

October 14, 2016

Amanda Lessard, Planner
Town of Windham
8 School Road
Windham, ME 04062

**Re: Major Subdivision Plan Application – Response to Review Comments
Alweber Road Subdivision, Alweber Road, Windham
Keith Jason Eder & Jay Hackett, Applicant**

Dear Amanda:

We have received the peer review comments from Will Haskell from Gorrill Palmer via email received October 6, 2016. The following outlines how the comments have been addressed in the attached revised plans and narratives:

Comment 1: The project requires a Maine DEP NRPA permit by rule. A copy of the NRPA PBR shall be provided to the Town prior to final approval.

Response 1: Enclosed is a copy of the Maine DEP NRPA permit by rule that was submitted on September 29, 2016.

Comment 2: A waiver has been requested from the stormwater flooding standard. The narrative indicates that 75% of the impervious and developed areas are treated by buffers or “equivalent best management practices”. The ordinance is currently written that a waiver is allowed if 75% of the impervious and developed areas are treated through buffers. It appears that only about 32% of the impervious and developed areas are treated through the wooded buffer. About 48% of the impervious and developed areas are treated through the underdrain soil filter and roof drip strips.

Response 2: To meet the requirements of the stormwater flooding standard a runoff analysis was performed to determine the peak rates of runoff in the pre- and post-development conditions. Enclosed is the revised Stormwater Management Report including the stormwater analysis results.

Comment 3: We recommend that the following information be noted/labeled on the SB-1 plan: Zoning District, Zoning District dimensional standards (frontage, min lot size, setbacks), NRPA setbacks.

Response 3: The notes have been added to the Subdivision Plan. The clearing limits mimic the NRPA setbacks and General Note 12 has been added to clarify.

Comment 4: General note 4 on SB-1 notes that elevation contours were obtained from Maine GIS. We have seen significant discrepancies between GIS contours and field survey elevations, especially in wooded areas. We are mostly concerned about critical infrastructure such as stormwater management practices. We would recommend that the stormwater ditch, level lip spreader and associated buffer be checked by field survey or have a note added that the location of these practices be field checked and sited in coordination with the design engineer, town engineer and contractor prior to construction to ensure there are no elevation issues. In addition, an as built survey should be required if locations of these features change due to actual field elevations/conditions.

Response 4: General Note 4 on the revised Subdivision Plan has been updated to require field verification of the grades associated with the stormwater infrastructure and that any significant changes to the road plans as a result of the existing topographic information are to be noted on as-built plans and submitted to the Town.

Comment 5: *The Open Space parcel as shown on SB-1 should be labeled as required in the subdivision ordinance, Section 911.K.4.a.*

Response 5: The label for the open space has been revised to meet the subdivision ordinance requirements.

Comment 6: *The SB-1 plan identifies 3 requested waivers. We have no concerns with the first two requests. See comment 2 above regarding the stormwater waiver.*

Response 6: Noted.

Comment 7: *The SB-1 plan shows easement areas for the hammerhead turnarounds. Easements for the hammerheads are allowed per the ordinance, however, per Section 911.M.3.a.3, the area of any hammerhead easement shall not be used for purposes of satisfying the frontage requirement of the applicable zoning district. It appears that Lot 6 may not meet frontage requirements without counting the length of a portion of the easement line around the hammerhead.*

Response 7: Lot 6 as shown on the Subdivision Plan has 103.12' of street frontage exceeding the required 100' street frontage for a cluster subdivision in this zone.

Comment 8: *Drawing PP -1 – Add stop signs at each road intersection with Alweber Road.*

Response 8: Stop signs have been added to the revised Plan and Profile sheet at the road intersections with Alweber Road.

Comment 9: *Drawing PP-1 – Add dimensions for curb radii at intersections with Alweber Road and at the hammerheads.*

Response 9: Labels have been added to the revised Plan and Profile sheet for the dimensions of the curb radii at the intersections with Alweber Road and at the hammerheads.

Comment 10: *Drawing D-1 (5 of 6) – Specifications for the various geotextile fabric callouts should be added to the plan to minimize questions during the construction phase.*

Response 10: The details on the revised Detail sheets now specify the required geotextile.

Comment 11: *Drawing D-1 (6 of 6) – What is the anticipated groundwater table elevation? Please confirm and include an impermeable liner if necessary.*

Response 11: Test pits 4 and 5 are located in the vicinity of the underdrained filter basin. The test pit logs for these two locations indicate a depth to groundwater of 12" below the surface. The installation of this basin will be below the groundwater table which will require dewatering during construction, but once the groundwater cut off drain is installed as shown on the plans and detail, it should keep the groundwater from entering the filter media.

Comment 12: *Drawing D-1 (6 of 6) – Note 3 for the underdrain soil filter should be clarified. The referenced inspection should be completed by the Design Engineer or suitable third party, not the Town Engineer.*

Response 12: The construction oversight notes have been revised to indicate that the design engineer or suitable third party will conduct the inspections.

Comment 13: *Drawing D-1 (6 of 6) – Specifications for the various geotextile fabric callouts should be added to minimize questions during the construction phase.*

Response 13: The details on the revised Details sheets now specify the required geotextile.

Comment 14: *Drawing D-1 (6 of 6) – For clarity, on the filter basin plan detail, the road label should be changed from Road A to Lionel Lane.*

Response 14: The road name on the Filter Basin Plan view has been revised.

Comment 15: *Drawing D-1 (6 of 6) – The catch basin outlet pipe size should be changed to 15" diameter in the underdrain soil filter detail to match PP-1.*

Response 15: The outlet pipe from the catch basin within the filter basin is to be a 12" diameter pipe. To clarify we added a note to the Plan and Profile sheet indicating the required diameter of the pipe. The details of the pipe have been shown on the filter basin detail.

Please let us know if you have any additional questions or require any additional information related to this application.

Sincerely,

DM Roma Consulting Engineers

Dustin M Roma

Dustin M. Roma, P.E.
President

Cc: Keith Jason Elder, Applicant
Jay Hackett, Applicant

Enc.

NRPA PERMIT BY RULE NOTIFICATION FORM

(For use with DEP Regulation, Natural Resources Protection Act—Permit by Rule Standards, Chapter 305)

PLEASE TYPE OR PRINT IN BLACK INK ONLY

Name of Applicant: (owner)			Name of Agent:		
Applicant Mailing Address:			Agent Phone # (include area code):		
Town/City:			PROJECT Information Name of Town/City:		
State and Zip code:			Name of Wetland or Waterbody:		
Daytime Phone # (include area code):			Map #:		Lot #:
Detailed Directions to Site:					
			UTM Northing: (if known)		UTM Easting: (if known)
Description of Project:					
Part of a larger project? (check one)→	☐ Yes ☐ No	After the Fact? (check one)→	☐ Yes ☐ No	Check one→ This project ☐ does (or) ☐ does not involve work below mean low water (average low water).	

NRPA PERMIT BY RULE (PBR) SECTIONS: (Check at least one)

I am filing notice of my intent to carry out work which meets the requirements for Permit By Rule (PBR) under DEP Rules, Chapter 305. I and my agents, if any, **have read** and will comply with all of the standards in the Sections checked below.

- | | | |
|---|---|--|
| ☐ Sec. (2) Act. Adj. to Protected Natural Res. | ☐ Sec. (10) Stream Crossing | ☐ Sec. (17) Transfers/Permit Extension |
| ☐ Sec. (3) Intake Pipes | ☐ Sec. (11) State Transportation Facil. | ☐ Sec. (18) Maintenance Dredging |
| ☐ Sec. (4) Replacement of Structures | ☐ Sec. (12) Restoration of Natural Areas | ☐ Sec. (19) Activities in/on/over significant vernal pool habitat |
| ☐ Sec. (5) REPEALED | ☐ Sec. (13) F&W Creation/Enhance/Water Quality Improvement | ☐ Sec. (20) Activities located in/on/over high or moderate value inland water-fowl & wading bird habitat or shore-bird feeding & roosting areas |
| ☐ Sec. (6) Movement of Rocks or Vegetation | ☐ Sec. (14) REPEALED | |
| ☐ Sec. (7) Outfall Pipes | ☐ Sec. (15) Public Boat Ramps | |
| ☐ Sec. (8) Shoreline stabilization | ☐ Sec. (16) Coastal Sand Dune Projects | |
| ☐ Sec. (9) Utility Crossing | | |

NOTIFICATION FORMS CANNOT BE ACCEPTED WITHOUT THE NECESSARY ATTACHMENTS:

- ☐ **Attach** a check for the correct fee, payable to: "Treasurer, State of Maine". The current fee for NRPA PBR Notifications can be found at the Department's website: <http://www.maine.gov/dep/feesched.pdf>
- ☐ **Attach** a U.S.G.S. topo map or Maine Atlas & Gazetteer map with the project site clearly marked.
- ☐ **Attach** Proof of Legal Name if applicant is a corporation, LLC, or other legal entity. Provide a copy of Secretary of State's registration information (available at <http://icrs.informe.org/nei-sos-icrs/ICRS?MainPage=x>). Individuals and municipalities are **not** required to provide any proof of identity.
- ☐ **Attach** photos of the proposed site where activity will take place as required in PBR Sections checked above.
- ☐ **Attach** all other required submissions as outlined in the PBR Sections checked above.

I authorize staff of the Departments of Environmental Protection, Inland Fisheries & Wildlife, and Marine Resources to access the project site for the purpose of determining compliance with the rules. I also understand that **this permit is not valid until approved by the Department or 14 days after receipt by the Department, whichever is less.**

By signing this Notification Form, I represent that the project meets all applicability requirements and standards in the rule and that the applicant has sufficient title, right, or interest in the property where the activity takes place.

Signature of Agent or Applicant:	<i>Dustin M Roma</i>	Date:	
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Keep a copy as a record of permit. Send the form with attachments via certified mail or hand deliver to the Maine Dept. of Environmental Protection at the appropriate regional office listed below. The DEP will send a copy to the Town Office as evidence of the DEP's receipt of notification. No further authorization by DEP will be issued after receipt of notice. Permits are valid for two years. **Work carried out in violation of any standard is subject to enforcement action.**

AUGUSTA DEP
17 STATE HOUSE STATION
AUGUSTA, ME 04333-0017
(207)287-3901

PORTLAND DEP
312 CANCO ROAD
PORTLAND, ME 04103
(207)822-6300

BANGOR DEP
106 HOGAN ROAD
BANGOR, ME 04401
(207)941-4570

PRESQUE ISLE DEP
1235 CENTRAL DRIVE
PRESQUE ISLE, ME 04769
(207)764-0477

OFFICE USE ONLY	Ck.#	Date	Staff	Staff	After Photos
PBR #	FP		Acc. Date	Def. Date	

STORMWATER MANAGEMENT REPORT

ALWEBER ROAD PROPERTY ALWEBER ROAD & RIVER ROAD, WINDHAM, MAINE

A. Narrative

Keith Elder and Jay Hackett are proposing to develop property located at the corner of Alweber Road and River Road in Windham as a six lot subdivision. The subdivision will require the construction of two roads totaling approximately 450 linear feet for access and street frontage. The development will be served by private wells, private onsite subsurface septic and underground electric, telephone and cable. The property is approximately 10.3 acres, is located in the Farm zoning district and is identified as lot 31 on the Town of Windham Assessors Map 3. The property is currently undeveloped field and woods. In general, the site drains to the northwest via three stream channels.

B. Alterations to Land Cover

The property is currently undeveloped. The proposed development will create approximately 27,600 square feet of new impervious area consisting of the proposed roadways, driveways and buildings. The project will also consist of 60,570 square feet of new landscaped/disturbed areas resulting in a total new developed area of 88,170 square feet. The site is moderately steep in the uplands (5-8%) but steepens at the stream banks. Soils on the property are all Buxton silt loam as identified on the Medium Intensity Soil Maps for Cumberland County, Maine published by the Natural Resources Conservation Service. The Buxton soils are in the hydrologic soil groups "D" as indicated on the enclosed soils map.

C. Methodology and Modeling Assumptions

The proposed stormwater management system has been designed utilizing Best Management Practices (BMPs) to adequately attenuate and provide stormwater treatment for the site. The goal of the storm drainage system design is to remove potential stormwater pollutants while promoting infiltration and runoff attenuation to reduce the post development peak runoff rates to or below existing conditions. The method utilized to predict the surface water runoff rates in this analysis is a computer program entitled HydroCAD, which is based on the same methods that were originally developed by the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service, and utilized in the TR-20 modeling program. Peak rates of runoff are forecasted based upon land use, hydrologic soil conditions, vegetative cover, contributing watershed area, time of concentration, rainfall data, storage volumes of detention basins and the hydraulic capacity of structures. The computer model predicts the amount of runoff as a function of time, with the ability to include the attenuation effect due to dams, lakes, large wetlands, floodplains and constructed stormwater management basins. The input data for rainfalls with statistical recurrence frequencies of 2-, 10- and 25 years was obtained from Table 12-2.8 of the Maine Department of Transportation Drainage Design Manual, Chapter 12, Dated January 2005. The National Weather Service developed four synthetic storm types to simulate

rainfall patterns around the country. For analysis in Cumberland County, Maine, the type III rainfall pattern with a 24-hour duration is appropriate.

The proposed stormwater management system has been designed utilizing Best Management Practices to provide stormwater quality improvement measures. The goal of the storm drainage system design is to remove potential stormwater pollutants while promoting infiltration and runoff attenuation.

D. Basic Standards

The project is required by the Town and the Maine Department of Environmental Protection (MDEP) to provide permanent and temporary Erosion Control Best Management Practices. These methods are outlined in detail in the plan set.

E. General Standard

The Windham Land Use Ordinance requires that projects requiring Subdivision Review shall comply with Section 4B-General Standards of the MDEP Chapter 500 Stormwater Management. This document outlines the requirement of the project to provide stormwater quality treatment for no less than 95% of the new impervious surface and 80% of the total new developed area associated with the project. The water quality requirements will be met with the utilization of an underdrained filter basin, a forested buffer and roof dripedges. Calculations can be found on the Post Development Stormwater Map and enclosed in this report.

F. Flooding Standards

The Windham Land Use Ordinance requires that projects requiring Subdivision Review shall comply with Section 4E-Flooding Standards of the MDEP Chapter 500 Stormwater Management. The project shall detain, retain or result in the infiltration of stormwater from the 24-hour storms of the 2-year, 10-year and 25-year frequencies such that the peak flows of stormwater from the project site do not exceed the peak flows of stormwater prior to undertaking the project. The proposed stormwater infrastructure includes an underdrain filter basin to provide treatment and attenuation and a wooded buffer with stone level spreader to provide treatment and promote infiltration. Study Points SP1, SP2 and SP3 used for the analysis are the locations where the three on-site streams leave the property to the northwest. These three streams combine only 250' +/- from the property which is the true study point to determine the actual impact that the site will have to the major stream channel. This location has been labeled as Study Point 4. The following table summarizes the analysis:

Table 1 – Peak Rates of Stormwater Runoff						
Study Point	2-Year (cfs)		10-Year (cfs)		25-Year (cfs)	
	Pre	Post	Pre	Post	Pre	Post
SP-1	9.76	9.77	21.60	21.63	27.52	27.56
SP-2	5.86	6.41	12.95	13.69	16.49	17.28
SP-3	13.48	13.36	51.85	51.74	67.86	67.61
SP-4	19.25	19.25	61.52	61.37	85.66	85.37

As indicated in the table, there are slight increases at SP1 and some larger increases at SP2 but still relatively small (5%-9% increase). We don't believe that these flow increases at the property line will cause any additional erosion of the stream channel.

There may be increases at these study points, but at the location where the three streams combine (SP4), the model is indicating that the peak flow rates in the post development are at or below the existing conditions meeting the general requirements of the Town's flooding standard. The watershed maps showing pre-development and post-development drainage patterns are included in the plan set and the offsite watershed map and the computations performed with the HydroCAD software program are included as an attachment to this report.

G. Maintenance of common facilities or property

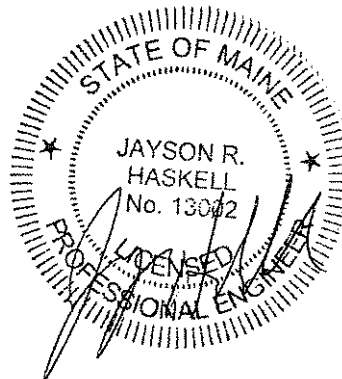
The homeowner's association will be responsible for the maintenance of the stormwater facilities. Enclosed is an Inspection, Maintenance and Housekeeping Plan for the project.

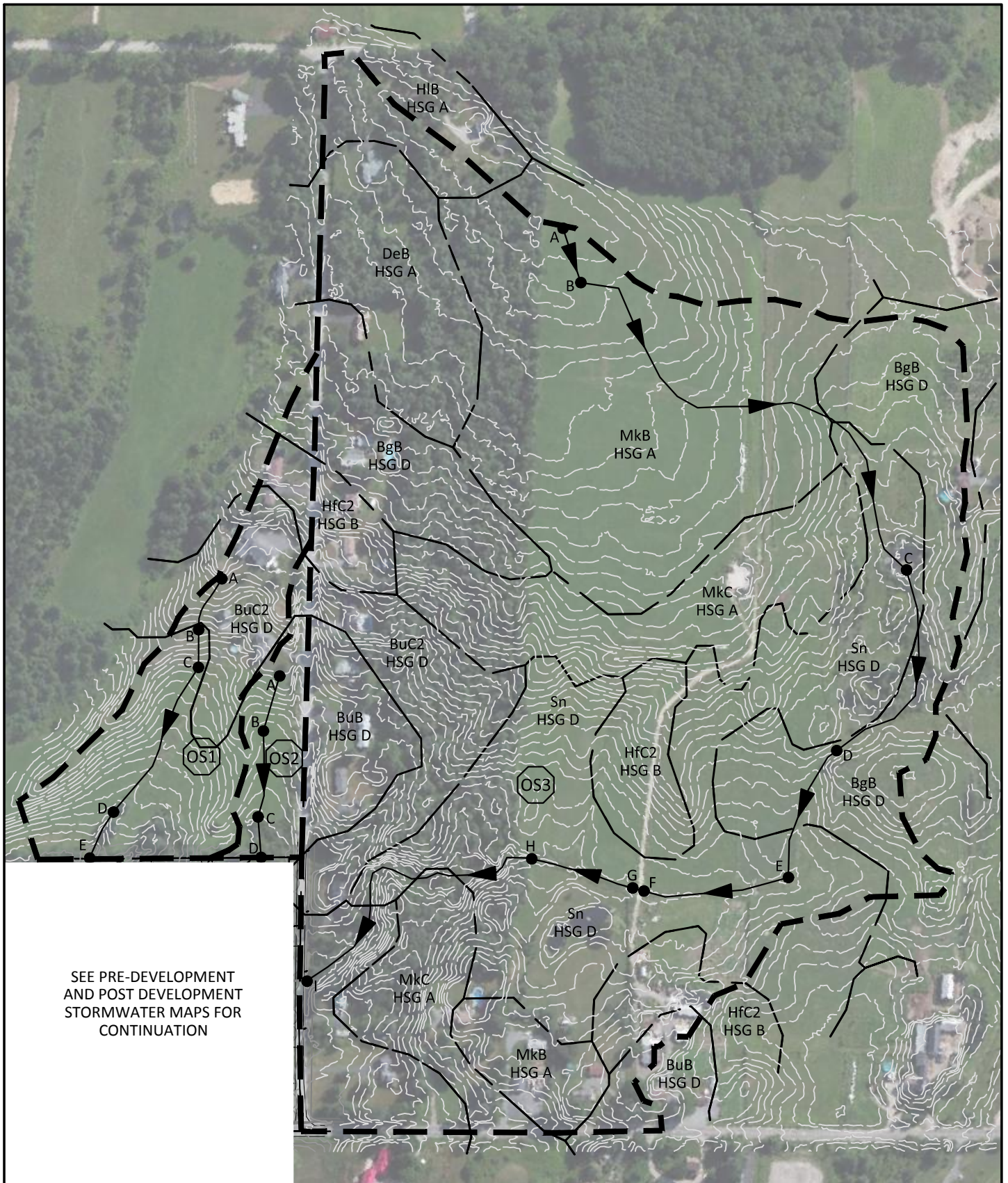
Prepared by:

DM ROMA CONSULTING ENGINEERS



Jayson R. Haskell, P.E.
Project Manager





OFF-SITE STORMWATER MAP

ALWEBER ROAD PROPERTY
WINDHAM, MAINE

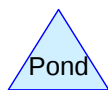
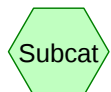
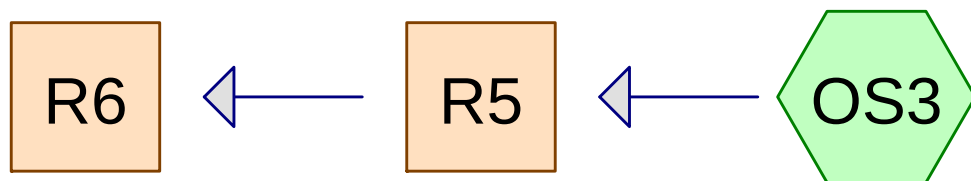
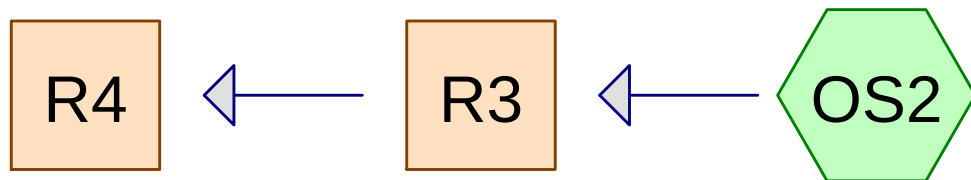
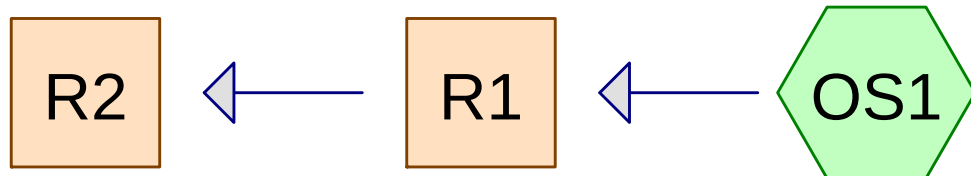
FOR RECORD OWNER:
KEITH JASON ELDER & JAY P. HACKETT
434 GRAY ROAD
WINDHAM, MAINE 04062

SCALE: 1"=350'
DATE: 10-14-16
JOB NUMBER: 16024

DM ROMA

CONSULTING ENGINEERS

59 HARVEST HILL RD
WINDHAM, ME 04062
(207) 310 - 0506



16024-Offsite Watersheds-Links

Type III 24-hr 25-YEAR Rainfall=5.50"

Prepared by DM Roma Consulting Engineers

Printed 10/13/2016

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Page 1

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment OS1: Runoff Area=358,675 sf 7.68% Impervious Runoff Depth>3.02"
Flow Length=832' Tc=13.3 min CN=79 Runoff=24.51 cfs 2.071 af

Subcatchment OS2: Runoff Area=98,770 sf 13.82% Impervious Runoff Depth>3.21"
Flow Length=487' Tc=13.0 min CN=81 Runoff=7.19 cfs 0.606 af

Subcatchment OS3: Runoff Area=3,557,800 sf 7.08% Impervious Runoff Depth>1.64"
Flow Length=3,922' Tc=53.9 min CN=63 Runoff=69.60 cfs 11.153 af

Reach R1: Avg. Flow Depth=0.56' Max Vel=8.30 fps Inflow=24.51 cfs 2.071 af
n=0.030 L=70.0' S=0.1000 '/ Capacity=373.56 cfs Outflow=24.45 cfs 2.071 af

Reach R2: Avg. Flow Depth=0.72' Max Vel=6.56 fps Inflow=24.45 cfs 2.071 af
n=0.030 L=138.0' S=0.0450 '/ Capacity=2,800.94 cfs Outflow=24.31 cfs 2.070 af

Reach R3: Avg. Flow Depth=0.26' Max Vel=3.68 fps Inflow=7.19 cfs 0.606 af
n=0.030 L=264.0' S=0.0500 '/ Capacity=26.57 cfs Outflow=7.06 cfs 0.605 af

Reach R4: Avg. Flow Depth=0.26' Max Vel=4.02 fps Inflow=7.06 cfs 0.605 af
n=0.030 L=502.0' S=0.0470 '/ Capacity=3,411.08 cfs Outflow=6.84 cfs 0.603 af

Reach R5: Avg. Flow Depth=2.50' Max Vel=13.61 fps Inflow=69.60 cfs 11.153 af
30.0" Round Pipe n=0.025 L=45.0' S=0.0756 '/ Capacity=58.63 cfs Outflow=61.92 cfs 11.152 af

Reach R6: Avg. Flow Depth=0.98' Max Vel=7.34 fps Inflow=61.92 cfs 11.152 af
n=0.030 L=855.0' S=0.0370 '/ Capacity=2,078.26 cfs Outflow=60.29 cfs 11.115 af

16024-Offsite Watersheds-Links

Type III 24-hr 25-YEAR Rainfall=5.50"

Prepared by DM Roma Consulting Engineers

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Summary for Subcatchment OS1:

Runoff = 24.51 cfs @ 12.19 hrs, Volume= 2.071 af, Depth> 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR Rainfall=5.50"

Area (sf)	CN	Description
22,600	68	1 acre lots, 20% imp, HSG B
115,120	84	1 acre lots, 20% imp, HSG D
198,185	78	Meadow, non-grazed, HSG D
22,770	77	Woods, Good, HSG D
358,675	79	Weighted Average
331,131		92.32% Pervious Area
27,544		7.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	150	0.0900	0.33		Sheet Flow, A TO B Grass: Short n= 0.150 P2= 3.00"
0.7	100	0.1200	2.42		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
4.7	445	0.0500	1.57		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
0.2	137	0.0650	13.39	214.30	Trap/Vee/Rect Channel Flow, D TO E Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.030
13.3	832	Total			

Summary for Subcatchment OS2:

Runoff = 7.19 cfs @ 12.18 hrs, Volume= 0.606 af, Depth> 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR Rainfall=5.50"

Area (sf)	CN	Description
* 13,650	98	Road Pavement
70,350	78	Meadow, non-grazed, HSG D
13,570	77	Woods, Good, HSG D
1,200	80	>75% Grass cover, Good, HSG D
98,770	81	Weighted Average
85,120		86.18% Pervious Area
13,650		13.82% Impervious Area

16024-Offsite Watersheds-Links

Type III 24-hr 25-YEAR Rainfall=5.50"

Prepared by DM Roma Consulting Engineers

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	150	0.0850	0.32		Sheet Flow, A TO B Grass: Short n= 0.150 P2= 3.00"
3.1	227	0.0300	1.21		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
2.1	110	0.0300	0.87		Shallow Concentrated Flow, C TO D Woodland Kv= 5.0 fps
13.0	487	Total			

Summary for Subcatchment OS3:

Runoff = 69.60 cfs @ 12.78 hrs, Volume= 11.153 af, Depth> 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR Rainfall=5.50"

	Area (sf)	CN	Description
*	41,540	98	Roads and Buildings
*	9,990	98	Water Surface
	269,935	30	Woods, Good, HSG A
	211,415	77	Woods, Good, HSG D
	5,030	76	Gravel roads, HSG A
	14,900	85	Gravel roads, HSG B
	12,475	91	Gravel roads, HSG D
	400,475	51	1 acre lots, 20% imp, HSG A
	55,215	68	1 acre lots, 20% imp, HSG B
	546,870	84	1 acre lots, 20% imp, HSG D
	781,295	39	Pasture/grassland/range, Good, HSG A
	145,800	61	Pasture/grassland/range, Good, HSG B
	988,620	80	Pasture/grassland/range, Good, HSG D
	48,715	39	>75% Grass cover, Good, HSG A
	3,030	61	>75% Grass cover, Good, HSG B
	22,495	80	>75% Grass cover, Good, HSG D
	3,557,800	63	Weighted Average
	3,305,758		92.92% Pervious Area
	252,042		7.08% Impervious Area

16024-Offsite Watersheds-Links

Type III 24-hr 25-YEAR Rainfall=5.50"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	150	0.0100	0.14		Sheet Flow, A TO B Grass: Short n= 0.150 P2= 3.00"
18.0	1,310	0.0300	1.21		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
14.0	590	0.0100	0.70		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
0.6	368	0.0300	10.85	216.95	Trap/Vee/Rect Channel Flow, D TO E Bot.W=2.00' D=2.00' Z= 4.0 ' Top.W=18.00' n= 0.025
1.0	385	0.0100	6.26	125.26	Trap/Vee/Rect Channel Flow, E TO F Bot.W=2.00' D=2.00' Z= 4.0 ' Top.W=18.00' n= 0.025
0.1	30	0.0050	5.91	29.00	Pipe Channel, F TO G 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.4	275	0.0250	10.19	224.13	Trap/Vee/Rect Channel Flow, G TO H Bot.W=3.00' D=2.00' Z= 4.0 ' Top.W=19.00' n= 0.025
1.3	814	0.0200	10.37	466.78	Trap/Vee/Rect Channel Flow, H TO I Bot.W=6.00' D=3.00' Z= 3.0 ' Top.W=24.00' n= 0.030
53.9	3,922	Total			

Summary for Reach R1:

Inflow Area = 8.234 ac, 7.68% Impervious, Inflow Depth > 3.02" for 25-YEAR event
 Inflow = 24.51 cfs @ 12.19 hrs, Volume= 2.071 af
 Outflow = 24.45 cfs @ 12.19 hrs, Volume= 2.071 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 8.30 fps, Min. Travel Time= 0.1 min
 Avg. Velocity = 3.18 fps, Avg. Travel Time= 0.4 min

Peak Storage= 207 cf @ 12.19 hrs
 Average Depth at Peak Storage= 0.56'
 Bank-Full Depth= 2.00' Flow Area= 22.0 sf, Capacity= 373.56 cfs

3.00' x 2.00' deep channel, n= 0.030
 Side Slope Z-value= 4.0 ' Top Width= 19.00'
 Length= 70.0' Slope= 0.1000 '
 Inlet Invert= 0.00', Outlet Invert= -7.00'



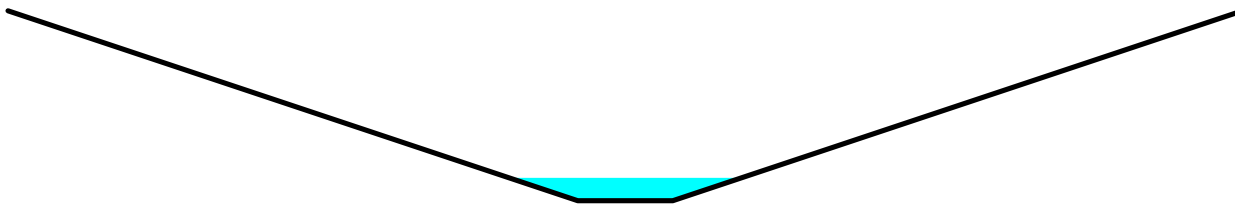
Summary for Reach R2:

Inflow Area = 8.234 ac, 7.68% Impervious, Inflow Depth > 3.02" for 25-YEAR event
Inflow = 24.45 cfs @ 12.19 hrs, Volume= 2.071 af
Outflow = 24.31 cfs @ 12.20 hrs, Volume= 2.070 af, Atten= 1%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.56 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.60 fps, Avg. Travel Time= 0.9 min

Peak Storage= 515 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.72'
Bank-Full Depth= 6.00' Flow Area= 126.0 sf, Capacity= 2,800.94 cfs

3.00' x 6.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 39.00'
Length= 138.0' Slope= 0.0450 '/'
Inlet Invert= 0.00', Outlet Invert= -6.21'

**Summary for Reach R3:**

Inflow Area = 2.267 ac, 13.82% Impervious, Inflow Depth > 3.21" for 25-YEAR event
Inflow = 7.19 cfs @ 12.18 hrs, Volume= 0.606 af
Outflow = 7.06 cfs @ 12.22 hrs, Volume= 0.605 af, Atten= 2%, Lag= 2.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.68 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 1.31 fps, Avg. Travel Time= 3.4 min

Peak Storage= 515 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 0.50' Flow Area= 5.0 sf, Capacity= 26.57 cfs

5.00' x 0.50' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 15.00'
Length= 264.0' Slope= 0.0500 '/'
Inlet Invert= 0.00', Outlet Invert= -13.20'



Summary for Reach R4:

Inflow Area = 2.267 ac, 13.82% Impervious, Inflow Depth > 3.20" for 25-YEAR event
Inflow = 7.06 cfs @ 12.22 hrs, Volume= 0.605 af
Outflow = 6.84 cfs @ 12.28 hrs, Volume= 0.603 af, Atten= 3%, Lag= 3.8 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.02 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.75 fps, Avg. Travel Time= 4.8 min

Peak Storage= 869 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 6.00' Flow Area= 144.0 sf, Capacity= 3,411.08 cfs

6.00' x 6.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 42.00'
Length= 502.0' Slope= 0.0470 '/'
Inlet Invert= 0.00', Outlet Invert= -23.59'

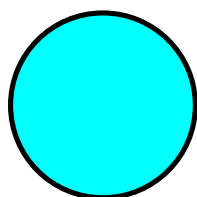
**Summary for Reach R5:**

Inflow Area = 81.676 ac, 7.08% Impervious, Inflow Depth > 1.64" for 25-YEAR event
Inflow = 69.60 cfs @ 12.78 hrs, Volume= 11.153 af
Outflow = 61.92 cfs @ 12.60 hrs, Volume= 11.152 af, Atten= 11%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 13.61 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 8.40 fps, Avg. Travel Time= 0.1 min

Peak Storage= 221 cf @ 12.65 hrs
Average Depth at Peak Storage= 2.50'
Bank-Full Depth= 2.50' Flow Area= 4.9 sf, Capacity= 58.63 cfs

30.0" Round Pipe
n= 0.025
Length= 45.0' Slope= 0.0756 '/'
Inlet Invert= 129.70', Outlet Invert= 126.30'



16024-Offsite Watersheds-Links

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Type III 24-hr 25-YEAR Rainfall=5.50"

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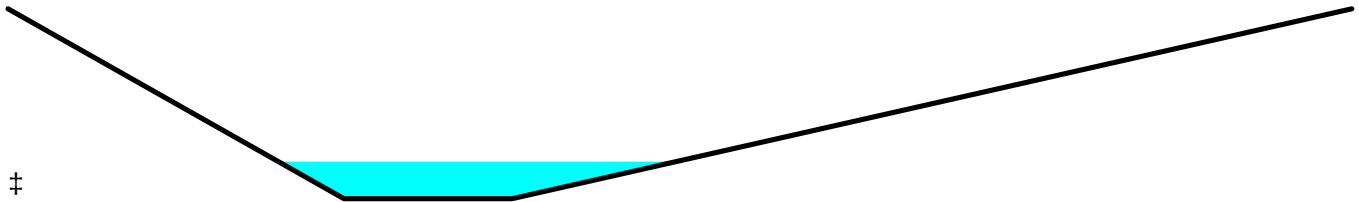
Summary for Reach R6:

Inflow Area = 81.676 ac, 7.08% Impervious, Inflow Depth > 1.64" for 25-YEAR event
Inflow = 61.92 cfs @ 12.60 hrs, Volume= 11.152 af
Outflow = 60.29 cfs @ 12.67 hrs, Volume= 11.115 af, Atten= 3%, Lag= 4.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.34 fps, Min. Travel Time= 1.9 min
Avg. Velocity= 4.18 fps, Avg. Travel Time= 3.4 min

Peak Storage= 7,031 cf @ 12.64 hrs
Average Depth at Peak Storage= 0.98'
Bank-Full Depth= 5.00' Flow Area= 112.5 sf, Capacity= 2,078.26 cfs

5.00' x 5.00' deep channel, n= 0.030
Side Slope Z-value= 2.0 5.0 '/' Top Width= 40.00'
Length= 855.0' Slope= 0.0370 '/'
Inlet Invert= 0.00', Outlet Invert= -31.64'



16024-Offsite Watersheds-Links

Type III 24-hr 2-YEAR Rainfall=3.00"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment OS1: Runoff Area=358,675 sf 7.68% Impervious Runoff Depth>1.09"
Flow Length=832' Tc=13.3 min CN=79 Runoff=8.78 cfs 0.748 af

Subcatchment OS2: Runoff Area=98,770 sf 13.82% Impervious Runoff Depth>1.21"
Flow Length=487' Tc=13.0 min CN=81 Runoff=2.72 cfs 0.229 af

Subcatchment OS3: Runoff Area=3,557,800 sf 7.08% Impervious Runoff Depth>0.37"
Flow Length=3,922' Tc=53.9 min CN=63 Runoff=12.14 cfs 2.498 af

Reach R1: Avg. Flow Depth=0.33' Max Vel=6.19 fps Inflow=8.78 cfs 0.748 af
n=0.030 L=70.0' S=0.1000 '/ Capacity=373.56 cfs Outflow=8.76 cfs 0.748 af

Reach R2: Avg. Flow Depth=0.42' Max Vel=4.88 fps Inflow=8.76 cfs 0.748 af
n=0.030 L=138.0' S=0.0450 '/ Capacity=2,800.94 cfs Outflow=8.68 cfs 0.747 af

Reach R3: Avg. Flow Depth=0.15' Max Vel=2.74 fps Inflow=2.72 cfs 0.229 af
n=0.030 L=264.0' S=0.0500 '/ Capacity=26.57 cfs Outflow=2.65 cfs 0.228 af

Reach R4: Avg. Flow Depth=0.14' Max Vel=2.83 fps Inflow=2.65 cfs 0.228 af
n=0.030 L=502.0' S=0.0470 '/ Capacity=3,411.08 cfs Outflow=2.60 cfs 0.227 af

Reach R5: Avg. Flow Depth=0.77' Max Vel=9.42 fps Inflow=12.14 cfs 2.498 af
30.0" Round Pipe n=0.025 L=45.0' S=0.0756 '/ Capacity=58.63 cfs Outflow=12.13 cfs 2.498 af

Reach R6: Avg. Flow Depth=0.41' Max Vel=4.56 fps Inflow=12.13 cfs 2.498 af
n=0.030 L=855.0' S=0.0370 '/ Capacity=2,078.26 cfs Outflow=12.08 cfs 2.479 af

16024-Offsite Watersheds-Links

Type III 24-hr 10-YEAR Rainfall=4.70"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment OS1: Runoff Area=358,675 sf 7.68% Impervious Runoff Depth>2.37"
Flow Length=832' Tc=13.3 min CN=79 Runoff=19.27 cfs 1.623 af

Subcatchment OS2: Runoff Area=98,770 sf 13.82% Impervious Runoff Depth>2.54"
Flow Length=487' Tc=13.0 min CN=81 Runoff=5.72 cfs 0.479 af

Subcatchment OS3: Runoff Area=3,557,800 sf 7.08% Impervious Runoff Depth>1.17"
Flow Length=3,922' Tc=53.9 min CN=63 Runoff=48.26 cfs 7.964 af

Reach R1: Avg. Flow Depth=0.50' Max Vel=7.77 fps Inflow=19.27 cfs 1.623 af
n=0.030 L=70.0' S=0.1000 '/ Capacity=373.56 cfs Outflow=19.23 cfs 1.623 af

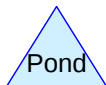
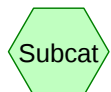
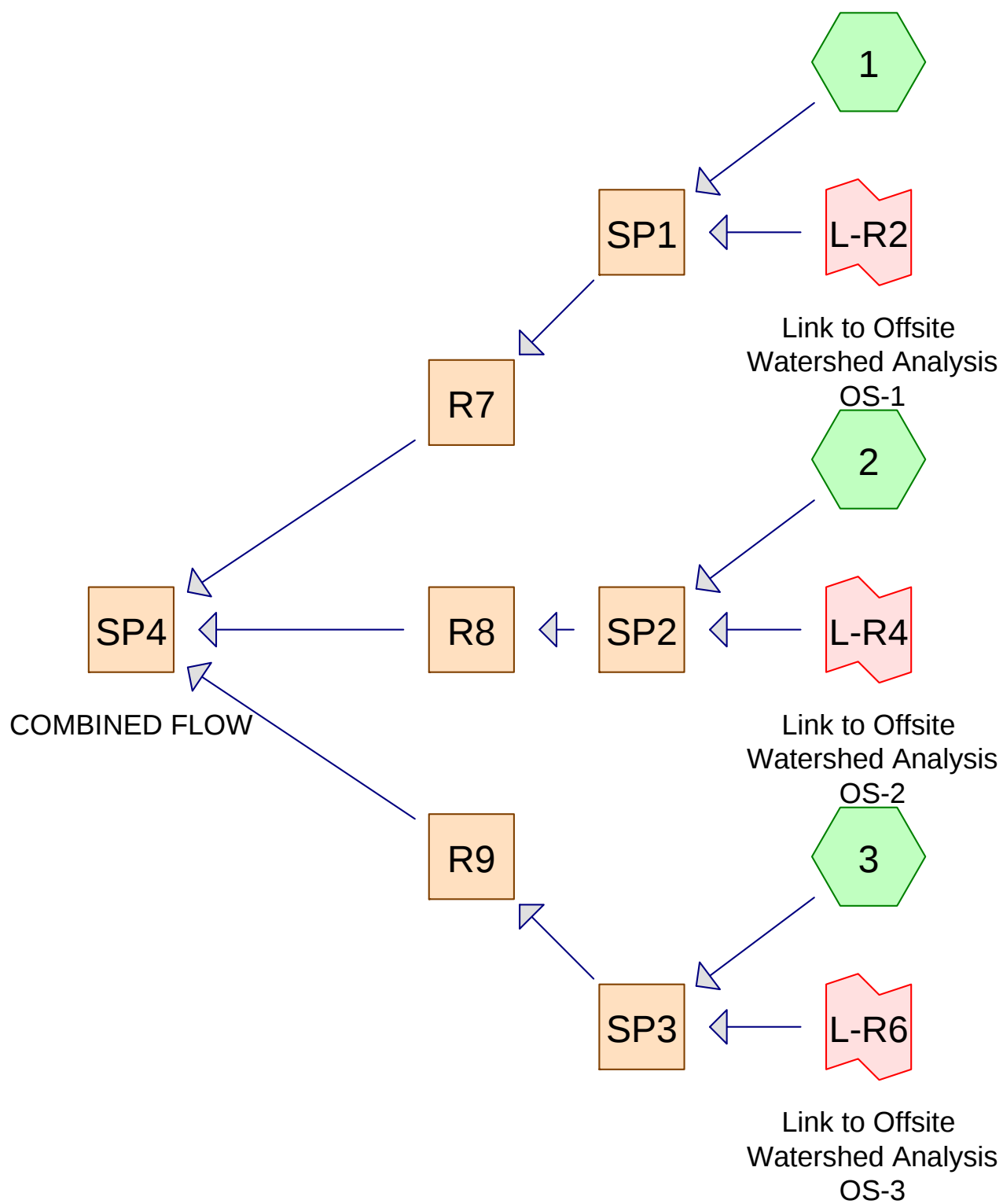
Reach R2: Avg. Flow Depth=0.64' Max Vel=6.14 fps Inflow=19.23 cfs 1.623 af
n=0.030 L=138.0' S=0.0450 '/ Capacity=2,800.94 cfs Outflow=19.11 cfs 1.622 af

Reach R3: Avg. Flow Depth=0.23' Max Vel=3.44 fps Inflow=5.72 cfs 0.479 af
n=0.030 L=264.0' S=0.0500 '/ Capacity=26.57 cfs Outflow=5.60 cfs 0.478 af

Reach R4: Avg. Flow Depth=0.22' Max Vel=3.71 fps Inflow=5.60 cfs 0.478 af
n=0.030 L=502.0' S=0.0470 '/ Capacity=3,411.08 cfs Outflow=5.44 cfs 0.477 af

Reach R5: Avg. Flow Depth=1.73' Max Vel=13.34 fps Inflow=48.26 cfs 7.964 af
30.0" Round Pipe n=0.025 L=45.0' S=0.0756 '/ Capacity=58.63 cfs Outflow=48.26 cfs 7.964 af

Reach R6: Avg. Flow Depth=0.87' Max Vel=6.89 fps Inflow=48.26 cfs 7.964 af
n=0.030 L=855.0' S=0.0370 '/ Capacity=2,078.26 cfs Outflow=48.13 cfs 7.933 af



Routing Diagram for 16024-PRE

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16024-PRE

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Type III 24-hr 25-YEAR Rainfall=5.50"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Runoff Area=59,590 sf 0.00% Impervious Runoff Depth>2.83"
 Flow Length=484' Tc=18.7 min CN=77 Runoff=3.38 cfs 0.322 af

Subcatchment2: Runoff Area=191,025 sf 1.03% Impervious Runoff Depth>2.82"
 Flow Length=794' Tc=23.8 min CN=77 Runoff=9.78 cfs 1.032 af

Subcatchment3: Runoff Area=244,570 sf 6.34% Impervious Runoff Depth>3.01"
 Flow Length=761' Tc=24.7 min CN=79 Runoff=13.10 cfs 1.407 af

Reach R7: Avg. Flow Depth=0.85' Max Vel=5.82 fps Inflow=27.52 cfs 2.392 af
 n=0.030 L=400.0' S=0.0300 '/ Capacity=2,286.96 cfs Outflow=26.92 cfs 2.388 af

Reach R8: Avg. Flow Depth=0.54' Max Vel=4.02 fps Inflow=16.49 cfs 1.635 af
 n=0.030 L=273.0' S=0.0200 '/ Capacity=2,225.33 cfs Outflow=16.28 cfs 1.632 af

Reach R9: Avg. Flow Depth=1.24' Max Vel=6.25 fps Inflow=67.86 cfs 12.522 af
 n=0.030 L=275.0' S=0.0200 '/ Capacity=427.57 cfs Outflow=67.27 cfs 12.507 af

Reach SP1: Inflow=27.52 cfs 2.392 af
 Outflow=27.52 cfs 2.392 af

Reach SP2: Inflow=16.49 cfs 1.635 af
 Outflow=16.49 cfs 1.635 af

Reach SP3: Inflow=67.86 cfs 12.522 af
 Outflow=67.86 cfs 12.522 af

Reach SP4: COMBINED FLOW Inflow=85.66 cfs 16.527 af
 Outflow=85.66 cfs 16.527 af

Link 25-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R2.hce Inflow=24.31 cfs 2.070 af
 Area= 8.234 ac 7.68% Imperv. Primary=24.31 cfs 2.070 af

Link 25-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R4.hce Inflow=6.84 cfs 0.603 af
 Area= 2.267 ac 13.82% Imperv. Primary=6.84 cfs 0.603 af

Link 25-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R6.hce Inflow=60.29 cfs 11.115 af
 Area= 81.676 ac 7.08% Imperv. Primary=60.29 cfs 11.115 af

16024-PRE

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Type III 24-hr 25-YEAR Rainfall=5.50"

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Summary for Subcatchment 1:

Runoff = 3.38 cfs @ 12.26 hrs, Volume= 0.322 af, Depth> 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR Rainfall=5.50"

Area (sf)	CN	Description
56,660	77	Woods, Good, HSG D
* 2,930	77	Woods-Wetlands
59,590	77	Weighted Average
59,590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	150	0.0850	0.15		Sheet Flow, A TO B Woods: Light underbrush n= 0.400 P2= 3.00"
1.3	120	0.0900	1.50		Shallow Concentrated Flow, B TO C Woodland Kv= 5.0 fps
0.2	214	0.0450	22.23	2,800.94	Trap/Vee/Rect Channel Flow, C TO D Bot.W=3.00' D=6.00' Z= 3.0 ' Top.W=39.00' n= 0.030
18.7	484	Total			

Summary for Subcatchment 2:

Runoff = 9.78 cfs @ 12.33 hrs, Volume= 1.032 af, Depth> 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR Rainfall=5.50"

Area (sf)	CN	Description
149,680	77	Woods, Good, HSG D
* 35,480	77	Woods-Wetlands
* 1,975	98	Road
1,690	80	>75% Grass cover, Good, HSG D
* 2,200	80	Grass-Wetlands
191,025	77	Weighted Average
189,050		98.97% Pervious Area
1,975		1.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.3	150	0.0500	0.12		Sheet Flow, A TO B Woods: Light underbrush n= 0.400 P2= 3.00"
2.1	142	0.0500	1.12		Shallow Concentrated Flow, B TO C Woodland Kv= 5.0 fps
0.4	502	0.0470	23.69	3,411.37	Trap/Vee/Rect Channel Flow, C TO D Bot.W=6.00' D=6.00' Z= 3.0 ' Top.W=42.00' n= 0.030
23.8	794	Total			

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Type III 24-hr 25-YEAR Rainfall=5.50"

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Summary for Subcatchment 3:

Runoff = 13.10 cfs @ 12.34 hrs, Volume= 1.407 af, Depth> 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR Rainfall=5.50"

Area (sf)	CN	Description
112,250	77	Woods, Good, HSG D
* 37,050	77	Woods-Wetlands
54,530	78	Meadow, non-grazed, HSG D
* 15,500	98	Roads
25,240	80	>75% Grass cover, Good, HSG D
244,570	79	Weighted Average
229,070		93.66% Pervious Area
15,500		6.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.1	111	0.0200	0.08		Sheet Flow, A TO B Woods: Light underbrush n= 0.400 P2= 3.00"
0.6	650	0.0370	18.47	2,078.10	Trap/Vee/Rect Channel Flow, D TO E Bot.W=5.00' D=5.00' Z= 2.0 & 5.0 ' Top.W=40.00' n= 0.030
24.7	761	Total			

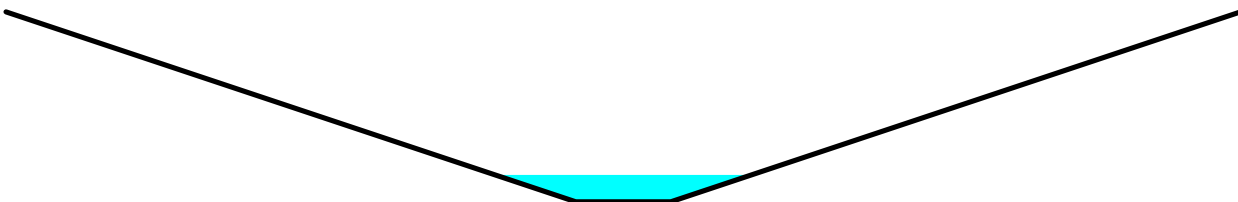
Summary for Reach R7:

Inflow Area = 9.602 ac, 6.59% Impervious, Inflow Depth > 2.99" for 25-YEAR event
 Inflow = 27.52 cfs @ 12.21 hrs, Volume= 2.392 af
 Outflow = 26.92 cfs @ 12.24 hrs, Volume= 2.388 af, Atten= 2%, Lag= 2.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 5.82 fps, Min. Travel Time= 1.1 min
 Avg. Velocity= 2.35 fps, Avg. Travel Time= 2.8 min

Peak Storage= 1,878 cf @ 12.22 hrs
 Average Depth at Peak Storage= 0.85'
 Bank-Full Depth= 6.00' Flow Area= 126.0 sf, Capacity= 2,286.96 cfs

3.00' x 6.00' deep channel, n= 0.030
 Side Slope Z-value= 3.0 ' Top Width= 39.00'
 Length= 400.0' Slope= 0.0300 '
 Inlet Invert= 0.00', Outlet Invert= -12.00'



Summary for Reach R8:

Inflow Area = 6.653 ac, 5.39% Impervious, Inflow Depth > 2.95" for 25-YEAR event
Inflow = 16.49 cfs @ 12.30 hrs, Volume= 1.635 af
Outflow = 16.28 cfs @ 12.34 hrs, Volume= 1.632 af, Atten= 1%, Lag= 2.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.02 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.54 fps, Avg. Travel Time= 2.9 min

Peak Storage= 1,117 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.54'
Bank-Full Depth= 6.00' Flow Area= 144.0 sf, Capacity= 2,225.33 cfs

6.00' x 6.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 42.00'
Length= 273.0' Slope= 0.0200 '/'
Inlet Invert= 0.00', Outlet Invert= -5.46'

**Summary for Reach R9:**

Inflow Area = 87.290 ac, 7.04% Impervious, Inflow Depth > 1.72" for 25-YEAR event
Inflow = 67.86 cfs @ 12.66 hrs, Volume= 12.522 af
Outflow = 67.27 cfs @ 12.68 hrs, Volume= 12.507 af, Atten= 1%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.25 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 2.93 fps, Avg. Travel Time= 1.6 min

Peak Storage= 2,980 cf @ 12.67 hrs
Average Depth at Peak Storage= 1.24'
Bank-Full Depth= 3.00' Flow Area= 42.0 sf, Capacity= 427.57 cfs

5.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 23.00'
Length= 275.0' Slope= 0.0200 '/'
Inlet Invert= 0.00', Outlet Invert= -5.50'



Summary for Reach SP1:

Inflow Area = 9.602 ac, 6.59% Impervious, Inflow Depth > 2.99" for 25-YEAR event
Inflow = 27.52 cfs @ 12.21 hrs, Volume= 2.392 af
Outflow = 27.52 cfs @ 12.21 hrs, Volume= 2.392 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach SP2:

Inflow Area = 6.653 ac, 5.39% Impervious, Inflow Depth > 2.95" for 25-YEAR event
Inflow = 16.49 cfs @ 12.30 hrs, Volume= 1.635 af
Outflow = 16.49 cfs @ 12.30 hrs, Volume= 1.635 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach SP3:

Inflow Area = 87.290 ac, 7.04% Impervious, Inflow Depth > 1.72" for 25-YEAR event
Inflow = 67.86 cfs @ 12.66 hrs, Volume= 12.522 af
Outflow = 67.86 cfs @ 12.66 hrs, Volume= 12.522 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach SP4: COMBINED FLOW

Inflow Area = 103.545 ac, 6.89% Impervious, Inflow Depth > 1.92" for 25-YEAR event
Inflow = 85.66 cfs @ 12.63 hrs, Volume= 16.527 af
Outflow = 85.66 cfs @ 12.63 hrs, Volume= 16.527 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link L-R2: Link to Offsite Watershed Analysis OS-1

Inflow Area = 8.234 ac, 7.68% Impervious, Inflow Depth > 3.02" for 25-YEAR event
Inflow = 24.31 cfs @ 12.20 hrs, Volume= 2.070 af
Primary = 24.31 cfs @ 12.20 hrs, Volume= 2.070 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

25-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R2.hce

Summary for Link L-R4: Link to Offsite Watershed Analysis OS-2

Inflow Area = 2.267 ac, 13.82% Impervious, Inflow Depth > 3.19" for 25-YEAR event
Inflow = 6.84 cfs @ 12.28 hrs, Volume= 0.603 af
Primary = 6.84 cfs @ 12.28 hrs, Volume= 0.603 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

16024-PRE*Type III 24-hr 25-YEAR Rainfall=5.50"*

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25-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R4.hce

Summary for Link L-R6: Link to Offsite Watershed Analysis OS-3

Inflow Area = 81.676 ac, 7.08% Impervious, Inflow Depth > 1.63" for 25-YEAR event
Inflow = 60.29 cfs @ 12.67 hrs, Volume= 11.115 af
Primary = 60.29 cfs @ 12.67 hrs, Volume= 11.115 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

25-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R6.hce

16024-PRE

Type III 24-hr 2-YEAR Rainfall=3.00"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1:	Runoff Area=59,590 sf 0.00% Impervious Runoff Depth>0.98" Flow Length=484' Tc=18.7 min CN=77 Runoff=1.13 cfs 0.111 af
Subcatchment2:	Runoff Area=191,025 sf 1.03% Impervious Runoff Depth>0.97" Flow Length=794' Tc=23.8 min CN=77 Runoff=3.30 cfs 0.356 af
Subcatchment3:	Runoff Area=244,570 sf 6.34% Impervious Runoff Depth>1.08" Flow Length=761' Tc=24.7 min CN=79 Runoff=4.69 cfs 0.508 af
Reach R7:	Avg. Flow Depth=0.49' Max Vel=4.36 fps Inflow=9.76 cfs 0.858 af n=0.030 L=400.0' S=0.0300 '/' Capacity=2,286.96 cfs Outflow=9.55 cfs 0.856 af
Reach R8:	Avg. Flow Depth=0.30' Max Vel=2.86 fps Inflow=5.86 cfs 0.583 af n=0.030 L=273.0' S=0.0200 '/' Capacity=2,225.33 cfs Outflow=5.78 cfs 0.581 af
Reach R9:	Avg. Flow Depth=0.53' Max Vel=3.90 fps Inflow=13.48 cfs 2.987 af n=0.030 L=275.0' S=0.0200 '/' Capacity=427.57 cfs Outflow=13.46 cfs 2.979 af
Reach SP1:	Inflow=9.76 cfs 0.858 af Outflow=9.76 cfs 0.858 af
Reach SP2:	Inflow=5.86 cfs 0.583 af Outflow=5.86 cfs 0.583 af
Reach SP3:	Inflow=13.48 cfs 2.987 af Outflow=13.48 cfs 2.987 af
Reach SP4: COMBINED FLOW	Inflow=19.25 cfs 4.416 af Outflow=19.25 cfs 4.416 af
Link	2-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R2.hce Inflow=8.68 cfs 0.747 af Area= 8.234 ac 7.68% Imperv. Primary=8.68 cfs 0.747 af
Link	2-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R4.hce Inflow=2.60 cfs 0.227 af Area= 2.267 ac 13.82% Imperv. Primary=2.60 cfs 0.227 af
Link	2-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R6.hce Inflow=12.08 cfs 2.479 af Area= 81.676 ac 7.08% Imperv. Primary=12.08 cfs 2.479 af

16024-PRE

Type III 24-hr 10-YEAR Rainfall=4.70"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Runoff Area=59,590 sf 0.00% Impervious Runoff Depth>2.20"
Flow Length=484' Tc=18.7 min CN=77 Runoff=2.62 cfs 0.250 af

Subcatchment2: Runoff Area=191,025 sf 1.03% Impervious Runoff Depth>2.19"
Flow Length=794' Tc=23.8 min CN=77 Runoff=7.60 cfs 0.801 af

Subcatchment3: Runoff Area=244,570 sf 6.34% Impervious Runoff Depth>2.36"
Flow Length=761' Tc=24.7 min CN=79 Runoff=10.30 cfs 1.102 af

Reach R7: Avg. Flow Depth=0.75' Max Vel=5.44 fps Inflow=21.60 cfs 1.872 af
n=0.030 L=400.0' S=0.0300 '/ Capacity=2,286.96 cfs Outflow=21.13 cfs 1.868 af

Reach R8: Avg. Flow Depth=0.47' Max Vel=3.72 fps Inflow=12.95 cfs 1.278 af
n=0.030 L=273.0' S=0.0200 '/ Capacity=2,225.33 cfs Outflow=12.79 cfs 1.275 af

Reach R9: Avg. Flow Depth=1.08' Max Vel=5.80 fps Inflow=51.85 cfs 9.035 af
n=0.030 L=275.0' S=0.0200 '/ Capacity=427.57 cfs Outflow=51.78 cfs 9.022 af

Reach SP1: Inflow=21.60 cfs 1.872 af
Outflow=21.60 cfs 1.872 af

Reach SP2: Inflow=12.95 cfs 1.278 af
Outflow=12.95 cfs 1.278 af

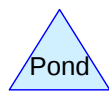
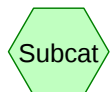
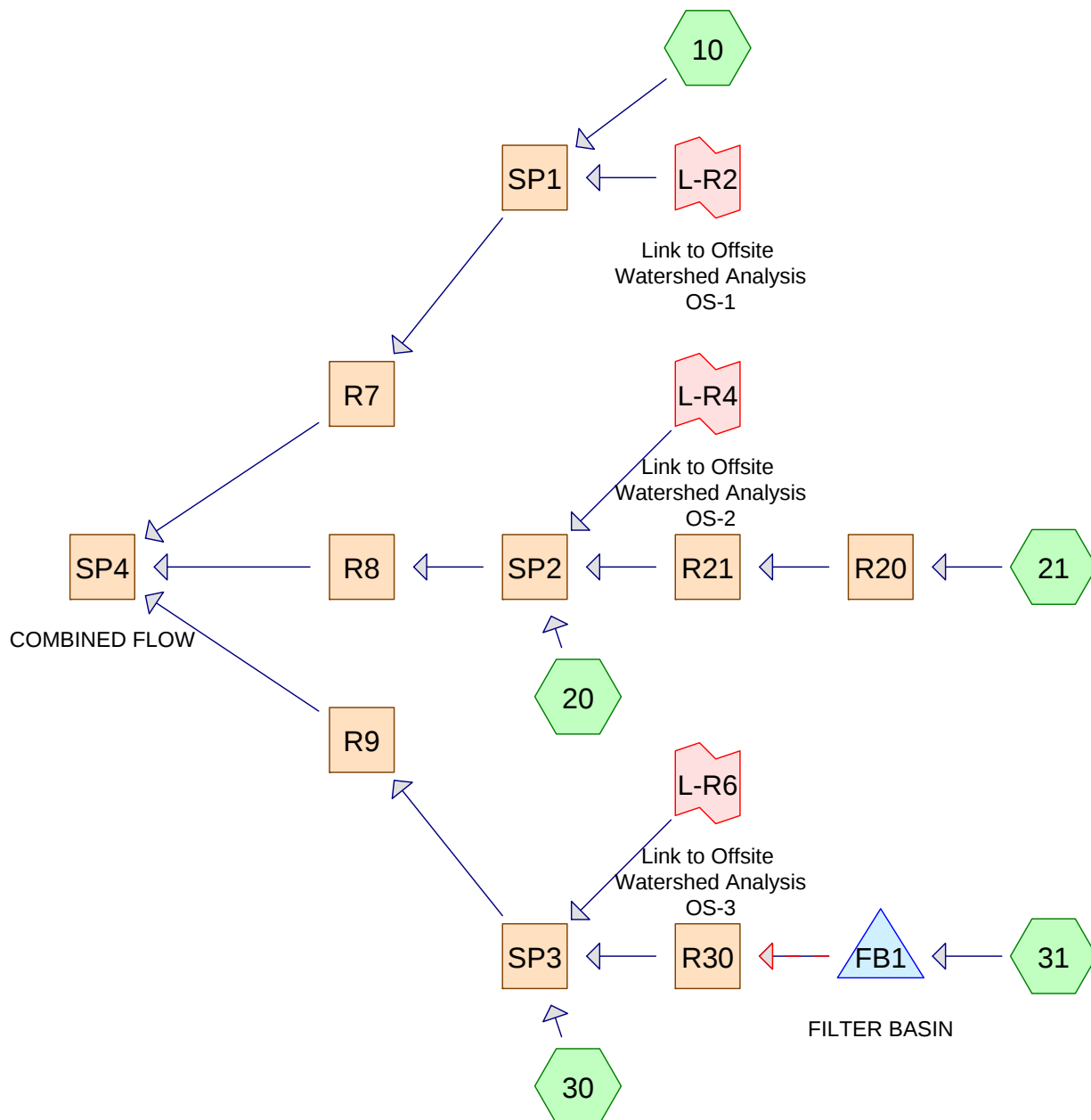
Reach SP3: Inflow=51.85 cfs 9.035 af
Outflow=51.85 cfs 9.035 af

Reach SP4: COMBINED FLOW Inflow=61.52 cfs 12.166 af
Outflow=61.52 cfs 12.166 af

Link 10-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R2.hce Inflow=19.11 cfs 1.622 af
Area= 8.234 ac 7.68% Imperv. Primary=19.11 cfs 1.622 af

Link 10-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R4.hce Inflow=5.44 cfs 0.477 af
Area= 2.267 ac 13.82% Imperv. Primary=5.44 cfs 0.477 af

Link 10-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R6.hce Inflow=48.13 cfs 7.933 af
Area= 81.676 ac 7.08% Imperv. Primary=48.13 cfs 7.933 af



Routing Diagram for 16024-POST

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Type III 24-hr 25-YEAR Rainfall=5.50"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment10:	Runoff Area=60,410 sf 0.00% Impervious Runoff Depth>2.83" Flow Length=484' Tc=18.7 min CN=77 Runoff=3.42 cfs 0.327 af
Subcatchment20:	Runoff Area=162,900 sf 3.99% Impervious Runoff Depth>2.92" Flow Length=794' Tc=23.8 min CN=78 Runoff=8.60 cfs 0.908 af
Subcatchment21:	Runoff Area=34,230 sf 29.13% Impervious Runoff Depth>3.61" Flow Length=443' Tc=6.9 min CN=85 Runoff=3.33 cfs 0.236 af
Subcatchment30:	Runoff Area=192,780 sf 8.89% Impervious Runoff Depth>3.10" Flow Length=761' Tc=24.7 min CN=80 Runoff=10.63 cfs 1.144 af
Subcatchment31:	Runoff Area=44,890 sf 23.82% Impervious Runoff Depth>3.50" Flow Length=214' Tc=11.4 min CN=84 Runoff=3.71 cfs 0.301 af
Reach R20:	Avg. Flow Depth=0.07' Max Vel=2.10 fps Inflow=3.33 cfs 0.236 af n=0.030 L=164.0' S=0.0800 '/ Capacity=147.90 cfs Outflow=3.15 cfs 0.236 af
Reach R21:	Avg. Flow Depth=0.16' Max Vel=3.04 fps Inflow=3.15 cfs 0.236 af n=0.030 L=145.0' S=0.0470 '/ Capacity=3,412.62 cfs Outflow=3.07 cfs 0.235 af
Reach R30:	Avg. Flow Depth=0.20' Max Vel=2.98 fps Inflow=3.48 cfs 0.254 af n=0.030 L=445.0' S=0.0370 '/ Capacity=2,078.41 cfs Outflow=3.30 cfs 0.253 af
Reach R7:	Avg. Flow Depth=0.85' Max Vel=5.83 fps Inflow=27.56 cfs 2.396 af n=0.030 L=400.0' S=0.0300 '/ Capacity=2,286.96 cfs Outflow=26.97 cfs 2.392 af
Reach R8:	Avg. Flow Depth=0.55' Max Vel=4.09 fps Inflow=17.28 cfs 1.747 af n=0.030 L=273.0' S=0.0200 '/ Capacity=2,225.33 cfs Outflow=17.15 cfs 1.744 af
Reach R9:	Avg. Flow Depth=1.24' Max Vel=6.24 fps Inflow=67.61 cfs 12.511 af n=0.030 L=275.0' S=0.0200 '/ Capacity=427.57 cfs Outflow=67.02 cfs 12.496 af
Reach SP1:	Inflow=27.56 cfs 2.396 af Outflow=27.56 cfs 2.396 af
Reach SP2:	Inflow=17.28 cfs 1.747 af Outflow=17.28 cfs 1.747 af
Reach SP3:	Inflow=67.61 cfs 12.511 af Outflow=67.61 cfs 12.511 af
Reach SP4: COMBINED FLOW	Inflow=85.37 cfs 16.633 af Outflow=85.37 cfs 16.633 af
Pond FB1: FILTER BASIN	Peak Elev=115.75' Storage=3,165 cf Inflow=3.71 cfs 0.301 af Primary=3.48 cfs 0.254 af Secondary=0.00 cfs 0.000 af Outflow=3.48 cfs 0.254 af

16024-POST

Type III 24-hr 25-YEAR Rainfall=5.50"

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Link 25-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R2.hce Inflow=24.31 cfs 2.070 af
Area= 8.234 ac 7.68% Imperv. Primary=24.31 cfs 2.070 af

Link 25-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R4.hce Inflow=6.84 cfs 0.603 af
Area= 2.267 ac 13.82% Imperv. Primary=6.84 cfs 0.603 af

Link 25-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R6.hce Inflow=60.29 cfs 11.115 af
Area= 81.676 ac 7.08% Imperv. Primary=60.29 cfs 11.115 af

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Type III 24-hr 25-YEAR Rainfall=5.50"

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Summary for Subcatchment 10:

Runoff = 3.42 cfs @ 12.26 hrs, Volume= 0.327 af, Depth> 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR Rainfall=5.50"

Area (sf)	CN	Description
2,405	74	>75% Grass cover, Good, HSG C
55,075	77	Woods, Good, HSG D
* 2,930	77	Woods-Wetlands
60,410	77	Weighted Average
60,410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	150	0.0850	0.15		Sheet Flow, A TO B
					Woods: Light underbrush n= 0.400 P2= 3.00"
1.3	120	0.0900	1.50		Shallow Concentrated Flow, B TO C
					Woodland Kv= 5.0 fps
0.2	214	0.0450	22.23	2,800.94	Trap/Vee/Rect Channel Flow, C TO D
					Bot.W=3.00' D=6.00' Z= 3.0 '/' Top.W=39.00'
					n= 0.030
18.7	484	Total			

Summary for Subcatchment 20:

Runoff = 8.60 cfs @ 12.33 hrs, Volume= 0.908 af, Depth> 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR Rainfall=5.50"

Area (sf)	CN	Description
* 2,840	98	Building
* 3,660	98	Pavement
* 2,200	80	Grass-Wetlands
12,495	80	>75% Grass cover, Good, HSG D
* 645	80	Grass-Wetlands
106,625	77	Woods, Good, HSG D
* 34,360	77	Woods-Wetlands
* 75	96	Gravel Shoulders
162,900	78	Weighted Average
156,400		96.01% Pervious Area
6,500		3.99% Impervious Area

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Type III 24-hr 25-YEAR Rainfall=5.50"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.3	150	0.0500	0.12		Sheet Flow, A TO B Woods: Light underbrush n= 0.400 P2= 3.00"
2.1	142	0.0500	1.12		Shallow Concentrated Flow, B TO C Woodland Kv= 5.0 fps
0.4	502	0.0470	23.69	3,411.37	Trap/Vee/Rect Channel Flow, C TO D Bot.W=6.00' D=6.00' Z= 3.0 ' Top.W=42.00' n= 0.030
23.8	794	Total			

Summary for Subcatchment 21:

Runoff = 3.33 cfs @ 12.10 hrs, Volume= 0.236 af, Depth> 3.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR Rainfall=5.50"

Area (sf)	CN	Description
* 1,010	96	Gravel Shoulders
* 8,550	98	Pavement
* 1,420	98	Building
4,375	77	Woods, Good, HSG D
18,875	80	>75% Grass cover, Good, HSG D
34,230	85	Weighted Average
24,260		70.87% Pervious Area
9,970		29.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	73	0.0400	0.20		Sheet Flow, A TO B Grass: Short n= 0.150 P2= 3.00"
0.1	67	0.0500	13.44	161.32	Trap/Vee/Rect Channel Flow, B TO C Bot.W=1.00' D=2.00' Z= 3.0 & 2.0 ' Top.W=11.00' n= 0.025
0.3	53	0.0050	3.21	2.52	Pipe Channel, C TO D 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
0.5	250	0.0450	8.43	29.52	Trap/Vee/Rect Channel Flow, D TO E Bot.W=1.00' D=1.00' Z= 3.0 & 2.0 ' Top.W=6.00' n= 0.025
6.9	443	Total			

Summary for Subcatchment 30:

Runoff = 10.63 cfs @ 12.34 hrs, Volume= 1.144 af, Depth> 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR Rainfall=5.50"

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Type III 24-hr 25-YEAR Rainfall=5.50"

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Area (sf)	CN	Description
* 455	96	Gravel Shoulders
* 14,290	98	Pavement
* 2,840	98	Buildings
92,855	77	Woods, Good, HSG D
* 36,800	77	Woods-Wetlands
42,855	80	>75% Grass cover, Good, HSG D
* 250	80	Grass-Wetlands
2,435	78	Meadow, non-grazed, HSG D
192,780	80	Weighted Average
175,650		91.11% Pervious Area
17,130		8.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.1	111	0.0200	0.08		Sheet Flow, A TO B Woods: Light underbrush n= 0.400 P2= 3.00"
0.6	650	0.0370	18.47	2,078.10	Trap/Vee/Rect Channel Flow, B TO C Bot.W=5.00' D=5.00' Z= 2.0 & 5.0 ' Top.W=40.00' n= 0.030
24.7	761	Total			

Summary for Subcatchment 31:

Runoff = 3.71 cfs @ 12.16 hrs, Volume= 0.301 af, Depth> 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR Rainfall=5.50"

Area (sf)	CN	Description
* 715	96	Gravel Shoulders
* 9,275	98	Pavement
* 1,420	98	Building
1,690	78	Meadow, non-grazed, HSG D
23,835	80	>75% Grass cover, Good, HSG D
7,955	77	Woods, Good, HSG D
44,890	84	Weighted Average
34,195		76.18% Pervious Area
10,695		23.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	90	0.1000	0.14		Sheet Flow, A TO B Woods: Light underbrush n= 0.400 P2= 3.00"
0.6	84	0.1000	2.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0500	9.54	42.94	Trap/Vee/Rect Channel Flow, Bot.W=2.00' D=1.00' Z= 3.0 & 2.0 ' Top.W=7.00' n= 0.025
11.4	214	Total			

Summary for Reach R20:

Inflow Area = 0.786 ac, 29.13% Impervious, Inflow Depth > 3.61" for 25-YEAR event
Inflow = 3.33 cfs @ 12.10 hrs, Volume= 0.236 af
Outflow = 3.15 cfs @ 12.14 hrs, Volume= 0.236 af, Atten= 5%, Lag= 2.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.10 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 4.2 min

Peak Storage= 255 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 0.50' Flow Area= 22.5 sf, Capacity= 147.90 cfs

20.00' x 0.50' deep channel, n= 0.030
Side Slope Z-value= 50.0 '/' Top Width= 70.00'
Length= 164.0' Slope= 0.0800 '/'
Inlet Invert= 0.00', Outlet Invert= -13.12'

**Summary for Reach R21:**

Inflow Area = 0.786 ac, 29.13% Impervious, Inflow Depth > 3.60" for 25-YEAR event
Inflow = 3.15 cfs @ 12.14 hrs, Volume= 0.236 af
Outflow = 3.07 cfs @ 12.16 hrs, Volume= 0.235 af, Atten= 3%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.04 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.65 fps, Avg. Travel Time= 1.5 min

Peak Storage= 149 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 6.00' Flow Area= 144.0 sf, Capacity= 3,412.62 cfs

6.00' x 6.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 42.00'
Length= 145.0' Slope= 0.0470 '/'
Inlet Invert= 0.00', Outlet Invert= -6.82'



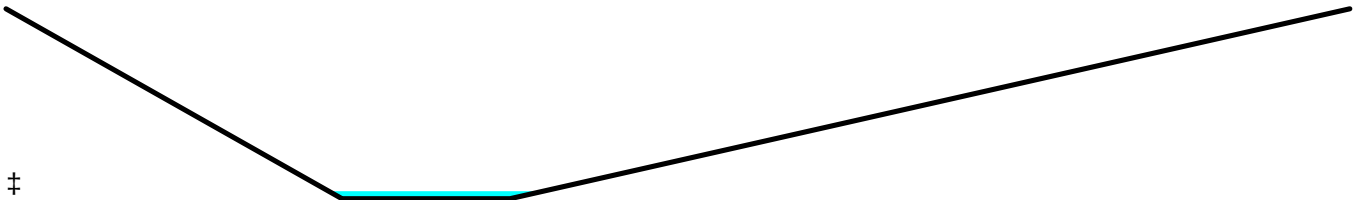
Summary for Reach R30:

Inflow Area = 1.031 ac, 23.82% Impervious, Inflow Depth > 2.96" for 25-YEAR event
 Inflow = 3.48 cfs @ 12.21 hrs, Volume= 0.254 af
 Outflow = 3.30 cfs @ 12.29 hrs, Volume= 0.253 af, Atten= 5%, Lag= 4.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 2.98 fps, Min. Travel Time= 2.5 min
 Avg. Velocity = 1.33 fps, Avg. Travel Time= 5.6 min

Peak Storage= 500 cf @ 12.25 hrs
 Average Depth at Peak Storage= 0.20'
 Bank-Full Depth= 5.00' Flow Area= 112.5 sf, Capacity= 2,078.41 cfs

5.00' x 5.00' deep channel, n= 0.030
 Side Slope Z-value= 2.0 5.0 '/' Top Width= 40.00'
 Length= 445.0' Slope= 0.0370 '/'
 Inlet Invert= 0.00', Outlet Invert= -16.47'

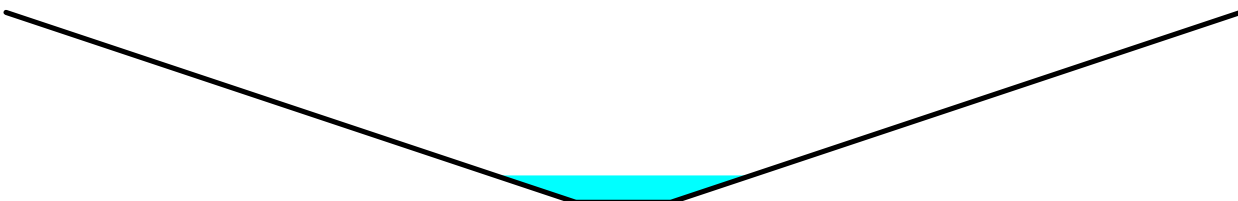
**Summary for Reach R7:**

Inflow Area = 9.621 ac, 6.57% Impervious, Inflow Depth > 2.99" for 25-YEAR event
 Inflow = 27.56 cfs @ 12.21 hrs, Volume= 2.396 af
 Outflow = 26.97 cfs @ 12.24 hrs, Volume= 2.392 af, Atten= 2%, Lag= 2.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 5.83 fps, Min. Travel Time= 1.1 min
 Avg. Velocity = 2.36 fps, Avg. Travel Time= 2.8 min

Peak Storage= 1,880 cf @ 12.22 hrs
 Average Depth at Peak Storage= 0.85'
 Bank-Full Depth= 6.00' Flow Area= 126.0 sf, Capacity= 2,286.96 cfs

3.00' x 6.00' deep channel, n= 0.030
 Side Slope Z-value= 3.0 '/' Top Width= 39.00'
 Length= 400.0' Slope= 0.0300 '/'
 Inlet Invert= 0.00', Outlet Invert= -12.00'



Summary for Reach R8:

Inflow Area = 6.793 ac, 10.18% Impervious, Inflow Depth > 3.09" for 25-YEAR event
 Inflow = 17.28 cfs @ 12.28 hrs, Volume= 1.747 af
 Outflow = 17.15 cfs @ 12.32 hrs, Volume= 1.744 af, Atten= 1%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 4.09 fps, Min. Travel Time= 1.1 min
 Avg. Velocity = 1.53 fps, Avg. Travel Time= 3.0 min

Peak Storage= 1,153 cf @ 12.30 hrs
 Average Depth at Peak Storage= 0.55'
 Bank-Full Depth= 6.00' Flow Area= 144.0 sf, Capacity= 2,225.33 cfs

6.00' x 6.00' deep channel, n= 0.030
 Side Slope Z-value= 3.0 '/' Top Width= 42.00'
 Length= 273.0' Slope= 0.0200 '/'
 Inlet Invert= 0.00', Outlet Invert= -5.46'

**Summary for Reach R9:**

Inflow Area = 87.132 ac, 7.37% Impervious, Inflow Depth > 1.72" for 25-YEAR event
 Inflow = 67.61 cfs @ 12.66 hrs, Volume= 12.511 af
 Outflow = 67.02 cfs @ 12.68 hrs, Volume= 12.496 af, Atten= 1%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 6.24 fps, Min. Travel Time= 0.7 min
 Avg. Velocity = 2.72 fps, Avg. Travel Time= 1.7 min

Peak Storage= 2,972 cf @ 12.67 hrs
 Average Depth at Peak Storage= 1.24'
 Bank-Full Depth= 3.00' Flow Area= 42.0 sf, Capacity= 427.57 cfs

5.00' x 3.00' deep channel, n= 0.030
 Side Slope Z-value= 3.0 '/' Top Width= 23.00'
 Length= 275.0' Slope= 0.0200 '/'
 Inlet Invert= 0.00', Outlet Invert= -5.50'



Summary for Reach SP1:

Inflow Area = 9.621 ac, 6.57% Impervious, Inflow Depth > 2.99" for 25-YEAR event
 Inflow = 27.56 cfs @ 12.21 hrs, Volume= 2.396 af
 Outflow = 27.56 cfs @ 12.21 hrs, Volume= 2.396 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach SP2:

Inflow Area = 6.793 ac, 10.18% Impervious, Inflow Depth > 3.09" for 25-YEAR event
 Inflow = 17.28 cfs @ 12.28 hrs, Volume= 1.747 af
 Outflow = 17.28 cfs @ 12.28 hrs, Volume= 1.747 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach SP3:

Inflow Area = 87.132 ac, 7.37% Impervious, Inflow Depth > 1.72" for 25-YEAR event
 Inflow = 67.61 cfs @ 12.66 hrs, Volume= 12.511 af
 Outflow = 67.61 cfs @ 12.66 hrs, Volume= 12.511 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach SP4: COMBINED FLOW

Inflow Area = 103.546 ac, 7.48% Impervious, Inflow Depth > 1.93" for 25-YEAR event
 Inflow = 85.37 cfs @ 12.63 hrs, Volume= 16.633 af
 Outflow = 85.37 cfs @ 12.63 hrs, Volume= 16.633 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond FB1: FILTER BASIN

Inflow Area = 1.031 ac, 23.82% Impervious, Inflow Depth > 3.50" for 25-YEAR event
 Inflow = 3.71 cfs @ 12.16 hrs, Volume= 0.301 af
 Outflow = 3.48 cfs @ 12.21 hrs, Volume= 0.254 af, Atten= 6%, Lag= 3.2 min
 Primary = 3.48 cfs @ 12.21 hrs, Volume= 0.254 af
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 115.75' @ 12.21 hrs Surf.Area= 2,651 sf Storage= 3,165 cf

Plug-Flow detention time= 82.5 min calculated for 0.253 af (84% of inflow)
 Center-of-Mass det. time= 38.6 min (817.4 - 778.8)

Volume	Invert	Avail.Storage	Storage Description
#1	114.00'	14,125 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

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Type III 24-hr 25-YEAR Rainfall=5.50"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.00	960	0	0
116.00	2,890	3,850	3,850
118.00	7,385	10,275	14,125

Device	Routing	Invert	Outlet Devices
#1	Primary	111.70'	12.0" Round Culvert L= 78.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 111.70' / 111.00' S= 0.0090 ' / Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	115.50'	2.0" x 2.0" Horiz. Orifice/Grate X 64.00 C= 0.600 in 24.0" x 24.0" Grate (44% open area) Limited to weir flow at low heads
#3	Device 1	114.00'	2.410 in/hr Exfiltration over Surface area
#4	Secondary	117.25'	10.0' long x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=3.42 cfs @ 12.21 hrs HW=115.75' (Free Discharge)

1=Culvert (Passes 3.42 cfs of 6.14 cfs potential flow)
 2=Orifice/Grate (Weir Controls 3.27 cfs @ 1.63 fps)
 3=Exfiltration (Exfiltration Controls 0.15 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=114.00' (Free Discharge)

4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Link L-R2: Link to Offsite Watershed Analysis OS-1

Inflow Area = 8.234 ac, 7.68% Impervious, Inflow Depth > 3.02" for 25-YEAR event
 Inflow = 24.31 cfs @ 12.20 hrs, Volume= 2.070 af
 Primary = 24.31 cfs @ 12.20 hrs, Volume= 2.070 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

25-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R2.hce

Summary for Link L-R4: Link to Offsite Watershed Analysis OS-2

Inflow Area = 2.267 ac, 13.82% Impervious, Inflow Depth > 3.19" for 25-YEAR event
 Inflow = 6.84 cfs @ 12.28 hrs, Volume= 0.603 af
 Primary = 6.84 cfs @ 12.28 hrs, Volume= 0.603 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

25-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R4.hce

Summary for Link L-R6: Link to Offsite Watershed Analysis OS-3

Inflow Area = 81.676 ac, 7.08% Impervious, Inflow Depth > 1.63" for 25-YEAR event
Inflow = 60.29 cfs @ 12.67 hrs, Volume= 11.115 af
Primary = 60.29 cfs @ 12.67 hrs, Volume= 11.115 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

25-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R6.hce

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Type III 24-hr 2-YEAR Rainfall=3.00"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment10:	Runoff Area=60,410 sf 0.00% Impervious Runoff Depth>0.98" Flow Length=484' Tc=18.7 min CN=77 Runoff=1.15 cfs 0.113 af
Subcatchment20:	Runoff Area=162,900 sf 3.99% Impervious Runoff Depth>1.03" Flow Length=794' Tc=23.8 min CN=78 Runoff=2.99 cfs 0.320 af
Subcatchment21:	Runoff Area=34,230 sf 29.13% Impervious Runoff Depth>1.48" Flow Length=443' Tc=6.9 min CN=85 Runoff=1.40 cfs 0.097 af
Subcatchment30:	Runoff Area=192,780 sf 8.89% Impervious Runoff Depth>1.14" Flow Length=761' Tc=24.7 min CN=80 Runoff=3.91 cfs 0.422 af
Subcatchment31:	Runoff Area=44,890 sf 23.82% Impervious Runoff Depth>1.41" Flow Length=214' Tc=11.4 min CN=84 Runoff=1.52 cfs 0.121 af
Reach R20:	Avg. Flow Depth=0.04' Max Vel=1.53 fps Inflow=1.40 cfs 0.097 af n=0.030 L=164.0' S=0.0800 '/' Capacity=147.90 cfs Outflow=1.32 cfs 0.096 af
Reach R21:	Avg. Flow Depth=0.09' Max Vel=2.23 fps Inflow=1.32 cfs 0.096 af n=0.030 L=145.0' S=0.0470 '/' Capacity=3,412.62 cfs Outflow=1.27 cfs 0.096 af
Reach R30:	Avg. Flow Depth=0.03' Max Vel=1.26 fps Inflow=0.18 cfs 0.092 af n=0.030 L=445.0' S=0.0370 '/' Capacity=2,078.41 cfs Outflow=0.17 cfs 0.090 af
Reach R7:	Avg. Flow Depth=0.49' Max Vel=4.36 fps Inflow=9.77 cfs 0.860 af n=0.030 L=400.0' S=0.0300 '/' Capacity=2,286.96 cfs Outflow=9.56 cfs 0.857 af
Reach R8:	Avg. Flow Depth=0.31' Max Vel=2.94 fps Inflow=6.41 cfs 0.644 af n=0.030 L=273.0' S=0.0200 '/' Capacity=2,225.33 cfs Outflow=6.33 cfs 0.642 af
Reach R9:	Avg. Flow Depth=0.52' Max Vel=3.89 fps Inflow=13.36 cfs 2.991 af n=0.030 L=275.0' S=0.0200 '/' Capacity=427.57 cfs Outflow=13.33 cfs 2.983 af
Reach SP1:	Inflow=9.77 cfs 0.860 af Outflow=9.77 cfs 0.860 af
Reach SP2:	Inflow=6.41 cfs 0.644 af Outflow=6.41 cfs 0.644 af
Reach SP3:	Inflow=13.36 cfs 2.991 af Outflow=13.36 cfs 2.991 af
Reach SP4: COMBINED FLOW	Inflow=19.25 cfs 4.483 af Outflow=19.25 cfs 4.483 af
Pond FB1: FILTER BASIN	Peak Elev=115.51' Storage=2,553 cf Inflow=1.52 cfs 0.121 af Primary=0.18 cfs 0.092 af Secondary=0.00 cfs 0.000 af Outflow=0.18 cfs 0.092 af

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Type III 24-hr 2-YEAR Rainfall=3.00"

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Link 2-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R2.hce Inflow=8.68 cfs 0.747 af
Area= 8.234 ac 7.68% Imperv. Primary=8.68 cfs 0.747 af

Link 2-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R4.hce Inflow=2.60 cfs 0.227 af
Area= 2.267 ac 13.82% Imperv. Primary=2.60 cfs 0.227 af

Link 2-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R6.hce Inflow=12.08 cfs 2.479 af
Area= 81.676 ac 7.08% Imperv. Primary=12.08 cfs 2.479 af

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Type III 24-hr 10-YEAR Rainfall=4.70"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment10: Runoff Area=60,410 sf 0.00% Impervious Runoff Depth>2.20"
 Flow Length=484' Tc=18.7 min CN=77 Runoff=2.66 cfs 0.254 af

Subcatchment20: Runoff Area=162,900 sf 3.99% Impervious Runoff Depth>2.27"
 Flow Length=794' Tc=23.8 min CN=78 Runoff=6.72 cfs 0.708 af

Subcatchment21: Runoff Area=34,230 sf 29.13% Impervious Runoff Depth>2.90"
 Flow Length=443' Tc=6.9 min CN=85 Runoff=2.70 cfs 0.190 af

Subcatchment30: Runoff Area=192,780 sf 8.89% Impervious Runoff Depth>2.44"
 Flow Length=761' Tc=24.7 min CN=80 Runoff=8.40 cfs 0.900 af

Subcatchment31: Runoff Area=44,890 sf 23.82% Impervious Runoff Depth>2.81"
 Flow Length=214' Tc=11.4 min CN=84 Runoff=3.00 cfs 0.241 af

Reach R20: Avg. Flow Depth=0.06' Max Vel=1.95 fps Inflow=2.70 cfs 0.190 af
 n=0.030 L=164.0' S=0.0800 '/ Capacity=147.90 cfs Outflow=2.55 cfs 0.190 af

Reach R21: Avg. Flow Depth=0.14' Max Vel=2.83 fps Inflow=2.55 cfs 0.190 af
 n=0.030 L=145.0' S=0.0470 '/ Capacity=3,412.62 cfs Outflow=2.49 cfs 0.189 af

Reach R30: Avg. Flow Depth=0.16' Max Vel=2.63 fps Inflow=2.47 cfs 0.199 af
 n=0.030 L=445.0' S=0.0370 '/ Capacity=2,078.41 cfs Outflow=2.31 cfs 0.197 af

Reach R7: Avg. Flow Depth=0.75' Max Vel=5.45 fps Inflow=21.63 cfs 1.875 af
 n=0.030 L=400.0' S=0.0300 '/ Capacity=2,286.96 cfs Outflow=21.16 cfs 1.872 af

Reach R8: Avg. Flow Depth=0.48' Max Vel=3.79 fps Inflow=13.69 cfs 1.375 af
 n=0.030 L=273.0' S=0.0200 '/ Capacity=2,225.33 cfs Outflow=13.57 cfs 1.372 af

Reach R9: Avg. Flow Depth=1.08' Max Vel=5.80 fps Inflow=51.74 cfs 9.030 af
 n=0.030 L=275.0' S=0.0200 '/ Capacity=427.57 cfs Outflow=51.67 cfs 9.017 af

Reach SP1: Inflow=21.63 cfs 1.875 af
 Outflow=21.63 cfs 1.875 af

Reach SP2: Inflow=13.69 cfs 1.375 af
 Outflow=13.69 cfs 1.375 af

Reach SP3: Inflow=51.74 cfs 9.030 af
 Outflow=51.74 cfs 9.030 af

Reach SP4: COMBINED FLOW Inflow=61.37 cfs 12.261 af
 Outflow=61.37 cfs 12.261 af

Pond FB1: FILTER BASIN Peak Elev=115.70' Storage=3,023 cf Inflow=3.00 cfs 0.241 af
 Primary=2.47 cfs 0.199 af Secondary=0.00 cfs 0.000 af Outflow=2.47 cfs 0.199 af

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Type III 24-hr 10-YEAR Rainfall=4.70"

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Link 10-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R2.hce Inflow=19.11 cfs 1.622 af
Area= 8.234 ac 7.68% Imperv. Primary=19.11 cfs 1.622 af

Link 10-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R4.hce Inflow=5.44 cfs 0.477 af
Area= 2.267 ac 13.82% Imperv. Primary=5.44 cfs 0.477 af

Link 10-YEAR Outflow Imported from 16024-Offsite Watersheds-Links~Reach R6.hce Inflow=48.13 cfs 7.933 af
Area= 81.676 ac 7.08% Imperv. Primary=48.13 cfs 7.933 af