeast Civil Solutions, Inc.
381 Payne Road
Scarborough, ME 04074

April 25th, 2018

RE: Capisic Meadows Subdivision (Contech Reference No. 589,880)
Review of Filterra Design

Dear Mr. Panciocco:

The purpose of this letter is to document Contech Engineered Solutions' review of the plans and the proposed application of Filterra water quality units for the Capisic Meadows Subdivision project in Scarborough, ME.

Contech Engineered Solutions (Contech) has reviewed the Filterra design for this project. We believe the FTIBC Filterra configuration with internal bypass is an appropriate water quality solution for this site. The Filterra systems are approved for use by MEDEP as an alternate to the General Standards of the Stormwater Rules (Chapter 500) if designed, installed, and maintained in accordance with the provisions noted in the February 2, 2017 approval letter from the MEDEP.

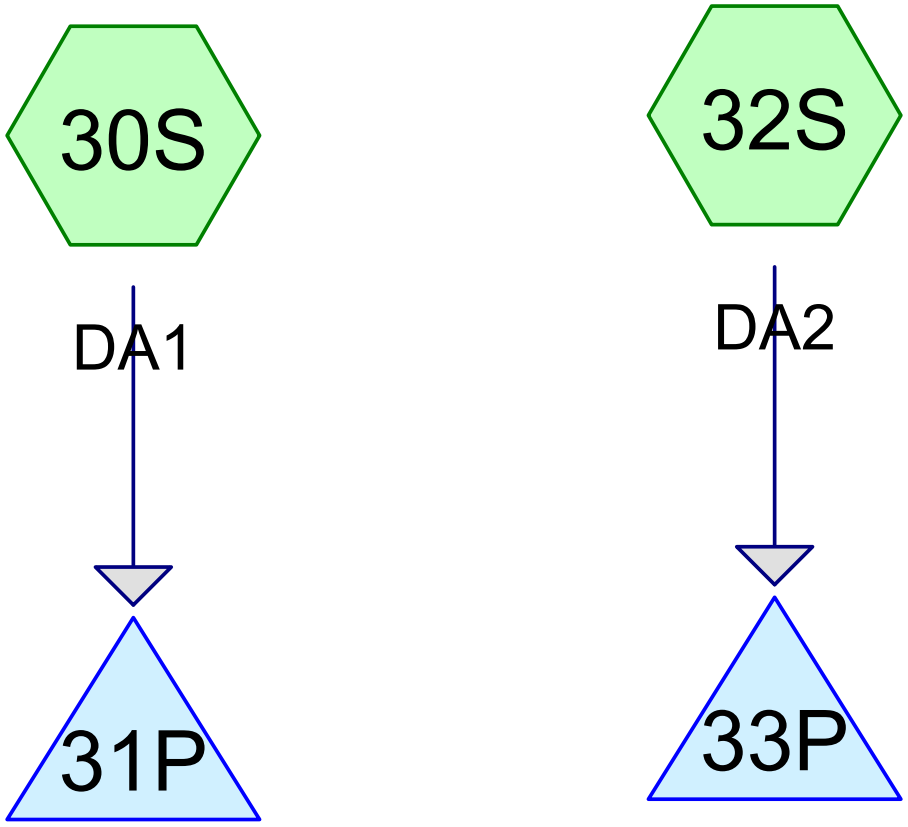
The engineer of record reports treatment drainage areas of 0.186 acres impervious and 0.156 acres landscaped, for each of two Filterra units. The two Filterra were designed in accordance with the sizing design guidelines to treat the runoff from the 0.95" storm over the entire contributing drainage area, including all pervious areas, prior to bypass. In order to adequately treat the generated run-off directed to each system, Contech recommends 6'x8' Filterra. The attached HydroCAD report is provided to support this size recommendation. The modeled peak elevation in the Filterra shows that at the approved 140"/hr hydraulic loading rate, the ponding in the Filterra will remain below the inside of the top slab (elevation 60.33' in the model) and be fully treated before bypass. The 25-year peak storm event was also modelled, and the HydroCAD report demonstrates that each of the Filterra's bypass capacities are suitable to convey the peak flow safely and keep the water surface elevation below the bottom of the system's top slab.

The configuration of the Filterra is acceptable. The system appears to be constructible and is located in order to facilitate maintenance activities. Our systems require periodic maintenance to continue operating properly. Given typical runoff pollutant loading rates, Contech recommends maintenance inspections on an annual basis. Based on the location of the system, we anticipate replacement of the mulch layer every 12 months for the system to continue to remove pollutants. Contech will be responsible for the first year of maintenance as included in the purchase of the Filterra unit; subsequent years of maintenance shall be performed by a third party at the owner's expense.

This system is expected to operate in accordance with Contech's design intent. Please feel free to contact me if you have any questions or concerns.

Sincerely,

Nicholas T. Busque
Stormwater Design Engineer
Contech Engineered Solutions, LLC.
(410) 609-6140
nbusque@conteches.com



Filterra 6x8/8x6

Filterra 6x8/8x6

Subcat Reach Pond Link

Routing Diagram for Filterra - 140inhr ME - Rainfall Type III Sizing - Fina

Prepared by Contech Engineered Solutions LLC, Printed 4/25/2018

Summary for Subcatchment 30S: DA1

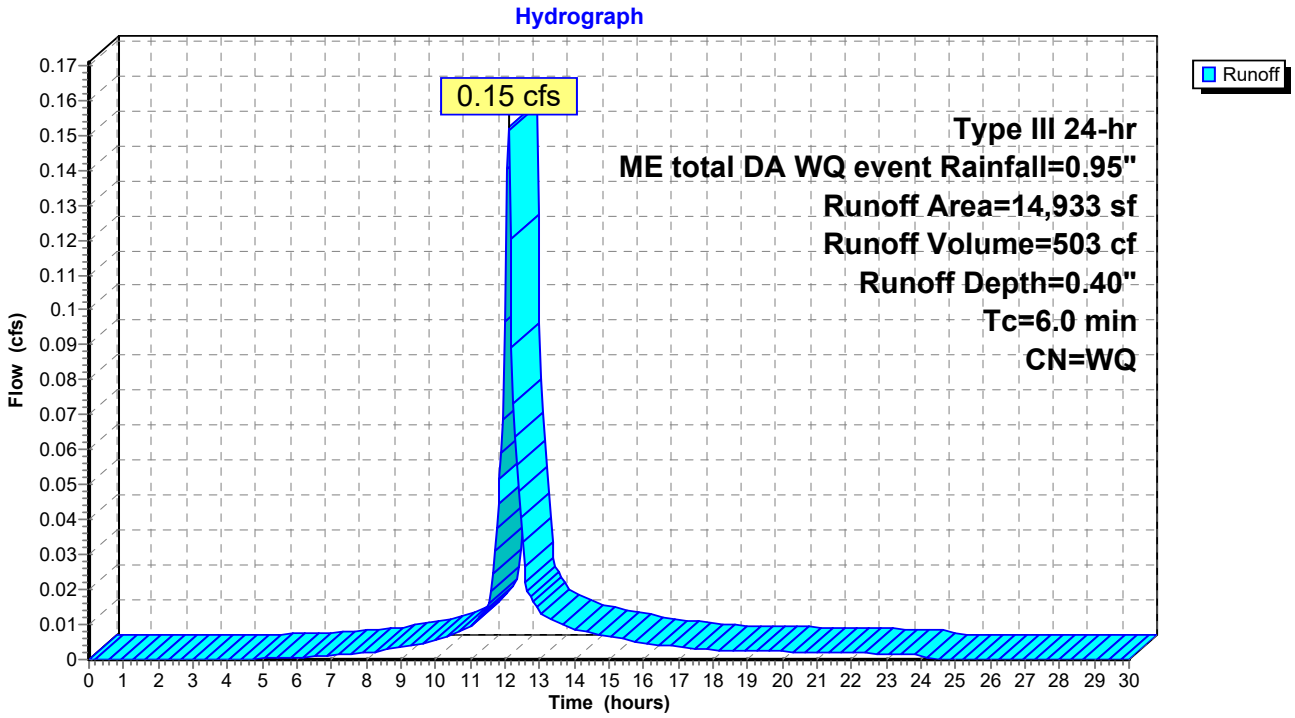
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 503 cf, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr ME total DA WQ event Rainfall=0.95"

	Area (sf)	CN	Description
*	8,116	98	impervious
	6,817	69	50-75% Grass cover, Fair, HSG B
	14,933		Weighted Average
	6,817	69	45.65% Pervious Area
	8,116	98	54.35% Impervious Area

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

Subcatchment 30S: DA1



Hydrograph for Subcatchment 30S: DA1

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.00	0.00	0.00
1.00	0.01	0.00	0.00
1.50	0.01	0.00	0.00
2.00	0.02	0.00	0.00
2.50	0.02	0.00	0.00
3.00	0.03	0.00	0.00
3.50	0.03	0.00	0.00
4.00	0.04	0.00	0.00
4.50	0.05	0.00	0.00
5.00	0.05	0.00	0.00
5.50	0.06	0.00	0.00
6.00	0.07	0.00	0.00
6.50	0.08	0.00	0.00
7.00	0.09	0.00	0.00
7.50	0.10	0.00	0.00
8.00	0.11	0.00	0.00
8.50	0.12	0.00	0.00
9.00	0.14	0.00	0.00
9.50	0.16	0.00	0.00
10.00	0.18	0.00	0.01
10.50	0.21	0.00	0.01
11.00	0.24	0.00	0.01
11.50	0.28	0.00	0.02
12.00	0.47	0.01	**0.10**
12.50	0.67	0.05	**0.03**
13.00	0.71	0.06	0.01
13.50	0.74	0.07	0.01
14.00	0.77	0.08	0.01
14.50	0.79	0.09	0.01
15.00	0.81	0.09	0.01
15.50	0.83	0.10	0.01
16.00	0.84	0.11	0.00
16.50	0.85	0.11	0.00
17.00	0.86	0.11	0.00
17.50	0.87	0.12	0.00
18.00	0.88	0.12	0.00
18.50	0.89	0.12	0.00
19.00	0.90	0.13	0.00
19.50	0.90	0.13	0.00
20.00	0.91	0.13	0.00
20.50	0.92	0.14	0.00
21.00	0.92	0.14	0.00
21.50	0.93	0.14	0.00
22.00	0.93	0.14	0.00
22.50	0.94	0.15	0.00
23.00	0.94	0.15	0.00
23.50	0.95	0.15	0.00
24.00	**0.95**	**0.15**	0.00
24.50	0.95	0.15	0.00
25.00	0.95	0.15	0.00
25.50	0.95	0.15	0.00
26.00	0.95	0.15	0.00
26.50	0.95	0.15	0.00
27.00	0.95	0.15	0.00
27.50	0.95	0.15	0.00
28.00	0.95	0.15	0.00
28.50	0.95	0.15	0.00
29.00	0.95	0.15	0.00
29.50	0.95	0.15	0.00
30.00	0.95	0.15	0.00

Summary for Pond 31P: Filterra 6x8/8x6

Inflow Area = 14,933 sf, 54.35% Impervious, Inflow Depth = 0.40" for ME total DA WQ event event
Inflow = 0.15 cfs @ 12.09 hrs, Volume= 503 cf
Outflow = 0.15 cfs @ 12.09 hrs, Volume= 503 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.15 cfs @ 12.09 hrs, Volume= 503 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 59.13' @ 12.09 hrs Surf.Area= 48 sf Storage= 0 cf

Plug-Flow detention time= 0.1 min calculated for 503 cf (100% of inflow)
Center-of-Mass det. time= 0.0 min (790.0 - 789.9)

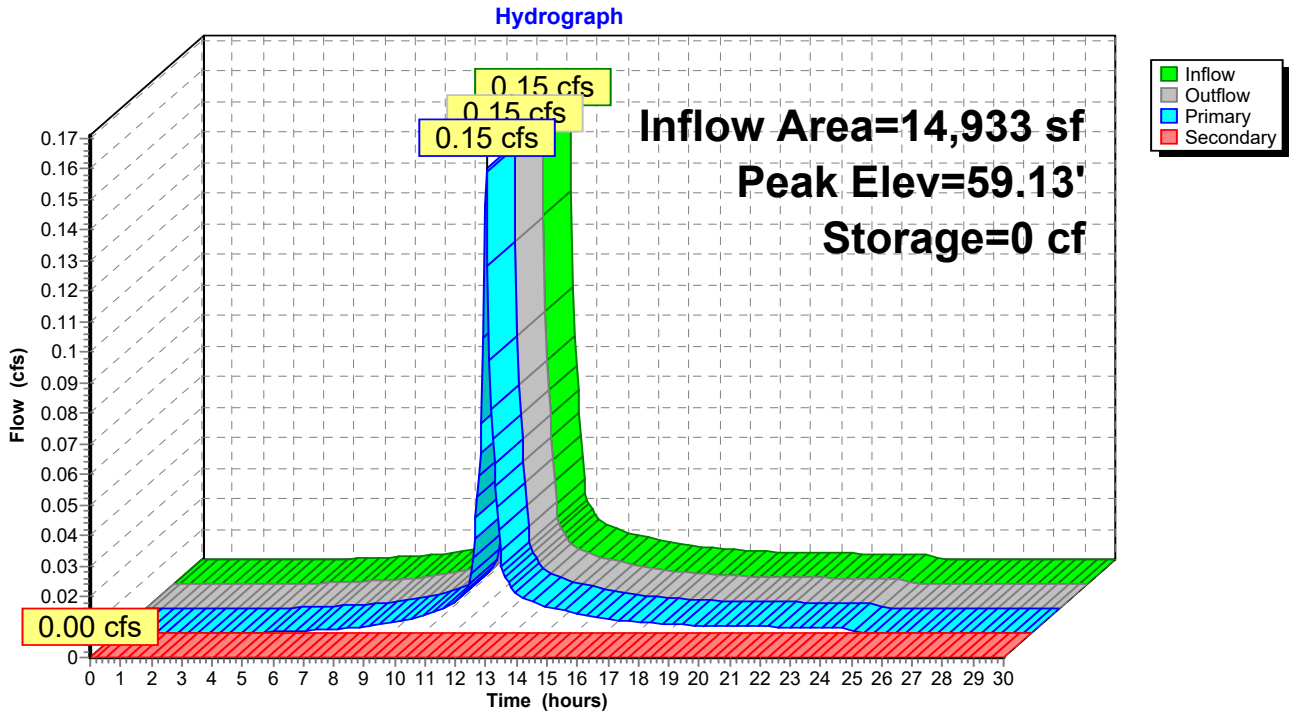
Volume	Invert	Avail.Storage	Storage Description
#1	59.12'	48 cf	**8.00'W x 6.00'L x 1.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Primary	59.12'	**140.000 in/hr Exfiltration over Surface area**
#2	Secondary	59.54'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.16 cfs @ 12.09 hrs HW=59.13' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=59.12' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 31P: Filterra 6x8/8x6



Hydrograph for Pond 31P: Filterra 6x8/8x6

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	59.12	0.00	0.00	**0.00**
1.00	0.00	0	59.12	0.00	0.00	0.00
2.00	0.00	0	59.12	0.00	0.00	0.00
3.00	0.00	0	59.12	0.00	0.00	0.00
4.00	0.00	0	59.12	0.00	0.00	0.00
5.00	0.00	0	59.12	0.00	0.00	0.00
6.00	0.00	0	59.12	0.00	0.00	0.00
7.00	0.00	0	59.12	0.00	0.00	0.00
8.00	0.00	0	59.12	0.00	0.00	0.00
9.00	0.00	0	59.12	0.00	0.00	0.00
10.00	0.01	0	59.12	0.01	0.01	0.00
11.00	0.01	0	59.12	0.01	0.01	0.00
12.00	**0.10**	**0**	**59.13**	**0.10**	**0.10**	0.00
13.00	**0.01**	**0**	**59.12**	**0.01**	**0.01**	0.00
14.00	0.01	0	59.12	0.01	0.01	0.00
15.00	0.01	0	59.12	0.01	0.01	0.00
16.00	0.00	0	59.12	0.00	0.00	0.00
17.00	0.00	0	59.12	0.00	0.00	0.00
18.00	0.00	0	59.12	0.00	0.00	0.00
19.00	0.00	0	59.12	0.00	0.00	0.00
20.00	0.00	0	59.12	0.00	0.00	0.00
21.00	0.00	0	59.12	0.00	0.00	0.00
22.00	0.00	0	59.12	0.00	0.00	0.00
23.00	0.00	0	59.12	0.00	0.00	0.00
24.00	0.00	0	59.12	0.00	0.00	0.00
25.00	0.00	0	59.12	0.00	0.00	0.00
26.00	0.00	0	59.12	0.00	0.00	0.00
27.00	0.00	0	59.12	0.00	0.00	0.00
28.00	0.00	0	59.12	0.00	0.00	0.00
29.00	0.00	0	59.12	0.00	0.00	0.00
30.00	0.00	0	59.12	0.00	0.00	0.00

Summary for Subcatchment 30S: DA1

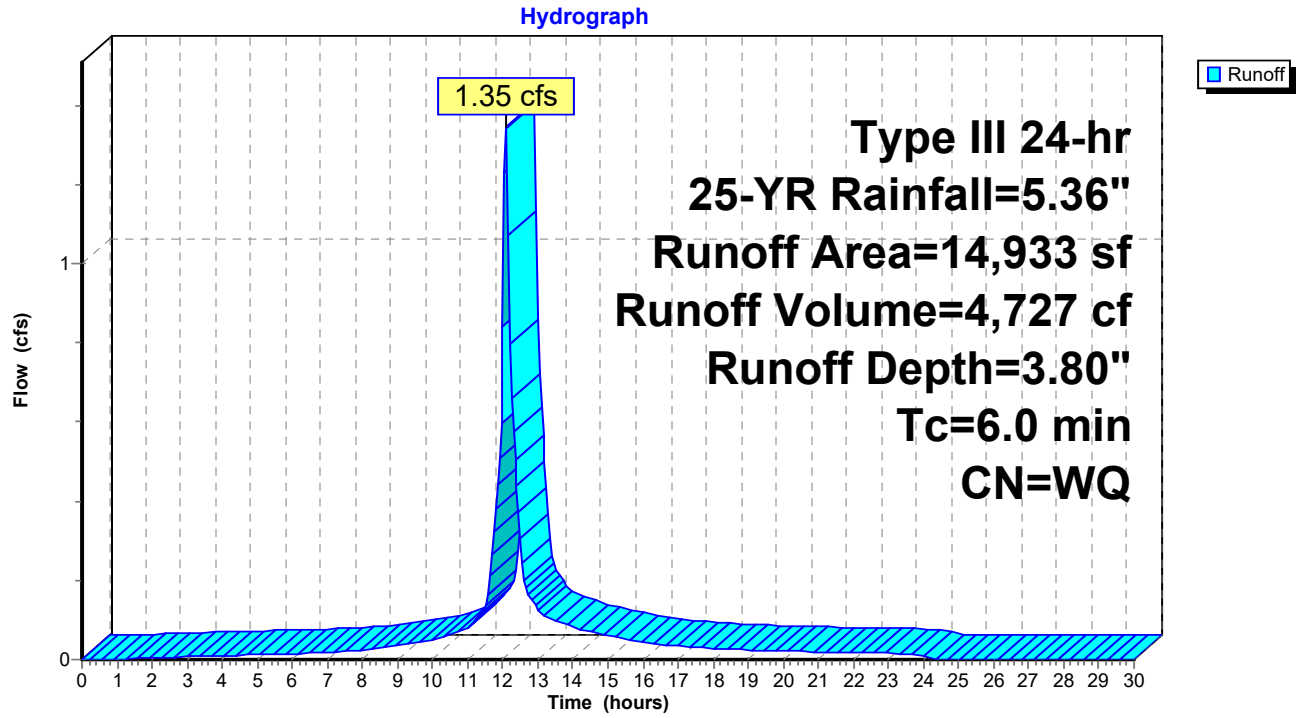
Runoff = 1.35 cfs @ 12.09 hrs, Volume= 4,727 cf, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.36"

	Area (sf)	CN	Description
*	8,116	98	impervious
	6,817	69	50-75% Grass cover, Fair, HSG B
	14,933		Weighted Average
	6,817	69	45.65% Pervious Area
	8,116	98	54.35% Impervious Area

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

Subcatchment 30S: DA1



Hydrograph for Subcatchment 30S: DA1

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.03	0.00	0.00
1.00	0.05	0.00	0.00
1.50	0.08	0.00	0.00
2.00	0.11	0.00	0.00
2.50	0.14	0.00	0.01
3.00	0.16	0.00	0.01
3.50	0.20	0.00	0.01
4.00	0.23	0.00	0.01
4.50	0.27	0.00	0.01
5.00	0.30	0.00	0.01
5.50	0.34	0.00	0.01
6.00	0.39	0.00	0.01
6.50	0.43	0.00	0.02
7.00	0.49	0.01	0.02
7.50	0.54	0.02	0.02
8.00	0.61	0.03	0.02
8.50	0.69	0.05	0.03
9.00	0.78	0.08	0.03
9.50	0.89	0.13	0.04
10.00	1.01	0.18	0.05
10.50	1.16	0.25	0.06
11.00	1.34	0.35	0.08
11.50	1.60	0.51	0.13
12.00	2.68	1.32	**0.84**
12.50	3.76	2.25	**0.31**
13.00	4.02	2.48	0.13
13.50	4.20	2.64	0.10
14.00	4.35	2.77	0.08
14.50	4.47	2.88	0.07
15.00	4.58	2.98	0.06
15.50	4.67	3.07	0.05
16.00	4.75	3.14	0.04
16.50	4.82	3.20	0.04
17.00	4.87	3.25	0.03
17.50	4.93	3.30	0.03
18.00	4.97	3.34	0.03
18.50	5.02	3.38	0.02
19.00	5.06	3.42	0.02
19.50	5.09	3.45	0.02
20.00	5.13	3.49	0.02
20.50	5.16	3.52	0.02
21.00	5.20	3.55	0.02
21.50	5.23	3.58	0.02
22.00	5.26	3.61	0.02
22.50	5.28	3.63	0.02
23.00	5.31	3.66	0.02
23.50	5.34	3.68	0.02
24.00	**5.36**	**3.70**	0.01
24.50	5.36	3.70	0.00
25.00	5.36	3.70	0.00
25.50	5.36	3.70	0.00
26.00	5.36	3.70	0.00
26.50	5.36	3.70	0.00
27.00	5.36	3.70	0.00
27.50	5.36	3.70	0.00
28.00	5.36	3.70	0.00
28.50	5.36	3.70	0.00
29.00	5.36	3.70	0.00
29.50	5.36	3.70	0.00
30.00	5.36	3.70	0.00

Summary for Pond 31P: Filterra 6x8/8x6

Inflow Area = 14,933 sf, 54.35% Impervious, Inflow Depth = 3.80" for 25-YR event
Inflow = 1.35 cfs @ 12.09 hrs, Volume= 4,727 cf
Outflow = 1.34 cfs @ 12.09 hrs, Volume= 4,696 cf, Atten= 1%, Lag= 0.0 min
Primary = 0.16 cfs @ 11.60 hrs, Volume= 3,243 cf
Secondary = 1.18 cfs @ 12.09 hrs, Volume= 1,453 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 59.81' @ 12.09 hrs Surf.Area= 48 sf Storage= 33 cf

Plug-Flow detention time= 4.8 min calculated for 4,688 cf (99% of inflow)
Center-of-Mass det. time= 0.5 min (774.0 - 773.5)

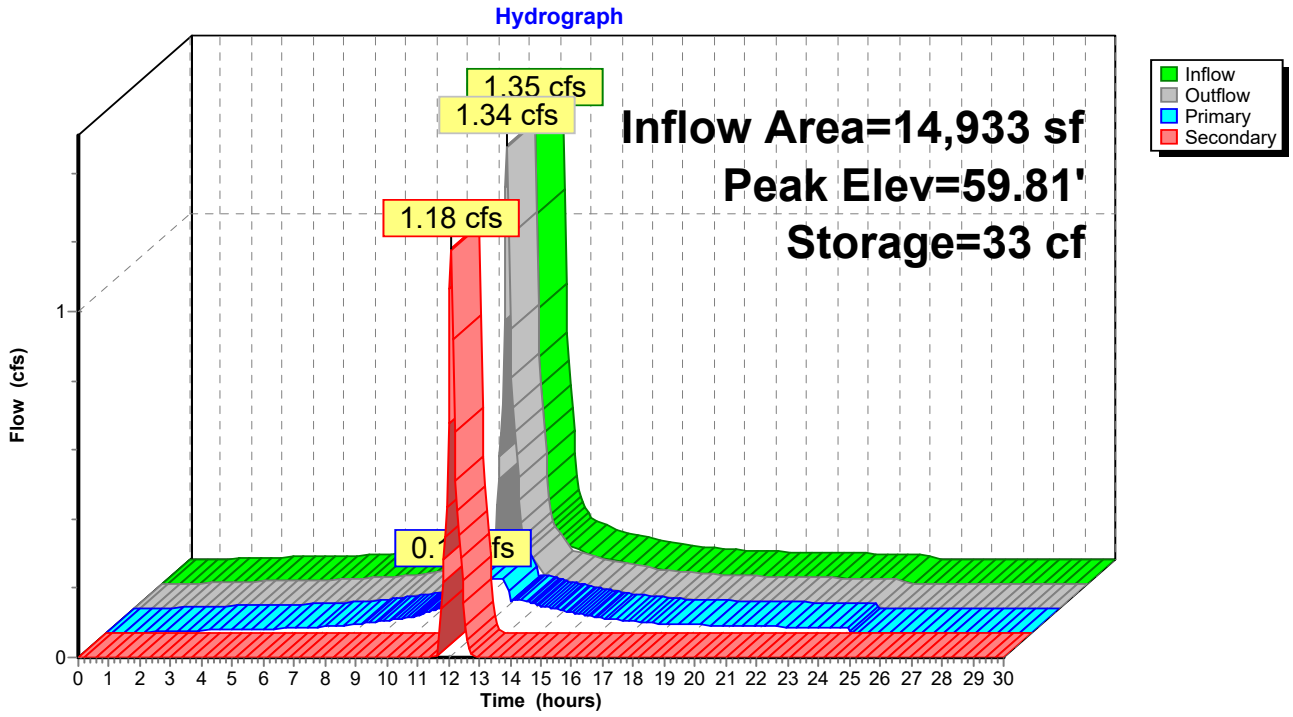
Volume	Invert	Avail.Storage	Storage Description
#1	59.12'	48 cf	**8.00'W x 6.00'L x 1.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Primary	59.12'	**140.000 in/hr Exfiltration over Surface area**
#2	Secondary	59.54'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.16 cfs @ 11.60 hrs HW=59.14' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Secondary OutFlow Max=1.15 cfs @ 12.09 hrs HW=59.80' (Free Discharge)
└**2=Orifice/Grate** (Weir Controls 1.15 cfs @ 1.68 fps)

Pond 31P: Filterra 6x8/8x6



Hydrograph for Pond 31P: Filterra 6x8/8x6

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	59.12	0.00	0.00	0.00
1.00	0.00	0	59.12	0.00	0.00	0.00
2.00	0.00	0	59.12	0.00	0.00	0.00
3.00	0.01	0	59.12	0.01	0.01	0.00
4.00	0.01	0	59.12	0.01	0.01	0.00
5.00	0.01	0	59.12	0.01	0.01	0.00
6.00	0.01	0	59.12	0.01	0.01	0.00
7.00	0.02	0	59.12	0.02	0.02	0.00
8.00	0.02	0	59.12	0.02	0.02	0.00
9.00	0.03	0	59.12	0.03	0.03	0.00
10.00	0.05	0	59.12	0.05	0.05	0.00
11.00	0.08	0	59.13	0.08	**0.08**	0.00
12.00	**0.84**	**29**	**59.72**	**0.83**	**0.16**	**0.68**
13.00	**0.13**	**9**	**59.31**	**0.16**	0.16	**0.00**
14.00	0.08	0	59.13	0.08	0.08	0.00
15.00	0.06	0	59.12	0.06	0.06	0.00
16.00	0.04	0	59.12	0.04	0.04	0.00
17.00	0.03	0	59.12	0.03	0.03	0.00
18.00	0.03	0	59.12	0.03	0.03	0.00
19.00	0.02	0	59.12	0.02	0.02	0.00
20.00	0.02	0	59.12	0.02	0.02	0.00
21.00	0.02	0	59.12	0.02	0.02	0.00
22.00	0.02	0	59.12	0.02	0.02	0.00
23.00	0.02	0	59.12	0.02	0.02	0.00
24.00	0.01	0	59.12	0.01	0.01	0.00
25.00	0.00	0	59.12	0.00	0.00	0.00
26.00	0.00	0	59.12	0.00	0.00	0.00
27.00	0.00	0	59.12	0.00	0.00	0.00
28.00	0.00	0	59.12	0.00	0.00	0.00
29.00	0.00	0	59.12	0.00	0.00	0.00
30.00	0.00	0	59.12	0.00	0.00	0.00

Summary for Subcatchment 32S: DA2

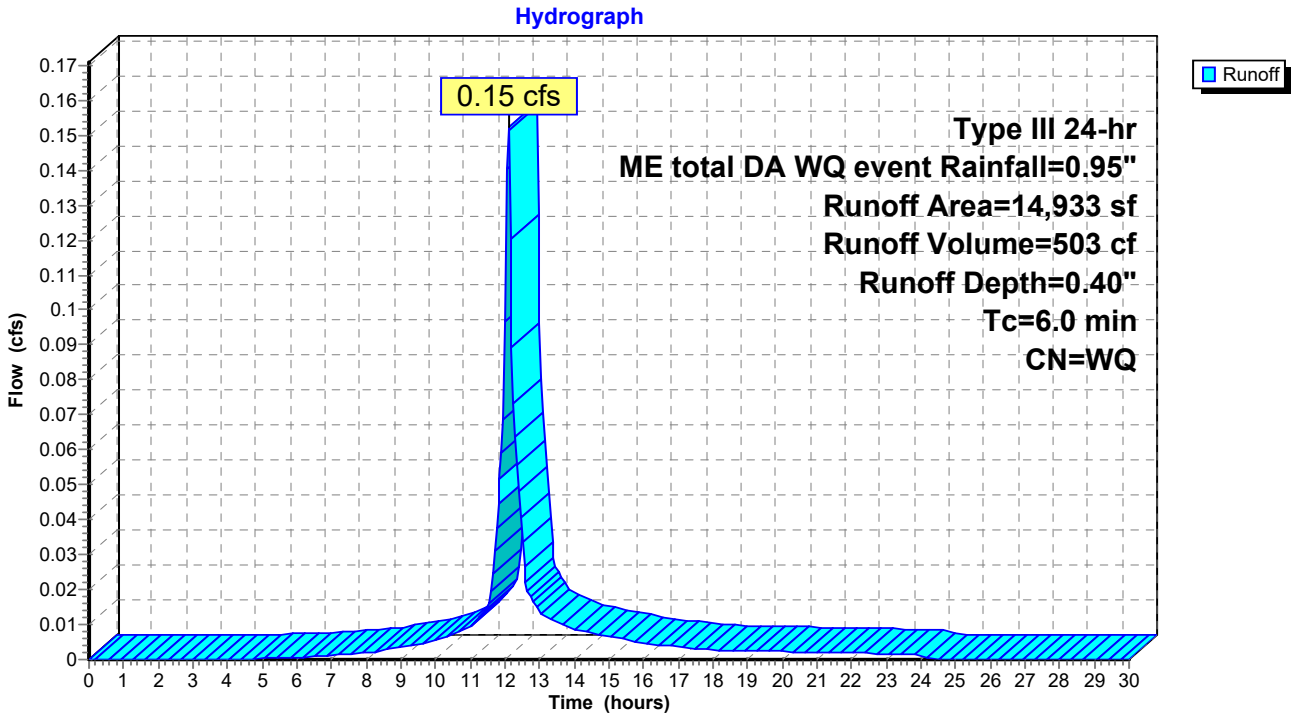
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 503 cf, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr ME total DA WQ event Rainfall=0.95"

	Area (sf)	CN	Description
*	8,116	98	impervious
	6,817	69	50-75% Grass cover, Fair, HSG B
	14,933		Weighted Average
	6,817	69	45.65% Pervious Area
	8,116	98	54.35% Impervious Area

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

Subcatchment 32S: DA2



Hydrograph for Subcatchment 32S: DA2

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.00	0.00	0.00
1.00	0.01	0.00	0.00
1.50	0.01	0.00	0.00
2.00	0.02	0.00	0.00
2.50	0.02	0.00	0.00
3.00	0.03	0.00	0.00
3.50	0.03	0.00	0.00
4.00	0.04	0.00	0.00
4.50	0.05	0.00	0.00
5.00	0.05	0.00	0.00
5.50	0.06	0.00	0.00
6.00	0.07	0.00	0.00
6.50	0.08	0.00	0.00
7.00	0.09	0.00	0.00
7.50	0.10	0.00	0.00
8.00	0.11	0.00	0.00
8.50	0.12	0.00	0.00
9.00	0.14	0.00	0.00
9.50	0.16	0.00	0.00
10.00	0.18	0.00	0.01
10.50	0.21	0.00	0.01
11.00	0.24	0.00	0.01
11.50	0.28	0.00	0.02
12.00	0.47	0.01	**0.10**
12.50	0.67	0.05	**0.03**
13.00	0.71	0.06	0.01
13.50	0.74	0.07	0.01
14.00	0.77	0.08	0.01
14.50	0.79	0.09	0.01
15.00	0.81	0.09	0.01
15.50	0.83	0.10	0.01
16.00	0.84	0.11	0.00
16.50	0.85	0.11	0.00
17.00	0.86	0.11	0.00
17.50	0.87	0.12	0.00
18.00	0.88	0.12	0.00
18.50	0.89	0.12	0.00
19.00	0.90	0.13	0.00
19.50	0.90	0.13	0.00
20.00	0.91	0.13	0.00
20.50	0.92	0.14	0.00
21.00	0.92	0.14	0.00
21.50	0.93	0.14	0.00
22.00	0.93	0.14	0.00
22.50	0.94	0.15	0.00
23.00	0.94	0.15	0.00
23.50	0.95	0.15	0.00
24.00	**0.95**	**0.15**	0.00
24.50	0.95	0.15	0.00
25.00	0.95	0.15	0.00
25.50	0.95	0.15	0.00
26.00	0.95	0.15	0.00
26.50	0.95	0.15	0.00
27.00	0.95	0.15	0.00
27.50	0.95	0.15	0.00
28.00	0.95	0.15	0.00
28.50	0.95	0.15	0.00
29.00	0.95	0.15	0.00
29.50	0.95	0.15	0.00
30.00	0.95	0.15	0.00

Summary for Pond 33P: Filterra 6x8/8x6

Inflow Area = 14,933 sf, 54.35% Impervious, Inflow Depth = 0.40" for ME total DA WQ event event
Inflow = 0.15 cfs @ 12.09 hrs, Volume= 503 cf
Outflow = 0.15 cfs @ 12.09 hrs, Volume= 503 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.15 cfs @ 12.09 hrs, Volume= 503 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 59.13' @ 12.09 hrs Surf.Area= 48 sf Storage= 0 cf

Plug-Flow detention time= 0.1 min calculated for 503 cf (100% of inflow)
Center-of-Mass det. time= 0.0 min (790.0 - 789.9)

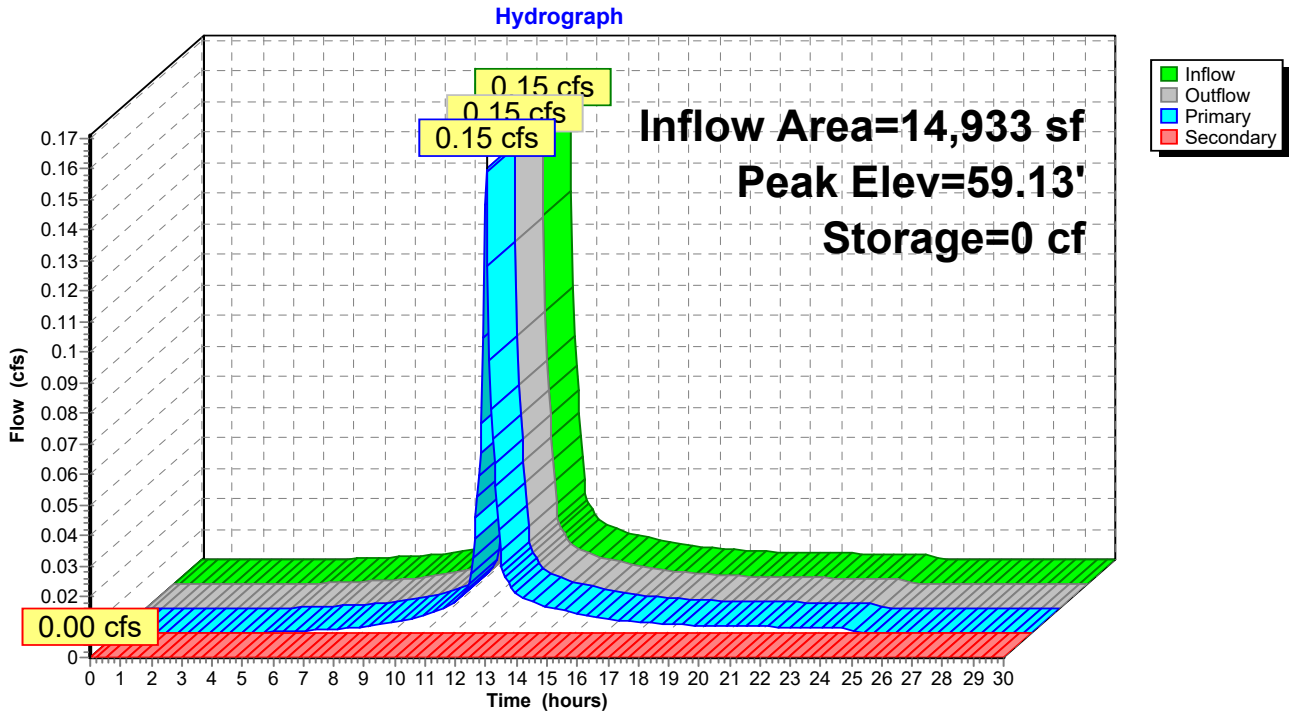
Volume	Invert	Avail.Storage	Storage Description
#1	59.12'	48 cf	**8.00'W x 6.00'L x 1.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Primary	59.12'	**140.000 in/hr Exfiltration over Surface area**
#2	Secondary	59.54'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.16 cfs @ 12.09 hrs HW=59.13' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=59.12' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 33P: Filterra 6x8/8x6



Hydrograph for Pond 33P: Filterra 6x8/8x6

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	59.12	0.00	0.00	**0.00**
1.00	0.00	0	59.12	0.00	0.00	0.00
2.00	0.00	0	59.12	0.00	0.00	0.00
3.00	0.00	0	59.12	0.00	0.00	0.00
4.00	0.00	0	59.12	0.00	0.00	0.00
5.00	0.00	0	59.12	0.00	0.00	0.00
6.00	0.00	0	59.12	0.00	0.00	0.00
7.00	0.00	0	59.12	0.00	0.00	0.00
8.00	0.00	0	59.12	0.00	0.00	0.00
9.00	0.00	0	59.12	0.00	0.00	0.00
10.00	0.01	0	59.12	0.01	0.01	0.00
11.00	0.01	0	59.12	0.01	0.01	0.00
12.00	**0.10**	**0**	**59.13**	**0.10**	**0.10**	0.00
13.00	**0.01**	**0**	**59.12**	**0.01**	**0.01**	0.00
14.00	0.01	0	59.12	0.01	0.01	0.00
15.00	0.01	0	59.12	0.01	0.01	0.00
16.00	0.00	0	59.12	0.00	0.00	0.00
17.00	0.00	0	59.12	0.00	0.00	0.00
18.00	0.00	0	59.12	0.00	0.00	0.00
19.00	0.00	0	59.12	0.00	0.00	0.00
20.00	0.00	0	59.12	0.00	0.00	0.00
21.00	0.00	0	59.12	0.00	0.00	0.00
22.00	0.00	0	59.12	0.00	0.00	0.00
23.00	0.00	0	59.12	0.00	0.00	0.00
24.00	0.00	0	59.12	0.00	0.00	0.00
25.00	0.00	0	59.12	0.00	0.00	0.00
26.00	0.00	0	59.12	0.00	0.00	0.00
27.00	0.00	0	59.12	0.00	0.00	0.00
28.00	0.00	0	59.12	0.00	0.00	0.00
29.00	0.00	0	59.12	0.00	0.00	0.00
30.00	0.00	0	59.12	0.00	0.00	0.00

Summary for Subcatchment 32S: DA2

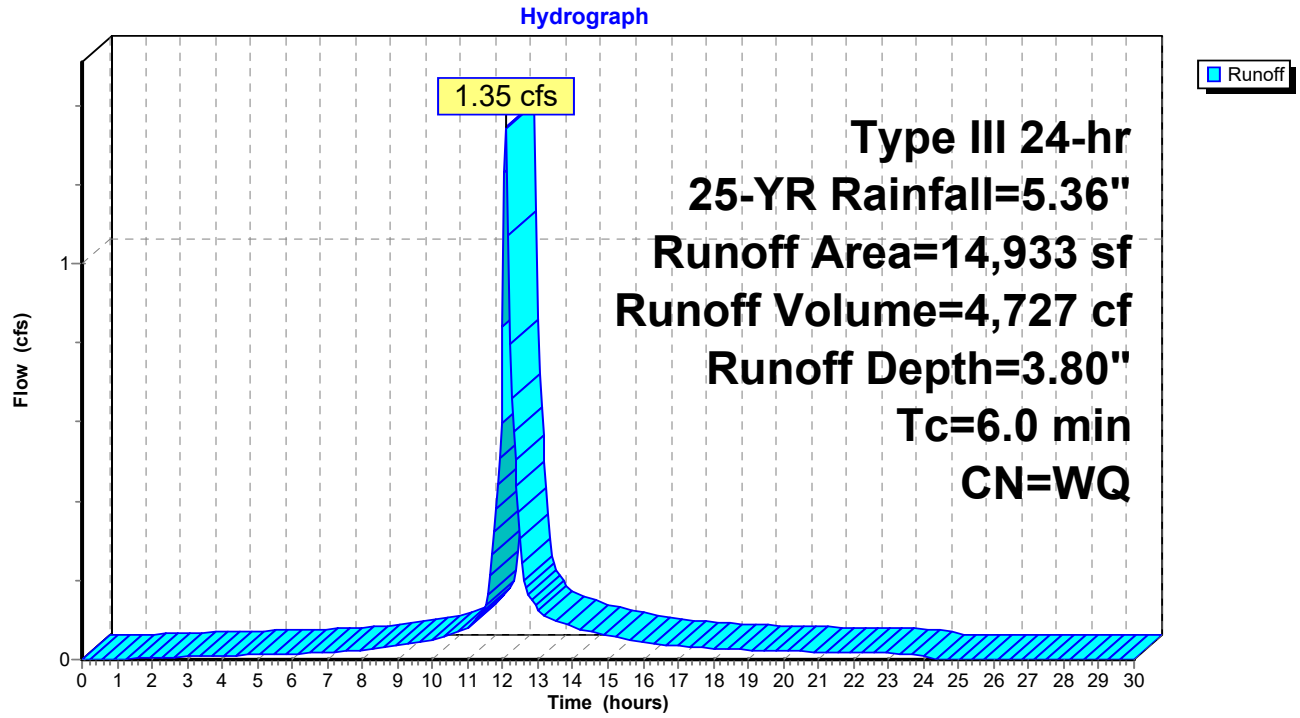
Runoff = 1.35 cfs @ 12.09 hrs, Volume= 4,727 cf, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.36"

	Area (sf)	CN	Description
*	8,116	98	impervious
	6,817	69	50-75% Grass cover, Fair, HSG B
	14,933		Weighted Average
	6,817	69	45.65% Pervious Area
	8,116	98	54.35% Impervious Area

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

Subcatchment 32S: DA2



Hydrograph for Subcatchment 32S: DA2

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.03	0.00	0.00
1.00	0.05	0.00	0.00
1.50	0.08	0.00	0.00
2.00	0.11	0.00	0.00
2.50	0.14	0.00	0.01
3.00	0.16	0.00	0.01
3.50	0.20	0.00	0.01
4.00	0.23	0.00	0.01
4.50	0.27	0.00	0.01
5.00	0.30	0.00	0.01
5.50	0.34	0.00	0.01
6.00	0.39	0.00	0.01
6.50	0.43	0.00	0.02
7.00	0.49	0.01	0.02
7.50	0.54	0.02	0.02
8.00	0.61	0.03	0.02
8.50	0.69	0.05	0.03
9.00	0.78	0.08	0.03
9.50	0.89	0.13	0.04
10.00	1.01	0.18	0.05
10.50	1.16	0.25	0.06
11.00	1.34	0.35	0.08
11.50	1.60	0.51	0.13
12.00	2.68	1.32	**0.84**
12.50	3.76	2.25	**0.31**
13.00	4.02	2.48	0.13
13.50	4.20	2.64	0.10
14.00	4.35	2.77	0.08
14.50	4.47	2.88	0.07
15.00	4.58	2.98	0.06
15.50	4.67	3.07	0.05
16.00	4.75	3.14	0.04
16.50	4.82	3.20	0.04
17.00	4.87	3.25	0.03
17.50	4.93	3.30	0.03
18.00	4.97	3.34	0.03
18.50	5.02	3.38	0.02
19.00	5.06	3.42	0.02
19.50	5.09	3.45	0.02
20.00	5.13	3.49	0.02
20.50	5.16	3.52	0.02
21.00	5.20	3.55	0.02
21.50	5.23	3.58	0.02
22.00	5.26	3.61	0.02
22.50	5.28	3.63	0.02
23.00	5.31	3.66	0.02
23.50	5.34	3.68	0.02
24.00	**5.36**	**3.70**	0.01
24.50	5.36	3.70	0.00
25.00	5.36	3.70	0.00
25.50	5.36	3.70	0.00
26.00	5.36	3.70	0.00
26.50	5.36	3.70	0.00
27.00	5.36	3.70	0.00
27.50	5.36	3.70	0.00
28.00	5.36	3.70	0.00
28.50	5.36	3.70	0.00
29.00	5.36	3.70	0.00
29.50	5.36	3.70	0.00
30.00	5.36	3.70	0.00

Summary for Pond 33P: Filterra 6x8/8x6

Inflow Area = 14,933 sf, 54.35% Impervious, Inflow Depth = 3.80" for 25-YR event
Inflow = 1.35 cfs @ 12.09 hrs, Volume= 4,727 cf
Outflow = 1.34 cfs @ 12.09 hrs, Volume= 4,696 cf, Atten= 1%, Lag= 0.0 min
Primary = 0.16 cfs @ 11.60 hrs, Volume= 3,243 cf
Secondary = 1.18 cfs @ 12.09 hrs, Volume= 1,453 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 59.81' @ 12.09 hrs Surf.Area= 48 sf Storage= 33 cf

Plug-Flow detention time= 4.8 min calculated for 4,688 cf (99% of inflow)
Center-of-Mass det. time= 0.5 min (774.0 - 773.5)

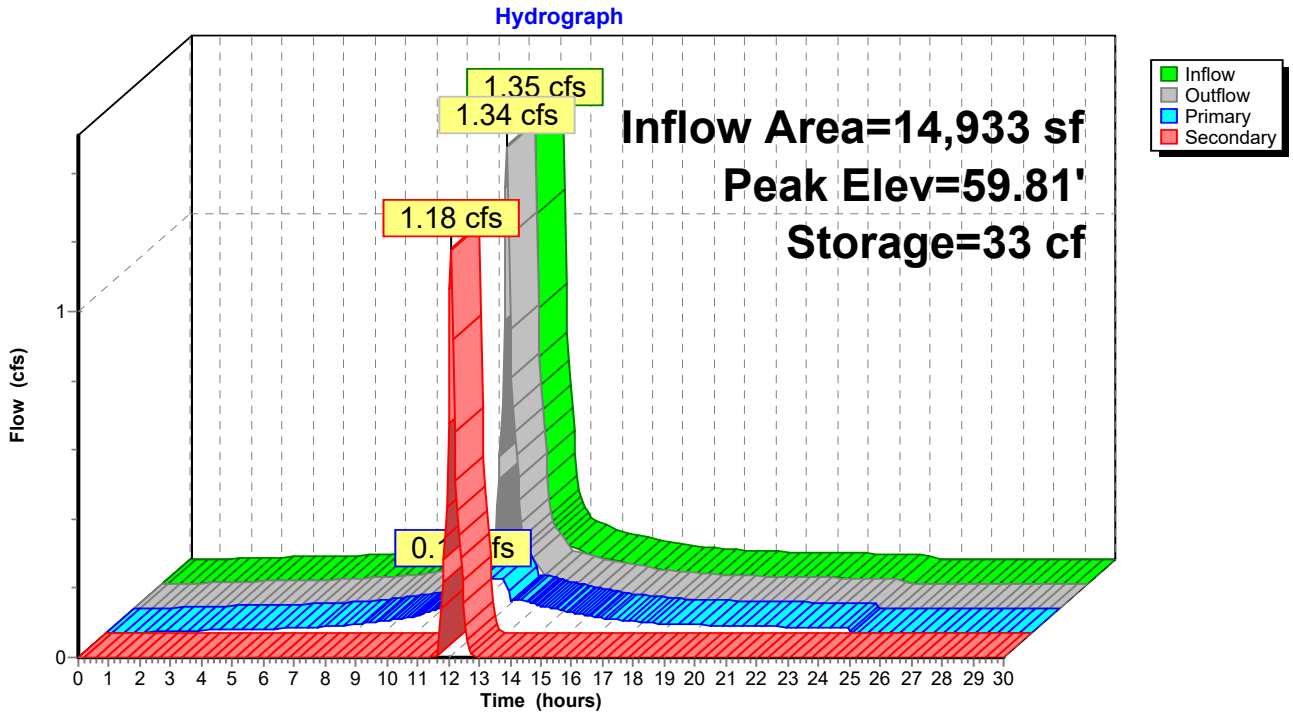
Volume	Invert	Avail.Storage	Storage Description
#1	59.12'	48 cf	**8.00'W x 6.00'L x 1.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Primary	59.12'	**140.000 in/hr Exfiltration over Surface area**
#2	Secondary	59.54'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.16 cfs @ 11.60 hrs HW=59.14' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Secondary OutFlow Max=1.15 cfs @ 12.09 hrs HW=59.80' (Free Discharge)
└**2=Orifice/Grate** (Weir Controls 1.15 cfs @ 1.68 fps)

Pond 33P: Filterra 6x8/8x6

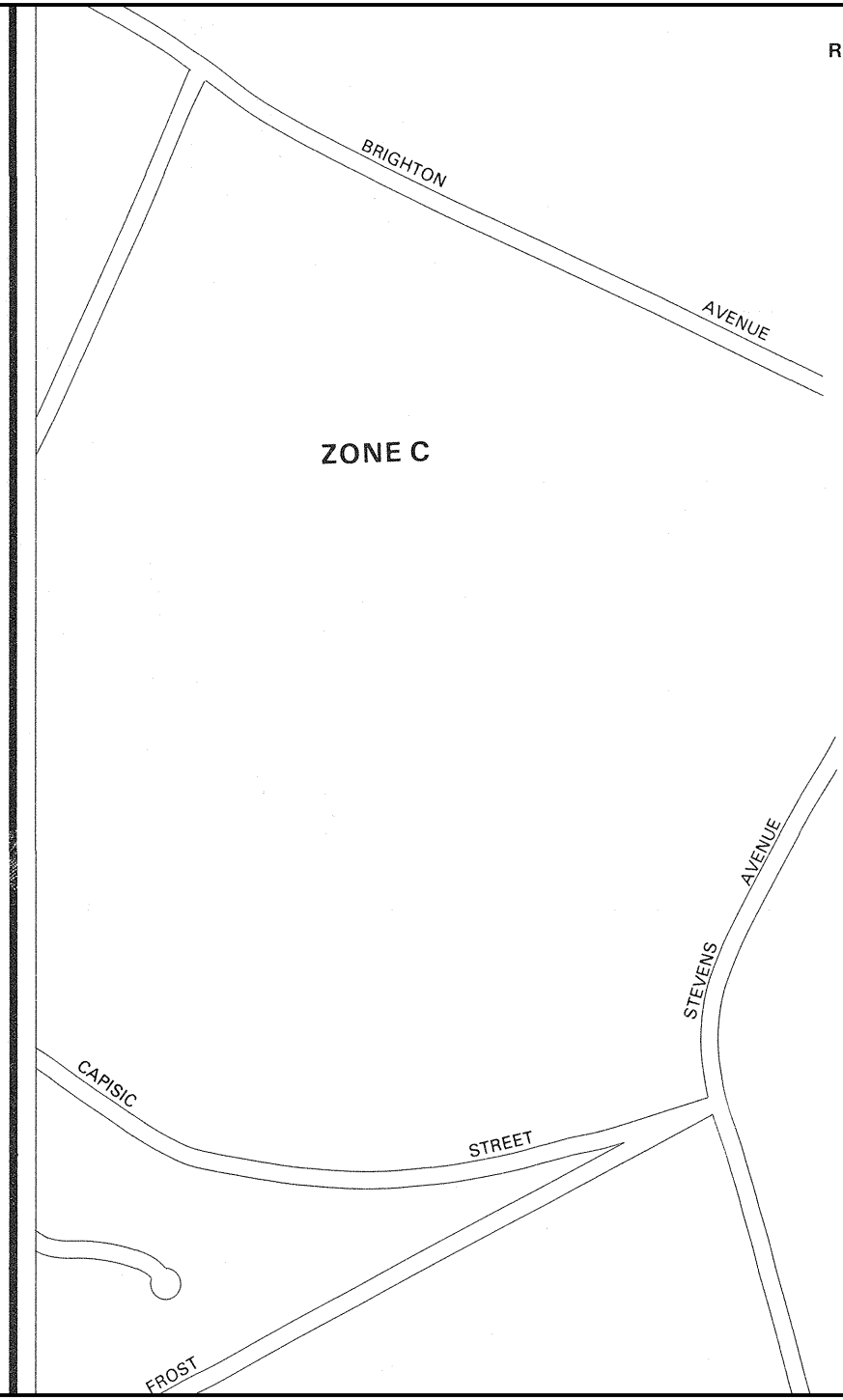


Hydrograph for Pond 33P: Filterra 6x8/8x6

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	59.12	0.00	0.00	0.00
1.00	0.00	0	59.12	0.00	0.00	0.00
2.00	0.00	0	59.12	0.00	0.00	0.00
3.00	0.01	0	59.12	0.01	0.01	0.00
4.00	0.01	0	59.12	0.01	0.01	0.00
5.00	0.01	0	59.12	0.01	0.01	0.00
6.00	0.01	0	59.12	0.01	0.01	0.00
7.00	0.02	0	59.12	0.02	0.02	0.00
8.00	0.02	0	59.12	0.02	0.02	0.00
9.00	0.03	0	59.12	0.03	0.03	0.00
10.00	0.05	0	59.12	0.05	0.05	0.00
11.00	0.08	0	59.13	0.08	**0.08**	0.00
12.00	**0.84**	**29**	**59.72**	**0.83**	**0.16**	**0.68**
13.00	**0.13**	**9**	**59.31**	**0.16**	0.16	**0.00**
14.00	0.08	0	59.13	0.08	0.08	0.00
15.00	0.06	0	59.12	0.06	0.06	0.00
16.00	0.04	0	59.12	0.04	0.04	0.00
17.00	0.03	0	59.12	0.03	0.03	0.00
18.00	0.03	0	59.12	0.03	0.03	0.00
19.00	0.02	0	59.12	0.02	0.02	0.00
20.00	0.02	0	59.12	0.02	0.02	0.00
21.00	0.02	0	59.12	0.02	0.02	0.00
22.00	0.02	0	59.12	0.02	0.02	0.00
23.00	0.02	0	59.12	0.02	0.02	0.00
24.00	0.01	0	59.12	0.01	0.01	0.00
25.00	0.00	0	59.12	0.00	0.00	0.00
26.00	0.00	0	59.12	0.00	0.00	0.00
27.00	0.00	0	59.12	0.00	0.00	0.00
28.00	0.00	0	59.12	0.00	0.00	0.00
29.00	0.00	0	59.12	0.00	0.00	0.00
30.00	0.00	0	59.12	0.00	0.00	0.00

APPENDIX F

Fema Firm Map



REFERENCE MARK	ELEVATION IN FT. (NGV
RM 28	56.00
RM 29	35.25
RM 30	25.36
RM 31	11.88
RM 32	9.89
RM 33	36.80
RM 34	22.81
RM 35	12.83
RM 36	28.34
RM 37	22.23
RM 38	15.56

APPROXIMATE SCALE

400 0 400 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

CITY OF
PORTLAND, MAINE
CUMBERLAND COUNTY

PANEL 13 OF 17
(SEE MAP INDEX FOR PANELS NOT PRINTED)

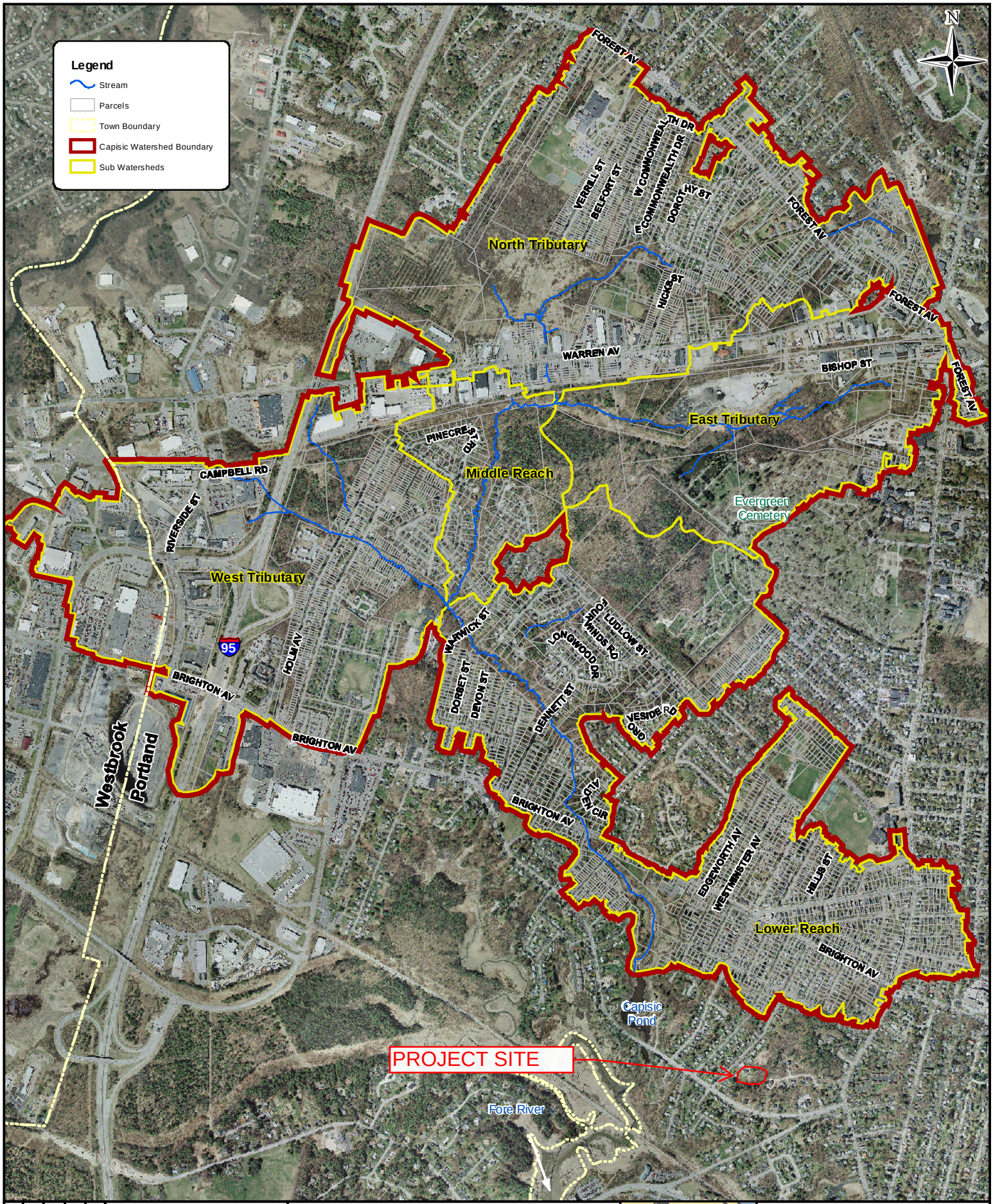
COMMUNITY-PANEL NUMBER
230051 0013 B

EFFECTIVE DATE:
JULY 17, 1986

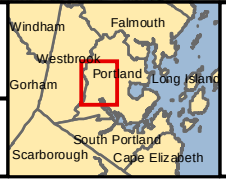
Federal Emergency Management Agency

APPENDIX G

Capisic Brook Watershed Map



Scale: 1" = 1500'	Job # 203939	Date: Oct 2010	Checked By: ZH	Drawn By: ADF/JS	**Aerial Site Location**	**City of Portland - Capisic Brook Watershed Management Plan**	
					Figure 1	**Sources:** City of Portland, Maine Office of GIS, DEP, WC Doc: SiteLocation_Aerials.mxd	



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