

STORMWATER MANAGEMENT REPORT

RETAIL & SELF-STORAGE FACILITY 968 ROOSEVELT TRAIL, WINDHAM

A. Narrative

Little Mountain, LLC is proposing to develop property located at 968 Roosevelt Trail in Windham as a retail and self-storage facility. The Public Warehouse use development consists of the construction of six buildings totaling 21,250 square feet with associated access aisles, utilities and stormwater infrastructure. The project also includes the construction of an approximately 4,445 square foot retail/commercial building with associated parking and utilities. The property is approximately 2.1 acres, is located in the Commercial District 1 zoning district and is identified as lot 2A on the Town of Windham Assessors Map 21. The property is currently developed consisting of a building with associated paved parking and areas of gravel which will be demolished as part of the development. The project will be served by the existing building's public water, a new on-site private subsurface septic system and underground electrical, telephone and data service. In general, the site drains to the southeast along Roosevelt Trail.

B. Alterations to Land Cover

The property currently consists of approximately 35,995 square feet of impervious surfaces. The proposed development will remove approximately 12,275 square of that impervious area while the remaining 23,720 square feet will remain impervious. The project in the post development condition will consist of approximately 57,565 total impervious surface resulting in a net increase of 21,570 square feet. The project will also consist of 32,920 square feet of new landscaped/disturbed areas resulting in a total new developed area of 54,490 square feet. The site is relatively flat along Roosevelt Trail but steepens to the rear of the site and at the property line along the abutting storage facility. Soils on the property are primarily Hermon extremely stony sandy loam and Peru fine sandy loam as identified on the Medium Intensity Soil Maps for Cumberland County, Maine published by the Natural Resources Conservation Service. The two soils within the proposed development are in the hydrologic soil groups "A" and "C" respectively, as indicated on the attached watershed maps.

C. Methodology and Modeling Assumptions

The proposed stormwater management system has been designed utilizing Best Management Practices to maintain existing drainage patterns while providing stormwater quality improvement measures. The goal of the storm drainage system design is to remove potential stormwater pollutants while attenuating the post-development peak runoff rates. 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.

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. Flooding Standard

The Windham Land Use Ordinance requires that projects requiring Site Plan Review 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 the construction of two infiltration basins. The study point chosen for the analysis is where the runoff discharges under the existing storage facility's driveway and leaves the overall study area. The following tables summarize 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	2.20	1.42	5.17	4.64	6.60	6.37

The installation of the infiltration basins reduces the peak rates of runoff at the Study Point. 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.

F. General Standard

The Windham Land Use Ordinance requires that projects requiring Major Site Plan Review shall comply with Section 4B(2) and Section 4B(3) of the 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. Water quality treatment will exceed the treatment requirements for the new impervious and developed areas in order to provide quantity control for the project. Calculations can be found on the Watershed Maps and enclosed in this report.

G. Maintenance of common facilities or property

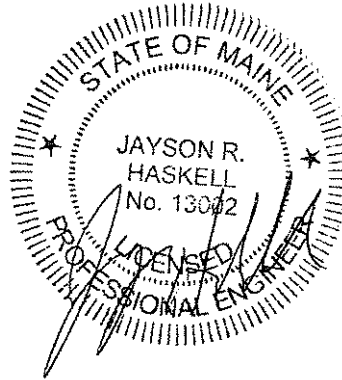
The owner of the facility will be responsible for the maintenance of the stormwater facilities.
Enclosed is an Inspection, Maintenance and Housekeeping Plan for the project.

Prepared by:

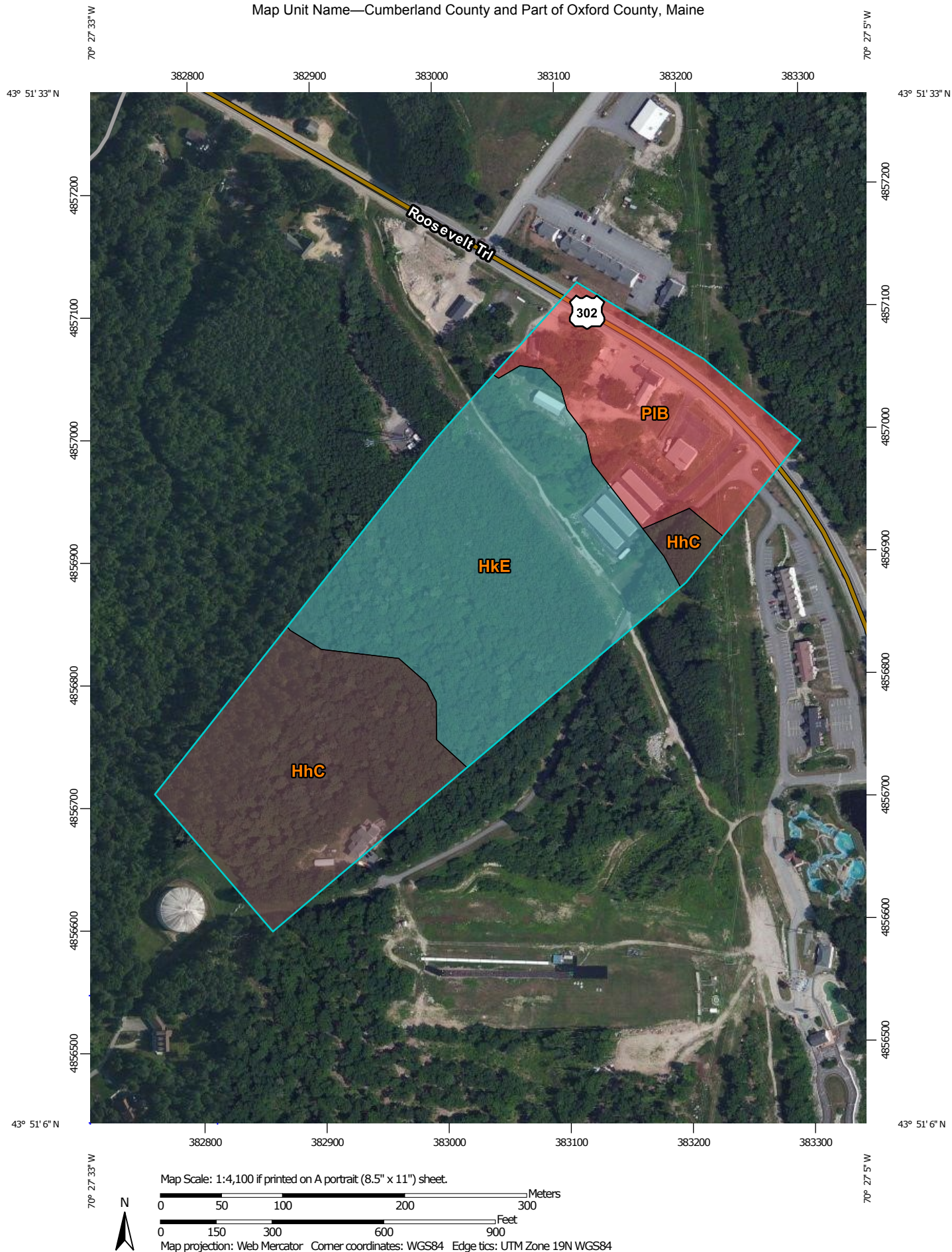
DM ROMA CONSULTING ENGINEERS



Jayson R. Haskell, P.E.
Project Manager




Map Unit Name—Cumberland County and Part of Oxford County, Maine







MAP LEGEND

Area of Interest (AOI)





 Area of Interest (AOI)

Soils





Soil Rating Polygons

-  Hermon extremely stony sandy loam, 20 to 60 percent slopes
-  Hermon very stony sandy loam, 8 to 15 percent slopes
-  Peru fine sandy loam, 0 to 8 percent slopes, very stony
-  Not rated or not available


Soil Rating Lines

-  Hermon extremely stony sandy loam, 20 to 60 percent slopes
-  Hermon very stony sandy loam, 8 to 15 percent slopes
-  Peru fine sandy loam, 0 to 8 percent slopes, very stony
-  Not rated or not available






Soil Rating Points

-  Hermon extremely stony sandy loam, 20 to 60 percent slopes
-  Hermon very stony sandy loam, 8 to 15 percent slopes
-  Peru fine sandy loam, 0 to 8 percent slopes, very stony
-  Not rated or not available


Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cumberland County and Part of Oxford County, Maine

Survey Area Data: Version 11, Sep 17, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 20, 2010—Jul 18, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Name

Map Unit Name— Summary by Map Unit — Cumberland County and Part of Oxford County, Maine (ME005)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
HhC	Hermon very stony sandy loam, 8 to 15 percent slopes	Hermon very stony sandy loam, 8 to 15 percent slopes	9.1	32.4%
HkE	Hermon extremely stony sandy loam, 20 to 60 percent slopes	Hermon extremely stony sandy loam, 20 to 60 percent slopes	13.0	46.3%
PIB	Peru fine sandy loam, 0 to 8 percent slopes, very stony	Peru fine sandy loam, 0 to 8 percent slopes, very stony	6.0	21.4%
Totals for Area of Interest			28.1	100.0%

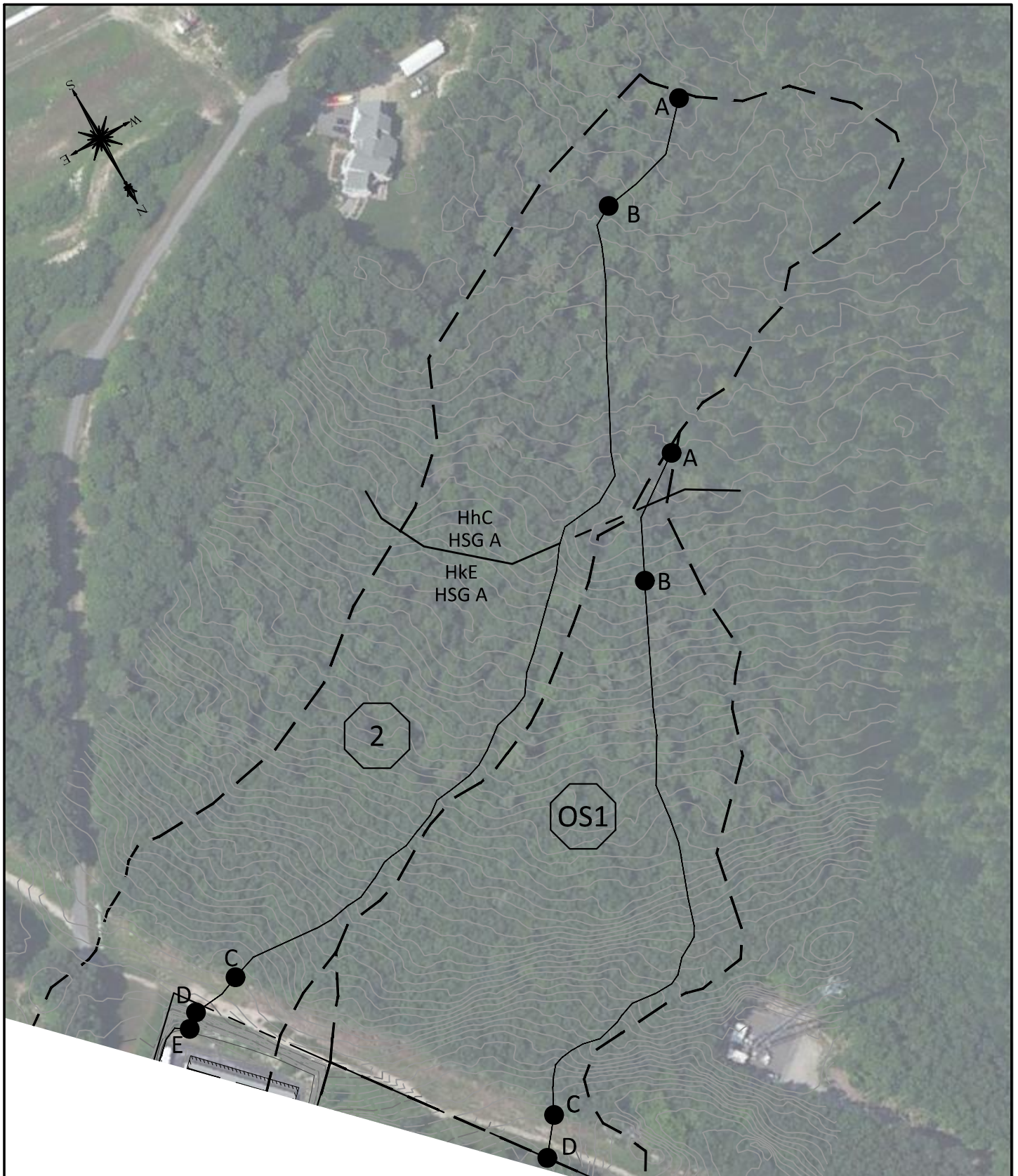
Description

A soil map unit is a collection of soil areas or nonsoil areas (miscellaneous areas) delineated in a soil survey. Each map unit is given a name that uniquely identifies the unit in a particular soil survey area.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower



OFFSITE WATERSHED MAP

RETAIL & SELF STORAGE FACILITY
WINDHAM, MAINE

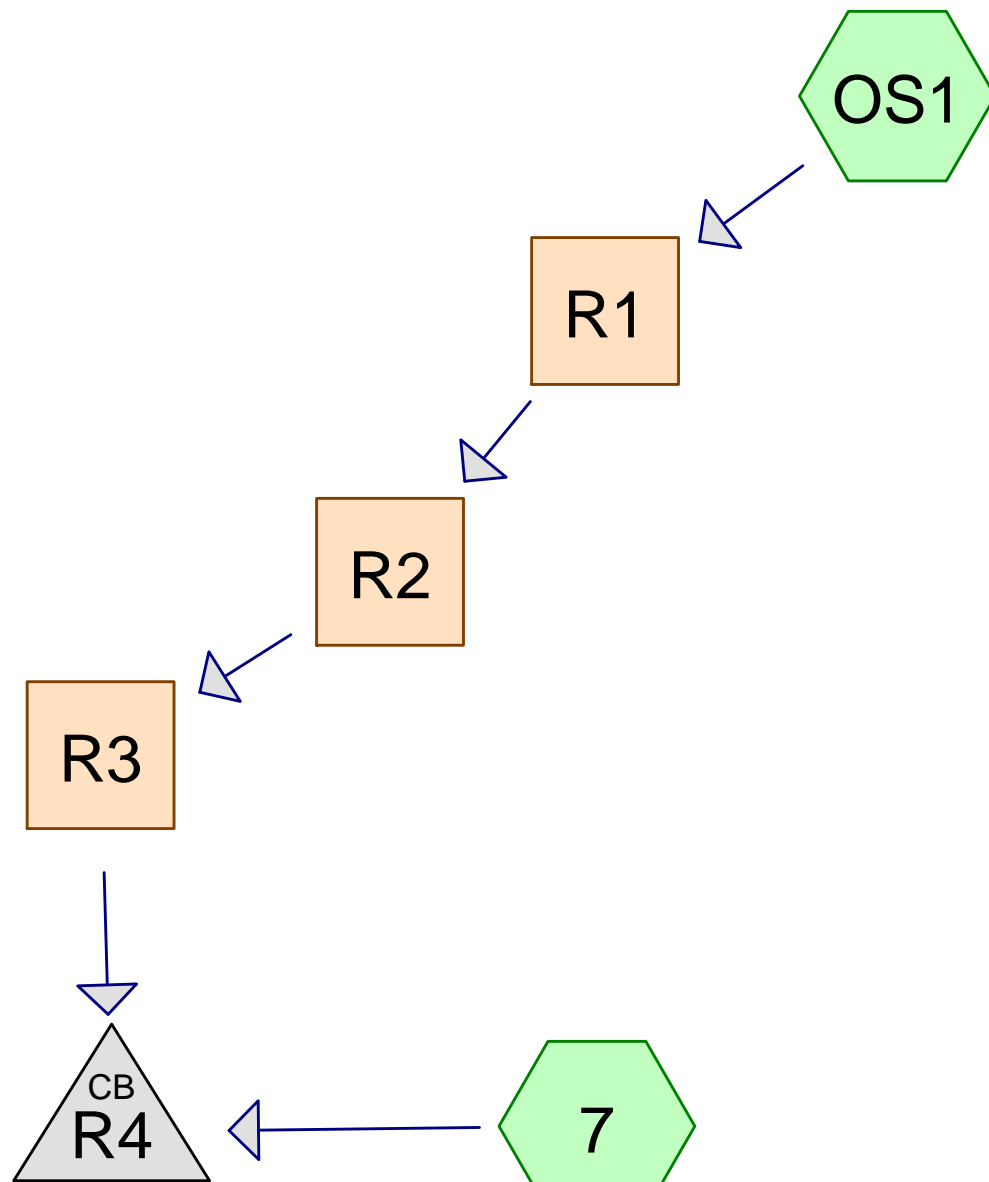
FOR RECORD OWNER:
LITTLE MOUNTAIN, LLC
3 OLD FORT ROAD
CAPE ELIZABETH, MAINE 04107

SCALE: 1"=150'
DATE: 08-22-2016
JOB NUMBER: 15021

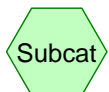
DM ROMA

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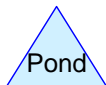
REACH 4



Subcat



Reach



Pond



Link

Routing Diagram for 15021-PRE

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15021-PRE*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

Subcatchment 7:

Runoff Area=181,730 sf 20.25% Impervious Runoff Depth>2.06"
Flow Length=606' Tc=15.1 min CN=68 Runoff=8.07 cfs 0.716 af

Subcatchment OS1:

Runoff Area=191,110 sf 0.00% Impervious Runoff Depth>0.03"
Flow Length=878' Tc=25.2 min CN=31 Runoff=0.02 cfs 0.010 af

Reach R1:

Avg. Flow Depth=0.01' Max Vel=0.88 fps Inflow=0.02 cfs 0.010 af
n=0.030 L=164.0' S=0.0600 '/' Capacity=205.89 cfs Outflow=0.02 cfs 0.010 af

Reach R2:

Avg. Flow Depth=0.01' Max Vel=0.17 fps Inflow=0.02 cfs 0.010 af
n=0.030 L=302.0' S=0.0075 '/' Capacity=33.48 cfs Outflow=0.02 cfs 0.008 af

Reach R3:

Avg. Flow Depth=0.04' Max Vel=0.32 fps Inflow=0.02 cfs 0.008 af
n=0.035 L=94.0' S=0.0050 '/' Capacity=10.69 cfs Outflow=0.02 cfs 0.007 af

Pond R4: REACH 4

Peak Elev=339.12' Inflow=8.07 cfs 0.723 af
15.0" Round Culvert n=0.025 L=41.0' S=0.0083 '/' Outflow=8.07 cfs 0.723 af

15021-PRE

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

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Summary for Subcatchment 7:

Runoff = 8.07 cfs @ 12.22 hrs, Volume= 0.716 af, Depth> 2.06"

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
* 36,795	98	Buildings and Pavement
5,150	76	Gravel roads, HSG A
46,570	89	Gravel roads, HSG C
7,810	74	>75% Grass cover, Good, HSG C
44,700	30	Meadow, non-grazed, HSG A
13,915	71	Meadow, non-grazed, HSG C
15,440	30	Woods, Good, HSG A
11,350	70	Woods, Good, HSG C
181,730	68	Weighted Average
144,935		79.75% Pervious Area
36,795		20.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	90	0.1400	0.16		Sheet Flow, A TO B Woods: Light underbrush n= 0.400 P2= 3.00"
5.0	422	0.0075	1.39		Shallow Concentrated Flow, B TO C Unpaved Kv= 16.1 fps
0.7	94	0.0050	2.14	10.69	Trap/Vee/Rect Channel Flow, C TO D Bot.W=2.00' D=1.00' Z= 3.0 ' Top.W=8.00' n= 0.035 Earth, dense weeds
15.1	606	Total			

Summary for Subcatchment OS1:

Runoff = 0.02 cfs @ 17.15 hrs, Volume= 0.010 af, Depth> 0.03"

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
172,300	30	Woods, Good, HSG A
15,380	30	Meadow, non-grazed, HSG A
3,430	76	Gravel roads, HSG A
191,110	31	Weighted Average
191,110		100.00% Pervious 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
18.6	150	0.0700	0.13		Sheet Flow, A TO B Woods: Light underbrush n= 0.400 P2= 3.00"
6.1	680	0.1400	1.87		Shallow Concentrated Flow, B TO C Woodland Kv= 5.0 fps
0.5	48	0.0600	1.71		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
25.2	878	Total			

Summary for Reach R1:

Inflow Area = 4.387 ac, 0.00% Impervious, Inflow Depth > 0.03" for 25-YEAR event
 Inflow = 0.02 cfs @ 17.15 hrs, Volume= 0.010 af
 Outflow = 0.02 cfs @ 17.25 hrs, Volume= 0.010 af, Atten= 0%, Lag= 6.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.88 fps, Min. Travel Time= 3.1 min
 Avg. Velocity = 0.88 fps, Avg. Travel Time= 3.1 min

Peak Storage= 5 cf @ 17.20 hrs
 Average Depth at Peak Storage= 0.01'
 Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 205.89 cfs

2.00' x 2.00' deep channel, n= 0.030
 Side Slope Z-value= 3.0 ' ' Top Width= 14.00'
 Length= 164.0' Slope= 0.0600 ' '
 Inlet Invert= 0.00', Outlet Invert= -9.84'

**Summary for Reach R2:**

Inflow Area = 4.387 ac, 0.00% Impervious, Inflow Depth > 0.03" for 25-YEAR event
 Inflow = 0.02 cfs @ 17.25 hrs, Volume= 0.010 af
 Outflow = 0.02 cfs @ 18.05 hrs, Volume= 0.008 af, Atten= 1%, Lag= 47.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.17 fps, Min. Travel Time= 29.8 min
 Avg. Velocity = 0.15 fps, Avg. Travel Time= 32.6 min

Peak Storage= 43 cf @ 17.55 hrs
 Average Depth at Peak Storage= 0.01'
 Bank-Full Depth= 0.50' Flow Area= 15.0 sf, Capacity= 33.48 cfs

15021-PRE

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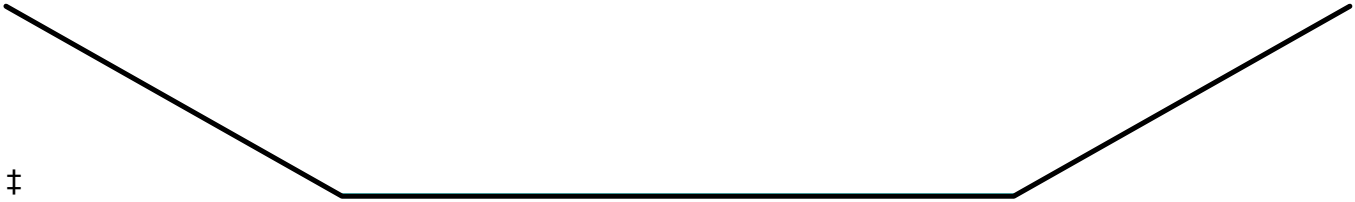
Type III 24-hr 25-YEAR Rainfall=5.50"

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20.00' x 0.50' deep channel, n= 0.030 Short grass
 Side Slope Z-value= 20.0 '/' Top Width= 40.00'
 Length= 302.0' Slope= 0.0075 '/'
 Inlet Invert= 0.00', Outlet Invert= -2.27'

**Summary for Reach R3:**

Inflow Area = 4.387 ac, 0.00% Impervious, Inflow Depth > 0.02" for 25-YEAR event
 Inflow = 0.02 cfs @ 18.05 hrs, Volume= 0.008 af
 Outflow = 0.02 cfs @ 18.18 hrs, Volume= 0.007 af, Atten= 0%, Lag= 8.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.32 fps, Min. Travel Time= 4.9 min
 Avg. Velocity = 0.27 fps, Avg. Travel Time= 5.7 min

Peak Storage= 7 cf @ 18.10 hrs
 Average Depth at Peak Storage= 0.04'
 Bank-Full Depth= 1.00' Flow Area= 5.0 sf, Capacity= 10.69 cfs

2.00' x 1.00' deep channel, n= 0.035
 Side Slope Z-value= 3.0 '/' Top Width= 8.00'
 Length= 94.0' Slope= 0.0050 '/'
 Inlet Invert= 0.00', Outlet Invert= -0.47'

**Summary for Pond R4: REACH 4**

Inflow Area = 8.559 ac, 9.87% Impervious, Inflow Depth > 1.01" for 25-YEAR event
 Inflow = 8.07 cfs @ 12.22 hrs, Volume= 0.723 af
 Outflow = 8.07 cfs @ 12.22 hrs, Volume= 0.723 af, Atten= 0%, Lag= 0.0 min
 Primary = 8.07 cfs @ 12.22 hrs, Volume= 0.723 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 339.12' @ 12.22 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	334.57'	15.0" Round Culvert L= 41.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 334.57' / 334.23' S= 0.0083 '/' Cc= 0.900

15021-PRE*Type III 24-hr 25-YEAR Rainfall=5.50"*

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n= 0.025 Corrugated metal, Flow Area= 1.23 sf

Primary OutFlow Max=7.96 cfs @ 12.22 hrs HW=339.03' (Free Discharge)↑**1=Culvert** (Barrel Controls 7.96 cfs @ 6.48 fps)

15021-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

Subcatchment 7:

Runoff Area=181,730 sf 20.25% Impervious Runoff Depth>0.56"
Flow Length=606' Tc=15.1 min CN=68 Runoff=1.87 cfs 0.194 af

Subcatchment OS1:

Runoff Area=191,110 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=878' Tc=25.2 min CN=31 Runoff=0.00 cfs 0.000 af

Reach R1:

Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=164.0' S=0.0600 '/' Capacity=205.89 cfs Outflow=0.00 cfs 0.000 af

Reach R2:

Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=302.0' S=0.0075 '/' Capacity=33.48 cfs Outflow=0.00 cfs 0.000 af

Reach R3:

Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=94.0' S=0.0050 '/' Capacity=10.69 cfs Outflow=0.00 cfs 0.000 af

Pond R4: REACH 4

Peak Elev=335.50' Inflow=1.87 cfs 0.194 af
15.0" Round Culvert n=0.025 L=41.0' S=0.0083 '/' Outflow=1.87 cfs 0.194 af

15021-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

Subcatchment 7:

Runoff Area=181,730 sf 20.25% Impervious Runoff Depth>1.52"
Flow Length=606' Tc=15.1 min CN=68 Runoff=5.88 cfs 0.529 af

Subcatchment OS1:

Runoff Area=191,110 sf 0.00% Impervious Runoff Depth>0.00"
Flow Length=878' Tc=25.2 min CN=31 Runoff=0.00 cfs 0.000 af

Reach R1:

Avg. Flow Depth=0.00' Max Vel=0.88 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=164.0' S=0.0600 '/' Capacity=205.89 cfs Outflow=0.00 cfs 0.000 af

Reach R2:

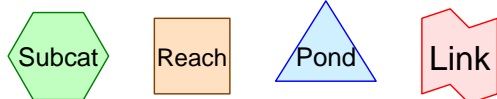
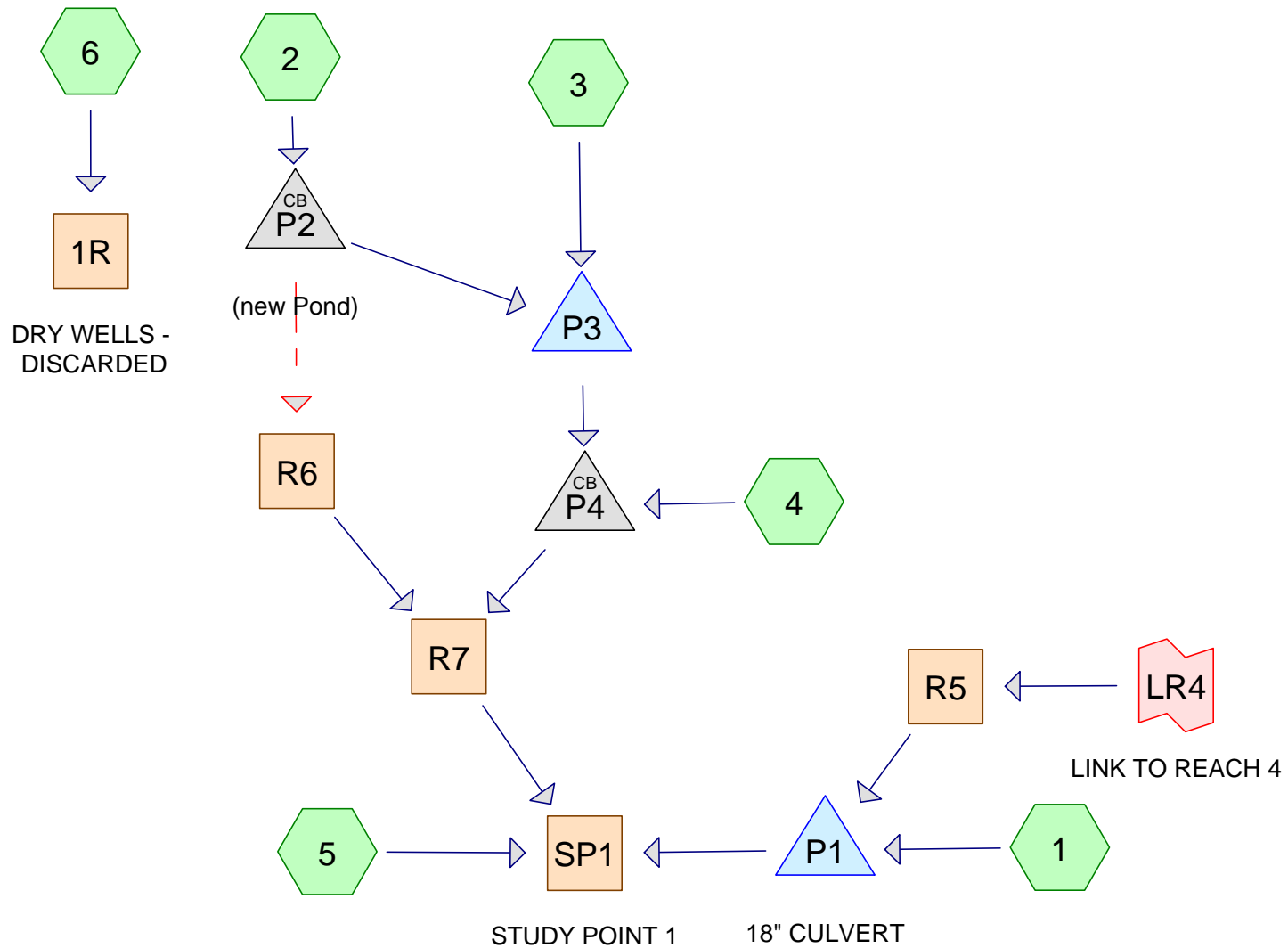
Avg. Flow Depth=0.00' Max Vel=0.13 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=302.0' S=0.0075 '/' Capacity=33.48 cfs Outflow=0.00 cfs 0.000 af

Reach R3:

Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=94.0' S=0.0050 '/' Capacity=10.69 cfs Outflow=0.00 cfs 0.000 af

Pond R4: REACH 4

Peak Elev=337.41' Inflow=5.88 cfs 0.529 af
15.0" Round Culvert n=0.025 L=41.0' S=0.0083 '/' Outflow=5.88 cfs 0.529 af



Routing Diagram for 15021-PRE 2
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15021-PRE 2

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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

Subcatchment 1: Runoff Area=29,330 sf 48.82% Impervious Runoff Depth>3.70"
 Flow Length=178' Slope=0.0100 '/ Tc=19.2 min CN=86 Runoff=2.10 cfs 0.207 af

Subcatchment 2: Runoff Area=343,265 sf 4.92% Impervious Runoff Depth>0.09"
 Flow Length=1,500' Tc=33.5 min CN=34 Runoff=0.13 cfs 0.057 af

Subcatchment 3: Runoff Area=8,295 sf 64.26% Impervious Runoff Depth>3.91"
 Flow Length=39' Tc=6.0 min CN=88 Runoff=0.88 cfs 0.062 af

Subcatchment 4: Runoff Area=1,205 sf 45.64% Impervious Runoff Depth>3.41"
 Tc=6.0 min CN=83 Runoff=0.11 cfs 0.008 af

Subcatchment 5: Runoff Area=28,235 sf 31.20% Impervious Runoff Depth>2.14"
 Flow Length=329' Tc=12.5 min CN=69 Runoff=1.39 cfs 0.116 af

Subcatchment 6: Runoff Area=27,285 sf 75.57% Impervious Runoff Depth>3.50"
 Flow Length=214' Tc=9.8 min CN=84 Runoff=2.35 cfs 0.183 af

Reach 1R: DRY WELLS - DISCARDED Inflow=2.35 cfs 0.183 af
 Outflow=2.35 cfs 0.183 af

Reach R5: Avg. Flow Depth=0.43' Max Vel=3.43 fps Inflow=8.07 cfs 0.723 af
 n=0.025 L=130.0' S=0.0200 '/ Capacity=312.85 cfs Outflow=7.95 cfs 0.722 af

Reach R6: Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
 n=0.025 L=87.0' S=0.0700 '/ Capacity=1,421.84 cfs Outflow=0.00 cfs 0.000 af

Reach R7: Avg. Flow Depth=0.08' Max Vel=1.75 fps Inflow=0.30 cfs 0.092 af
 n=0.025 L=142.0' S=0.0300 '/ Capacity=930.81 cfs Outflow=0.30 cfs 0.092 af

Reach SP1: STUDY POINT 1 Inflow=6.60 cfs 1.126 af
 Outflow=6.60 cfs 1.126 af

Pond P1: 18" CULVERT Peak Elev=336.00' Storage=8,018 cf Inflow=10.04 cfs 0.930 af
 18.0" Round Culvert n=0.025 L=40.0' S=0.0070 '/ Outflow=5.62 cfs 0.918 af

Pond P2: (new Pond) Peak Elev=341.82' Inflow=0.13 cfs 0.057 af
 Primary=0.13 cfs 0.057 af Secondary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.057 af

Pond P3: Peak Elev=339.47' Storage=1,581 cf Inflow=0.88 cfs 0.119 af
 Outflow=0.27 cfs 0.084 af

Pond P4: Peak Elev=335.61' Inflow=0.30 cfs 0.092 af
 12.0" Round Culvert n=0.025 L=40.0' S=0.0083 '/ Outflow=0.30 cfs 0.092 af

Link LR4: LINK 25-YEAR Primary Outflow Imported from 15021-PRE~Pond R4.hce Inflow=8.07 cfs 0.723 af
 Area= 8.559 ac 9.87% Imperv. Primary=8.07 cfs 0.723 af

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

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Summary for Subcatchment 1:

Runoff = 2.10 cfs @ 12.26 hrs, Volume= 0.207 af, Depth> 3.70"

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
*	14,320	98	Pavement and Roof
	1,620	89	Gravel roads, HSG C
	1,100	71	Meadow, non-grazed, HSG C
	12,290	74	>75% Grass cover, Good, HSG C
	29,330	86	Weighted Average
	15,010		51.18% Pervious Area
	14,320		48.82% Impervious Area

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"
0.7	28	0.0100	0.70		Shallow Concentrated Flow, B TO C
					Short Grass Pasture Kv= 7.0 fps
19.2	178	Total			

Summary for Subcatchment 2:

Runoff = 0.13 cfs @ 15.22 hrs, Volume= 0.057 af, Depth> 0.09"

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
	304,480	30	Woods, Good, HSG A
	260	70	Woods, Good, HSG C
	18,740	30	Meadow, non-grazed, HSG A
	2,910	89	Gravel roads, HSG C
*	16,875	98	Buildings and Pavement
	343,265	34	Weighted Average
	326,390		95.08% Pervious Area
	16,875		4.92% 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
20.8	150	0.0530	0.12		Sheet Flow, A TO B Woods: Light underbrush n= 0.400 P2= 3.00"
11.0	1,040	0.1000	1.58		Shallow Concentrated Flow, B TO C Woodland Kv= 5.0 fps
0.5	60	0.1000	2.21		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
0.1	20	0.7500	6.06		Shallow Concentrated Flow, D TO E Short Grass Pasture Kv= 7.0 fps
1.1	230	0.0300	3.52		Shallow Concentrated Flow, E TO F Paved Kv= 20.3 fps
33.5	1,500	Total			

Summary for Subcatchment 3:

Runoff = 0.88 cfs @ 12.09 hrs, Volume= 0.062 af, Depth> 3.91"

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
*	5,330	98	Pavement and Buildings
	2,965	71	Meadow, non-grazed, HSG C
	8,295	88	Weighted Average
	2,965		35.74% Pervious Area
	5,330		64.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0200	1.01		Sheet Flow, A TO B Smooth surfaces n= 0.011 P2= 3.00"
0.0	14	0.7500	6.06		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
5.6					Direct Entry, 6 MINUTE MIN. TC
6.0	39	Total			

Summary for Subcatchment 4:

Runoff = 0.11 cfs @ 12.09 hrs, Volume= 0.008 af, Depth> 3.41"

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
*	550	98	Pavement
	655	71	Meadow, non-grazed, HSG C
	1,205	83	Weighted Average
	655		54.36% Pervious Area
	550		45.64% 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
6.0					Direct Entry, 6 MINUTE MIN. TC

Summary for Subcatchment 5:

Runoff = 1.39 cfs @ 12.18 hrs, Volume= 0.116 af, Depth> 2.14"

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
* 8,810	98	Pavement
5,910	30	Woods, Good, HSG A
1,600	70	Woods, Good, HSG C
5,810	74	>75% Grass cover, Good, HSG C
4,245	71	Meadow, non-grazed, HSG C
1,860	30	Meadow, non-grazed, HSG A
28,235	69	Weighted Average
19,425		68.80% Pervious Area
8,810		31.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	112	0.2000	0.19		Sheet Flow, A TO B
					Woods: Light underbrush n= 0.400 P2= 3.00"
0.1	17	0.0200	2.87		Shallow Concentrated Flow, B TO C
					Paved Kv= 20.3 fps
2.7	200	0.0300	1.21		Shallow Concentrated Flow, C TO D
					Short Grass Pasture Kv= 7.0 fps
12.5	329	Total			

Summary for Subcatchment 6:

Runoff = 2.35 cfs @ 12.14 hrs, Volume= 0.183 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
* 20,620	98	Pavement and Buildings
1,430	76	Gravel roads, HSG A
3,235	30	Meadow, non-grazed, HSG A
200	71	Meadow, non-grazed, HSG C
1,800	30	Woods, Good, HSG A
27,285	84	Weighted Average
6,665		24.43% Pervious Area
20,620		75.57% 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
7.0	60	0.1300	0.14		Sheet Flow, A TO B Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	48	0.1500	0.32		Sheet Flow, B TO C Grass: Short n= 0.150 P2= 3.00"
0.0	17	0.7500	6.06		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
0.3	89	0.0500	4.54		Shallow Concentrated Flow, D TO E Paved Kv= 20.3 fps
9.8	214	Total			

Summary for Reach 1R: DRY WELLS - DISCARDED

Inflow Area = 0.626 ac, 75.57% Impervious, Inflow Depth > 3.50" for 25-YEAR event
 Inflow = 2.35 cfs @ 12.14 hrs, Volume= 0.183 af
 Outflow = 2.35 cfs @ 12.14 hrs, Volume= 0.183 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 R5:

Inflow Area = 8.559 ac, 9.87% Impervious, Inflow Depth > 1.01" for 25-YEAR event
 Inflow = 8.07 cfs @ 12.22 hrs, Volume= 0.723 af
 Outflow = 7.95 cfs @ 12.24 hrs, Volume= 0.722 af, Atten= 1%, Lag= 1.3 min

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

Max. Velocity= 3.43 fps, Min. Travel Time= 0.6 min

Avg. Velocity= 1.62 fps, Avg. Travel Time= 1.3 min

Peak Storage= 303 cf @ 12.23 hrs

Average Depth at Peak Storage= 0.43'

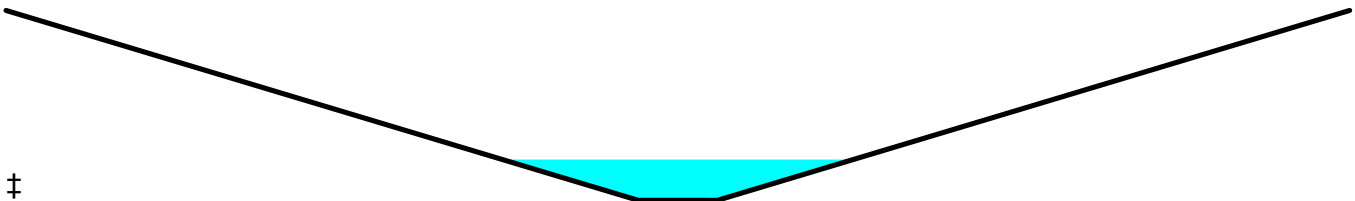
Bank-Full Depth= 2.00' Flow Area= 36.0 sf, Capacity= 312.85 cfs

2.00' x 2.00' deep channel, n= 0.025

Side Slope Z-value= 8.0 ' ' Top Width= 34.00'

Length= 130.0' Slope= 0.0200 ' '

Inlet Invert= 0.00', Outlet Invert= -2.60'



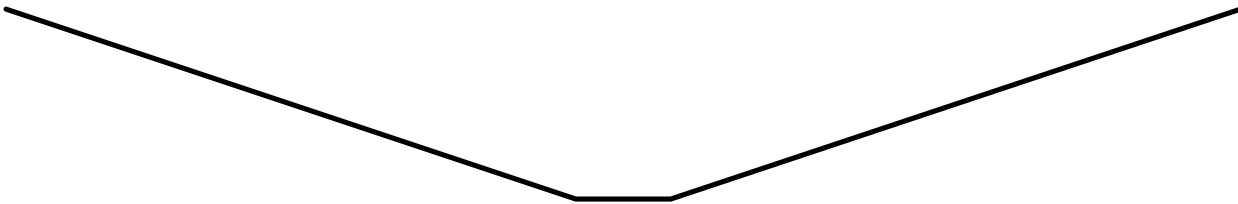
Summary for Reach R6:

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 4.00' Flow Area= 56.0 sf, Capacity= 1,421.84 cfs

2.00' x 4.00' deep channel, n= 0.025
Side Slope Z-value= 3.0 '/' Top Width= 26.00'
Length= 87.0' Slope= 0.0700 '/'
Inlet Invert= 0.00', Outlet Invert= -6.09'

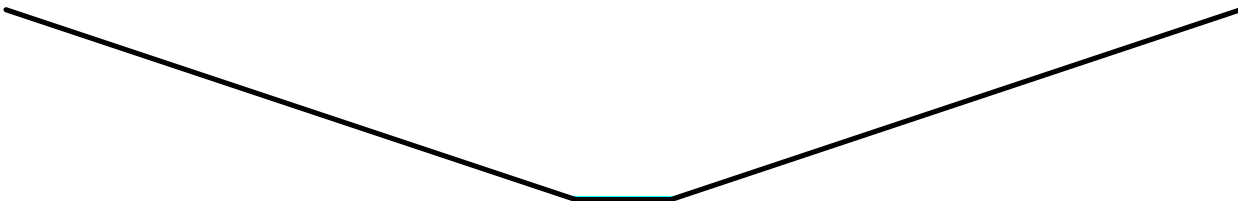
**Summary for Reach R7:**

Inflow Area = 8.098 ac, 6.45% Impervious, Inflow Depth > 0.14" for 25-YEAR event
Inflow = 0.30 cfs @ 12.42 hrs, Volume= 0.092 af
Outflow = 0.30 cfs @ 12.47 hrs, Volume= 0.092 af, Atten= 2%, Lag= 2.8 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.75 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 1.26 fps, Avg. Travel Time= 1.9 min

Peak Storage= 24 cf @ 12.44 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 4.00' Flow Area= 56.0 sf, Capacity= 930.81 cfs

2.00' x 4.00' deep channel, n= 0.025
Side Slope Z-value= 3.0 '/' Top Width= 26.00'
Length= 142.0' Slope= 0.0300 '/'
Inlet Invert= 0.00', Outlet Invert= -4.26'



Summary for Reach SP1: STUDY POINT 1

Inflow Area = 17.979 ac, 10.56% Impervious, Inflow Depth > 0.75" for 25-YEAR event
 Inflow = 6.60 cfs @ 12.45 hrs, Volume= 1.126 af
 Outflow = 6.60 cfs @ 12.45 hrs, Volume= 1.126 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 P1: 18" CULVERT

Inflow Area = 9.233 ac, 12.71% Impervious, Inflow Depth > 1.21" for 25-YEAR event
 Inflow = 10.04 cfs @ 12.24 hrs, Volume= 0.930 af
 Outflow = 5.62 cfs @ 12.53 hrs, Volume= 0.918 af, Atten= 44%, Lag= 17.1 min
 Primary = 5.62 cfs @ 12.53 hrs, Volume= 0.918 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 336.00' @ 12.53 hrs Surf.Area= 10,200 sf Storage= 8,018 cf

Plug-Flow detention time= 20.7 min calculated for 0.915 af (98% of inflow)
 Center-of-Mass det. time= 16.3 min (826.1 - 809.8)

Volume	Invert	Avail.Storage	Storage Description
#1	334.00'	8,060 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
334.00	10	0	0
335.00	2,940	1,475	1,475
336.00	10,230	6,585	8,060

Device	Routing	Invert	Outlet Devices
#1	Primary	334.23'	18.0" Round Culvert L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 334.23' / 333.95' S= 0.0070 1' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=5.61 cfs @ 12.53 hrs HW=335.99' (Free Discharge)

↑**1=Culvert** (Barrel Controls 5.61 cfs @ 3.40 fps)

Summary for Pond P2: (new Pond)

Inflow Area = 7.880 ac, 4.92% Impervious, Inflow Depth > 0.09" for 25-YEAR event
 Inflow = 0.13 cfs @ 15.22 hrs, Volume= 0.057 af
 Outflow = 0.13 cfs @ 15.22 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.13 cfs @ 15.22 hrs, Volume= 0.057 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= 341.82' @ 15.22 hrs

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

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Device	Routing	Invert	Outlet Devices
#1	Primary	341.64'	15.0" Round Culvert L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 341.64' / 339.22' S= 0.0605 '/' Cc= 0.900 n= 0.025, Flow Area= 1.23 sf
#2	Secondary	342.85'	6.0' 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

Primary OutFlow Max=0.13 cfs @ 15.22 hrs HW=341.82' (Free Discharge)

└─1=Culvert (Inlet Controls 0.13 cfs @ 1.15 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=341.64' (Free Discharge)

└─2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P3:

Inflow Area = 8.071 ac, 6.32% Impervious, Inflow Depth > 0.18" for 25-YEAR event
 Inflow = 0.88 cfs @ 12.09 hrs, Volume= 0.119 af
 Outflow = 0.27 cfs @ 12.42 hrs, Volume= 0.084 af, Atten= 69%, Lag= 20.0 min
 Primary = 0.27 cfs @ 12.42 hrs, Volume= 0.084 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 339.47' @ 12.42 hrs Surf.Area= 1,268 sf Storage= 1,581 cf

Plug-Flow detention time= 164.3 min calculated for 0.084 af (70% of inflow)
 Center-of-Mass det. time= 78.4 min (947.3 - 868.9)

Volume	Invert	Avail.Storage	Storage Description
#1	337.00'	2,320 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
337.00	10	0	0
338.00	510	260	260
339.00	1,045	778	1,038
340.00	1,520	1,283	2,320

Device	Routing	Invert	Outlet Devices
#1	Primary	339.40'	6.0' 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

Primary OutFlow Max=0.26 cfs @ 12.42 hrs HW=339.47' (Free Discharge)

└─1=Broad-Crested Rectangular Weir (Weir Controls 0.26 cfs @ 0.62 fps)

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

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Summary for Pond P4:

Inflow Area = 8.098 ac, 6.45% Impervious, Inflow Depth > 0.14" for 25-YEAR event
 Inflow = 0.30 cfs @ 12.42 hrs, Volume= 0.092 af
 Outflow = 0.30 cfs @ 12.42 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.30 cfs @ 12.42 hrs, Volume= 0.092 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 335.61' @ 12.42 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	335.23'	12.0" Round Culvert L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 335.23' / 334.90' S= 0.0083 '/ Cc= 0.900 n= 0.025, Flow Area= 0.79 sf

Primary OutFlow Max=0.30 cfs @ 12.42 hrs HW=335.61' (Free Discharge)
 ↑ **1=Culvert** (Barrel Controls 0.30 cfs @ 1.64 fps)

Summary for Link LR4: LINK TO REACH 4

Inflow Area = 8.559 ac, 9.87% Impervious, Inflow Depth > 1.01" for 25-YEAR event
 Inflow = 8.07 cfs @ 12.22 hrs, Volume= 0.723 af
 Primary = 8.07 cfs @ 12.22 hrs, Volume= 0.723 af, Atten= 0%, Lag= 0.0 min

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

25-YEAR Primary Outflow Imported from 15021-PRE~Pond R4.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

Subcatchment 1: Runoff Area=29,330 sf 48.82% Impervious Runoff Depth>1.54"
 Flow Length=178' Slope=0.0100 '/ Tc=19.2 min CN=86 Runoff=0.90 cfs 0.087 af

Subcatchment 2: Runoff Area=343,265 sf 4.92% Impervious Runoff Depth=0.00"
 Flow Length=1,500' Tc=33.5 min CN=34 Runoff=0.00 cfs 0.000 af

Subcatchment 3: Runoff Area=8,295 sf 64.26% Impervious Runoff Depth>1.70"
 Flow Length=39' Tc=6.0 min CN=88 Runoff=0.40 cfs 0.027 af

Subcatchment 4: Runoff Area=1,205 sf 45.64% Impervious Runoff Depth>1.34"
 Tc=6.0 min CN=83 Runoff=0.05 cfs 0.003 af

Subcatchment 5: Runoff Area=28,235 sf 31.20% Impervious Runoff Depth>0.60"
 Flow Length=329' Tc=12.5 min CN=69 Runoff=0.34 cfs 0.032 af

Subcatchment 6: Runoff Area=27,285 sf 75.57% Impervious Runoff Depth>1.41"
 Flow Length=214' Tc=9.8 min CN=84 Runoff=0.96 cfs 0.073 af

Reach 1R: DRY WELLS - DISCARDED Inflow=0.96 cfs 0.073 af
 Outflow=0.96 cfs 0.073 af

Reach R5: Avg. Flow Depth=0.22' Max Vel=2.34 fps Inflow=1.87 cfs 0.194 af
 n=0.025 L=130.0' S=0.0200 '/ Capacity=312.85 cfs Outflow=1.85 cfs 0.193 af

Reach R6: Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
 n=0.025 L=87.0' S=0.0700 '/ Capacity=1,421.84 cfs Outflow=0.00 cfs 0.000 af

Reach R7: Avg. Flow Depth=0.02' Max Vel=1.16 fps Inflow=0.05 cfs 0.003 af
 n=0.025 L=142.0' S=0.0300 '/ Capacity=930.81 cfs Outflow=0.04 cfs 0.003 af

Reach SP1: STUDY POINT 1 Inflow=2.20 cfs 0.309 af
 Outflow=2.20 cfs 0.309 af

Pond P1: 18" CULVERT Peak Elev=335.13' Storage=1,905 cf Inflow=2.74 cfs 0.280 af
 18.0" Round Culvert n=0.025 L=40.0' S=0.0070 '/ Outflow=1.98 cfs 0.273 af

Pond P2: (new Pond) Peak Elev=341.64' Inflow=0.00 cfs 0.000 af
 Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond P3: Peak Elev=339.13' Storage=1,176 cf Inflow=0.40 cfs 0.027 af
 Outflow=0.00 cfs 0.000 af

Pond P4: Peak Elev=335.38' Inflow=0.05 cfs 0.003 af
 12.0" Round Culvert n=0.025 L=40.0' S=0.0083 '/ Outflow=0.05 cfs 0.003 af

Link LR4: LINK 2-YEAR Primary Outflow Imported from 15021-PRE~Pond R4.hce Inflow=1.87 cfs 0.194 af
 Area= 8.559 ac 9.87% Imperv. Primary=1.87 cfs 0.194 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

Subcatchment 1: Runoff Area=29,330 sf 48.82% Impervious Runoff Depth>2.99"
 Flow Length=178' Slope=0.0100 '/ Tc=19.2 min CN=86 Runoff=1.71 cfs 0.168 af

Subcatchment 2: Runoff Area=343,265 sf 4.92% Impervious Runoff Depth>0.02"
 Flow Length=1,500' Tc=33.5 min CN=34 Runoff=0.03 cfs 0.011 af

Subcatchment 3: Runoff Area=8,295 sf 64.26% Impervious Runoff Depth>3.19"
 Flow Length=39' Tc=6.0 min CN=88 Runoff=0.72 cfs 0.051 af

Subcatchment 4: Runoff Area=1,205 sf 45.64% Impervious Runoff Depth>2.72"
 Tc=6.0 min CN=83 Runoff=0.09 cfs 0.006 af

Subcatchment 5: Runoff Area=28,235 sf 31.20% Impervious Runoff Depth>1.59"
 Flow Length=329' Tc=12.5 min CN=69 Runoff=1.02 cfs 0.086 af

Subcatchment 6: Runoff Area=27,285 sf 75.57% Impervious Runoff Depth>2.81"
 Flow Length=214' Tc=9.8 min CN=84 Runoff=1.90 cfs 0.147 af

Reach 1R: DRY WELLS - DISCARDED Inflow=1.90 cfs 0.147 af
 Outflow=1.90 cfs 0.147 af

Reach R5: Avg. Flow Depth=0.37' Max Vel=3.16 fps Inflow=5.88 cfs 0.529 af
 n=0.025 L=130.0' S=0.0200 '/ Capacity=312.85 cfs Outflow=5.80 cfs 0.529 af

Reach R6: Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
 n=0.025 L=87.0' S=0.0700 '/ Capacity=1,421.84 cfs Outflow=0.00 cfs 0.000 af

Reach R7: Avg. Flow Depth=0.04' Max Vel=1.16 fps Inflow=0.09 cfs 0.033 af
 n=0.025 L=142.0' S=0.0300 '/ Capacity=930.81 cfs Outflow=0.08 cfs 0.033 af

Reach SP1: STUDY POINT 1 Inflow=5.17 cfs 0.806 af
 Outflow=5.17 cfs 0.806 af

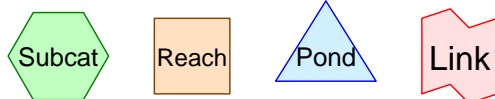
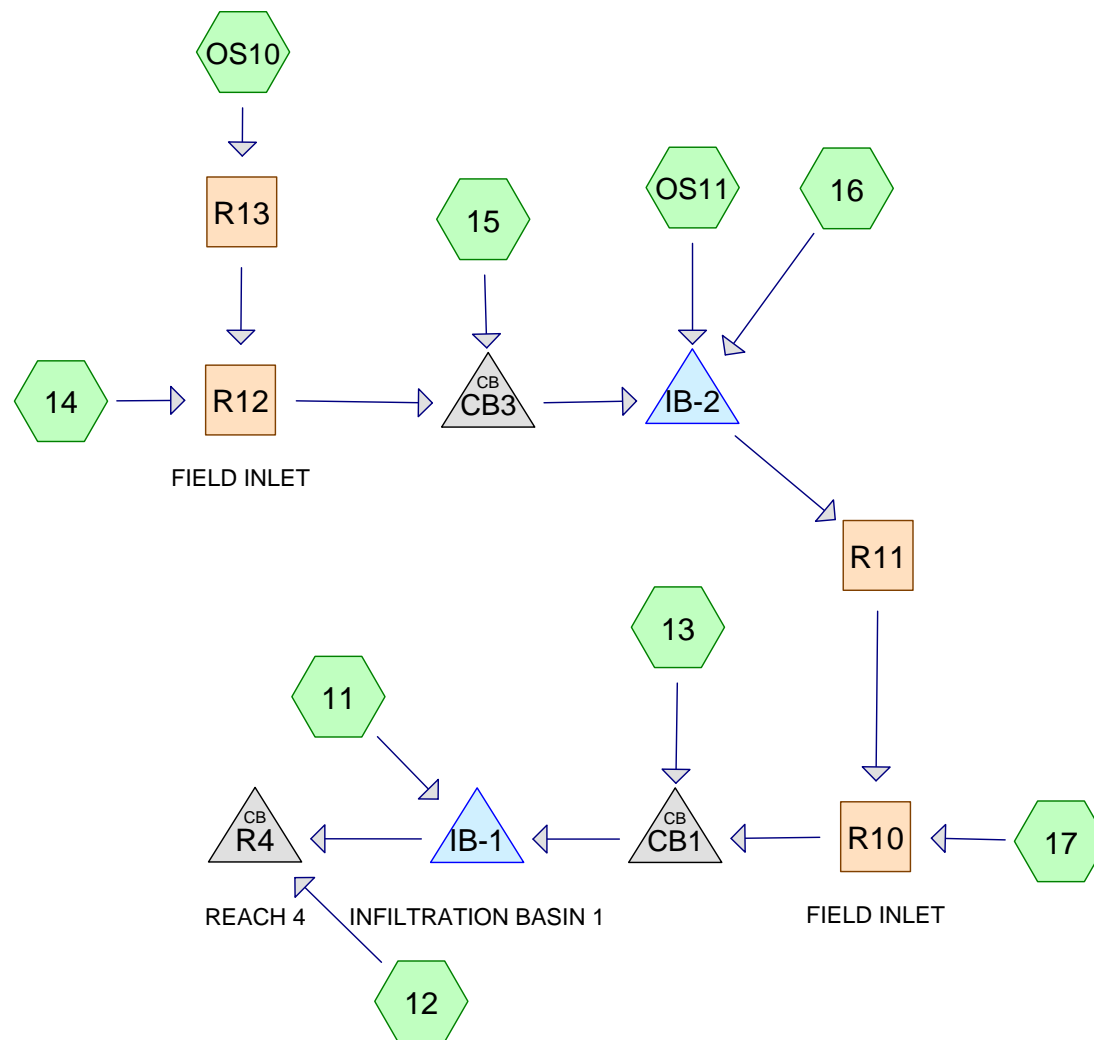
Pond P1: 18" CULVERT Peak Elev=335.73' Storage=5,559 cf Inflow=7.50 cfs 0.696 af
 18.0" Round Culvert n=0.025 L=40.0' S=0.0070 '/ Outflow=4.61 cfs 0.687 af

Pond P2: (new Pond) Peak Elev=341.73' Inflow=0.03 cfs 0.011 af
 Primary=0.03 cfs 0.011 af Secondary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.011 af

Pond P3: Peak Elev=339.43' Storage=1,525 cf Inflow=0.72 cfs 0.062 af
 Outflow=0.06 cfs 0.027 af

Pond P4: Peak Elev=335.44' Inflow=0.09 cfs 0.033 af
 12.0" Round Culvert n=0.025 L=40.0' S=0.0083 '/ Outflow=0.09 cfs 0.033 af

Link LR4: LINK 10-YEAR Primary Outflow Imported from 15021-PRE~Pond R4.hce Inflow=5.88 cfs 0.529 af
 Area= 8.559 ac 9.87% Imperv. Primary=5.88 cfs 0.529 af



Routing Diagram for 15021-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

Subcatchment 11: Runoff Area=35,540 sf 60.69% Impervious Runoff Depth>4.12"
 Flow Length=93' Tc=6.0 min CN=90 Runoff=3.91 cfs 0.280 af

Subcatchment 12: Runoff Area=18,865 sf 58.55% Impervious Runoff Depth>3.90"
 Flow Length=157' Tc=15.7 min CN=88 Runoff=1.52 cfs 0.141 af

Subcatchment 13: Runoff Area=19,470 sf 99.18% Impervious Runoff Depth>4.87"
 Flow Length=103' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=2.35 cfs 0.182 af

Subcatchment 14: Runoff Area=19,545 sf 45.74% Impervious Runoff Depth>1.83"
 Flow Length=175' Tc=6.0 min CN=65 Runoff=1.00 cfs 0.068 af

Subcatchment 15: Runoff Area=10,515 sf 100.00% Impervious Runoff Depth>4.87"
 Flow Length=60' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=1.27 cfs 0.098 af

Subcatchment 16: Runoff Area=5,595 sf 0.00% Impervious Runoff Depth>0.22"
 Tc=6.0 min CN=38 Runoff=0.01 cfs 0.002 af

Subcatchment 17: Runoff Area=66,915 sf 12.15% Impervious Runoff Depth>2.05"
 Flow Length=385' Tc=21.0 min CN=68 Runoff=2.60 cfs 0.263 af

Subcatchment OS10: Runoff Area=189,485 sf 0.00% Impervious Runoff Depth>0.03"
 Flow Length=878' Tc=25.2 min CN=31 Runoff=0.02 cfs 0.010 af

Subcatchment OS11: Runoff Area=1,625 sf 0.00% Impervious Runoff Depth>0.15"
 Flow Length=45' Slope=0.0700 '/' Tc=7.1 min CN=36 Runoff=0.00 cfs 0.000 af

Reach R10: FIELD INLET Avg. Flow Depth=0.85' Max Vel=3.66 fps Inflow=2.60 cfs 0.263 af
 12.0" Round Pipe n=0.013 L=98.0' S=0.0050 '/' Capacity=2.52 cfs Outflow=2.59 cfs 0.263 af

Reach R11: Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
 n=0.025 L=252.0' S=0.0200 '/' Capacity=64.69 cfs Outflow=0.00 cfs 0.000 af

Reach R12: FIELD INLET Avg. Flow Depth=0.40' Max Vel=2.98 fps Inflow=1.00 cfs 0.078 af
 15.0" Round Pipe n=0.013 L=100.0' S=0.0050 '/' Capacity=4.57 cfs Outflow=0.97 cfs 0.078 af

Reach R13: Avg. Flow Depth=0.02' Max Vel=0.50 fps Inflow=0.02 cfs 0.010 af
 n=0.025 L=139.0' S=0.0100 '/' Capacity=40.35 cfs Outflow=0.02 cfs 0.009 af

Pond CB1: Peak Elev=336.13' Inflow=3.62 cfs 0.444 af
 12.0" Round Culvert n=0.013 L=61.0' S=0.0066 '/' Outflow=3.62 cfs 0.444 af

Pond CB3: Peak Elev=339.94' Inflow=2.22 cfs 0.176 af
 15.0" Round Culvert n=0.013 L=175.0' S=0.0051 '/' Outflow=2.22 cfs 0.176 af

Pond IB-1: INFILTRATION BASIN 1 Peak Elev=335.30' Storage=8,753 cf Inflow=7.47 cfs 0.724 af
 Discarded=0.30 cfs 0.164 af Primary=5.47 cfs 0.405 af Outflow=5.77 cfs 0.569 af

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Pond IB-2:

Peak Elev=339.39' Storage=3,898 cf Inflow=2.22 cfs 0.178 af
Discarded=0.12 cfs 0.103 af Primary=0.00 cfs 0.000 af Outflow=0.12 cfs 0.103 af

Pond R4: REACH 4

Peak Elev=338.22' Inflow=6.99 cfs 0.546 af
15.0" Round Culvert n=0.025 L=41.0' S=0.0083 '/' Outflow=6.99 cfs 0.546 af

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Summary for Subcatchment 11:

Runoff = 3.91 cfs @ 12.09 hrs, Volume= 0.280 af, Depth> 4.12"

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
*	21,570	98	Pavement and Roof
	3,160	89	Gravel roads, HSG C
	10,290	74	>75% Grass cover, Good, HSG C
	520	71	Meadow, non-grazed, HSG C
	35,540	90	Weighted Average
	13,970		39.31% Pervious Area
	21,570		60.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	75	0.0250	1.37		Sheet Flow, A TO B
					Smooth surfaces n= 0.011 P2= 3.00"
0.1	18	0.3300	4.02		Shallow Concentrated Flow, B TO C
					Short Grass Pasture Kv= 7.0 fps
5.0					Direct Entry, 6 MINUTE MIN. TC
6.0	93	Total			

Summary for Subcatchment 12:

Runoff = 1.52 cfs @ 12.21 hrs, Volume= 0.141 af, Depth> 3.90"

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
*	11,045	98	Pavement
	7,820	74	>75% Grass cover, Good, HSG C
	18,865	88	Weighted Average
	7,820		41.45% Pervious Area
	11,045		58.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	150	0.0150	0.16		Sheet Flow, A TO B
					Grass: Short n= 0.150 P2= 3.00"
0.0	7	0.5000	4.95		Shallow Concentrated Flow, B TO C
					Short Grass Pasture Kv= 7.0 fps
15.7	157	Total			

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

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Summary for Subcatchment 13:

Runoff = 2.35 cfs @ 12.09 hrs, Volume= 0.182 af, Depth> 4.87"

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
* 19,310	98	Pavement and Roof
160	39	>75% Grass cover, Good, HSG A
19,470	98	Weighted Average
160		0.82% Pervious Area
19,310		99.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	55	0.0100	0.90		Sheet Flow, A TO B
					Smooth surfaces n= 0.011 P2= 3.00"
0.4	48	0.0100	2.03		Shallow Concentrated Flow, B TO C
					Paved Kv= 20.3 fps
4.6					Direct Entry, 6 MINUTE MIN. TC
6.0	103	Total			

Summary for Subcatchment 14:

Runoff = 1.00 cfs @ 12.10 hrs, Volume= 0.068 af, Depth> 1.83"

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
* 8,940	98	Pavement and Roof
8,540	39	>75% Grass cover, Good, HSG A
2,065	30	Meadow, non-grazed, HSG A
19,545	65	Weighted Average
10,605		54.26% Pervious Area
8,940		45.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	18	0.1400	0.17		Sheet Flow, A TO B
					Grass: Dense n= 0.240 P2= 3.00"
1.3	38	0.5000	0.49		Sheet Flow, B TO C
					Grass: Short n= 0.150 P2= 3.00"
0.4	119	0.0100	5.38	40.35	Trap/Vee/Rect Channel Flow, C TO D
					Bot.W=2.00' D=1.50' Z= 2.0 '/' Top.W=8.00'
					n= 0.025
2.6					Direct Entry, 6 MINUTE MIN. TC
6.0	175	Total			

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

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Summary for Subcatchment 15:

Runoff = 1.27 cfs @ 12.09 hrs, Volume= 0.098 af, Depth> 4.87"

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
* 10,515	98	Pavement and Roof
10,515		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	60	0.0100	0.91		Sheet Flow, A TO B
					Smooth surfaces n= 0.011 P2= 3.00"
4.9					Direct Entry, 6 MINUTE MIN. TC
6.0	60	Total			

Summary for Subcatchment 16:

Runoff = 0.01 cfs @ 12.43 hrs, Volume= 0.002 af, Depth> 0.22"

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
5,270	39	>75% Grass cover, Good, HSG A
325	30	Meadow, non-grazed, HSG A
5,595	38	Weighted Average
5,595		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 MINUTE MIN. TC

Summary for Subcatchment 17:

Runoff = 2.60 cfs @ 12.31 hrs, Volume= 0.263 af, Depth> 2.05"

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
*	8,130	98	Pavement and Roof
	5,480	39	>75% Grass cover, Good, HSG A
	4,560	74	>75% Grass cover, Good, HSG C
	7,300	30	Meadow, non-grazed, HSG A
	7,020	71	Meadow, non-grazed, HSG C
	11,350	70	Woods, Good, HSG C
	5,100	30	Woods, Good, HSG A
	12,900	89	Gravel roads, HSG C
	5,075	76	Gravel roads, HSG A
	66,915	68	Weighted Average
	58,785		87.85% Pervious Area
	8,130		12.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	150	0.0750	0.14		Sheet Flow, A TO B Woods: Light underbrush n= 0.400 P2= 3.00"
1.5	100	0.0250	1.11		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
1.4	135	0.0100	1.61		Shallow Concentrated Flow, C TO D Unpaved Kv= 16.1 fps
21.0	385	Total			

Summary for Subcatchment OS10:

Runoff = 0.02 cfs @ 17.15 hrs, Volume= 0.010 af, Depth> 0.03"

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
172,300	30	Woods, Good, HSG A
13,975	30	Meadow, non-grazed, HSG A
3,210	76	Gravel roads, HSG A
189,485	31	Weighted Average
189,485		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	150	0.0700	0.13		Sheet Flow, A TO B Woods: Light underbrush n= 0.400 P2= 3.00"
6.1	680	0.1400	1.87		Shallow Concentrated Flow, B TO C Woodland Kv= 5.0 fps
0.5	48	0.0600	1.71		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
25.2	878	Total			

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

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Summary for Subcatchment OS11:

Runoff = 0.00 cfs @ 13.66 hrs, Volume= 0.000 af, Depth> 0.15"

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
1,405	30	Meadow, non-grazed, HSG A
220	76	Gravel roads, HSG A
1,625	36	Weighted Average
1,625		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	45	0.0700	0.11		Sheet Flow, A TO B Woods: Light underbrush n= 0.400 P2= 3.00"

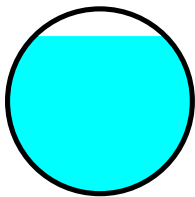
Summary for Reach R10: FIELD INLET

Inflow Area = 6.742 ac, 9.39% Impervious, Inflow Depth > 0.47" for 25-YEAR event
 Inflow = 2.60 cfs @ 12.31 hrs, Volume= 0.263 af
 Outflow = 2.59 cfs @ 12.32 hrs, Volume= 0.263 af, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 3.66 fps, Min. Travel Time= 0.4 min
 Avg. Velocity= 1.87 fps, Avg. Travel Time= 0.9 min

Peak Storage= 70 cf @ 12.31 hrs
 Average Depth at Peak Storage= 0.85'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
 n= 0.013
 Length= 98.0' Slope= 0.0050 '/'
 Inlet Invert= 0.00', Outlet Invert= -0.49'

**Summary for Reach R11:**

Inflow Area = 5.206 ac, 8.58% Impervious, Inflow Depth = 0.00" for 25-YEAR event
 Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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

Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min

Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs

Average Depth at Peak Storage= 0.00'

Bank-Full Depth= 0.50' Flow Area= 17.5 sf, Capacity= 64.69 cfs

10.00' x 0.50' deep channel, n= 0.025

Side Slope Z-value= 50.0 '/' Top Width= 60.00'

Length= 252.0' Slope= 0.0200 '/'

Inlet Invert= 0.00', Outlet Invert= -5.04'



Summary for Reach R12: FIELD INLET

Inflow Area = 4.799 ac, 4.28% Impervious, Inflow Depth > 0.19" for 25-YEAR event

Inflow = 1.00 cfs @ 12.10 hrs, Volume= 0.078 af

Outflow = 0.97 cfs @ 12.11 hrs, Volume= 0.078 af, Atten= 3%, Lag= 0.9 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= 0.6 min

Avg. Velocity = 1.35 fps, Avg. Travel Time= 1.2 min

Peak Storage= 33 cf @ 12.11 hrs

Average Depth at Peak Storage= 0.40'

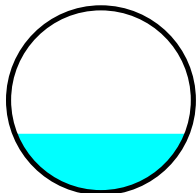
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 4.57 cfs

15.0" Round Pipe

n= 0.013

Length= 100.0' Slope= 0.0050 '/'

Inlet Invert= 339.70', Outlet Invert= 339.20'



Summary for Reach R13:

Inflow Area = 4.350 ac, 0.00% Impervious, Inflow Depth > 0.03" for 25-YEAR event
 Inflow = 0.02 cfs @ 17.15 hrs, Volume= 0.010 af
 Outflow = 0.02 cfs @ 17.28 hrs, Volume= 0.009 af, Atten= 0%, Lag= 7.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.50 fps, Min. Travel Time= 4.6 min
 Avg. Velocity = 0.47 fps, Avg. Travel Time= 4.9 min

Peak Storage= 7 cf @ 17.20 hrs
 Average Depth at Peak Storage= 0.02'
 Bank-Full Depth= 1.50' Flow Area= 7.5 sf, Capacity= 40.35 cfs

2.00' x 1.50' deep channel, n= 0.025
 Side Slope Z-value= 2.0 '/' Top Width= 8.00'
 Length= 139.0' Slope= 0.0100 '/'
 Inlet Invert= 0.00', Outlet Invert= -1.39'

**Summary for Pond CB1:**

Inflow Area = 7.189 ac, 14.98% Impervious, Inflow Depth > 0.74" for 25-YEAR event
 Inflow = 3.62 cfs @ 12.12 hrs, Volume= 0.444 af
 Outflow = 3.62 cfs @ 12.12 hrs, Volume= 0.444 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.62 cfs @ 12.12 hrs, Volume= 0.444 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 336.13' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	334.40'	12.0" Round Culvert L= 61.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 334.40' / 334.00' S= 0.0066 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=3.56 cfs @ 12.12 hrs HW=336.09' (Free Discharge)
 ↑1=Culvert (Barrel Controls 3.56 cfs @ 4.54 fps)

Summary for Pond CB3:

Inflow Area = 5.040 ac, 8.86% Impervious, Inflow Depth > 0.42" for 25-YEAR event
 Inflow = 2.22 cfs @ 12.10 hrs, Volume= 0.176 af
 Outflow = 2.22 cfs @ 12.10 hrs, Volume= 0.176 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.22 cfs @ 12.10 hrs, Volume= 0.176 af

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

Peak Elev= 339.94' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	339.10'	15.0" Round Culvert L= 175.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 339.10' / 338.20' S= 0.0051 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=2.21 cfs @ 12.10 hrs HW=339.94' (Free Discharge)↑**1=Culvert** (Barrel Controls 2.21 cfs @ 3.58 fps)**Summary for Pond IB-1: INFILTRATION BASIN 1**

Inflow Area = 8.005 ac, 19.63% Impervious, Inflow Depth > 1.09" for 25-YEAR event
Inflow = 7.47 cfs @ 12.10 hrs, Volume= 0.724 af
Outflow = 5.77 cfs @ 12.22 hrs, Volume= 0.569 af, Atten= 23%, Lag= 7.0 min
Discarded = 0.30 cfs @ 12.22 hrs, Volume= 0.164 af
Primary = 5.47 cfs @ 12.22 hrs, Volume= 0.405 af

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

Peak Elev= 335.30' @ 12.22 hrs Surf.Area= 5,372 sf Storage= 8,753 cf

Plug-Flow detention time= 93.3 min calculated for 0.567 af (78% of inflow)

Center-of-Mass det. time= 36.7 min (811.4 - 774.7)

Volume	Invert	Avail.Storage	Storage Description
#1	331.00'	14,158 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
331.00	840	0	0
332.00	1,240	1,040	1,040
333.00	1,690	1,465	2,505
334.00	2,380	2,035	4,540
335.00	3,440	2,910	7,450
336.00	9,975	6,708	14,158

Device	Routing	Invert	Outlet Devices
#1	Discarded	331.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	334.80'	6.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.30 cfs @ 12.22 hrs HW=335.29' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.30 cfs)**Primary OutFlow** Max=5.42 cfs @ 12.22 hrs HW=335.29' (Free Discharge)↑**2=Broad-Crested Rectangular Weir** (Weir Controls 5.42 cfs @ 1.83 fps)

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

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Summary for Pond IB-2:

Inflow Area = 5.206 ac, 8.58% Impervious, Inflow Depth > 0.41" for 25-YEAR event
 Inflow = 2.22 cfs @ 12.10 hrs, Volume= 0.178 af
 Outflow = 0.12 cfs @ 15.33 hrs, Volume= 0.103 af, Atten= 94%, Lag= 194.1 min
 Discarded = 0.12 cfs @ 15.33 hrs, Volume= 0.103 af
 Primary = 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= 339.39' @ 15.33 hrs Surf.Area= 2,231 sf Storage= 3,898 cf

Plug-Flow detention time= 187.3 min calculated for 0.103 af (57% of inflow)
 Center-of-Mass det. time= 89.5 min (874.0 - 784.5)

Volume	Invert	Avail.Storage	Storage Description
#1	337.00'	8,240 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
337.00	1,090	0	0
338.00	1,520	1,305	1,305
339.00	2,015	1,768	3,073
340.00	2,570	2,293	5,365
341.00	3,180	2,875	8,240

Device	Routing	Invert	Outlet Devices
#1	Discarded	337.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	340.00'	10.0' 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

Discarded OutFlow Max=0.12 cfs @ 15.33 hrs HW=339.39' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=337.00' (Free Discharge)

↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond R4: REACH 4

Inflow Area = 8.438 ac, 21.63% Impervious, Inflow Depth > 0.78" for 25-YEAR event
 Inflow = 6.99 cfs @ 12.21 hrs, Volume= 0.546 af
 Outflow = 6.99 cfs @ 12.21 hrs, Volume= 0.546 af, Atten= 0%, Lag= 0.0 min
 Primary = 6.99 cfs @ 12.21 hrs, Volume= 0.546 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 338.22' @ 12.21 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	334.57'	15.0" Round Culvert

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L= 41.0' CMP, projecting, no headwall, Ke= 0.900

Inlet / Outlet Invert= 334.57' / 334.23' S= 0.0083 '/ Cc= 0.900

n= 0.025 Corrugated metal, Flow Area= 1.23 sf

Primary OutFlow Max=6.93 cfs @ 12.21 hrs HW=338.17' (Free Discharge)↑**1=Culvert** (Barrel Controls 6.93 cfs @ 5.65 fps)

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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

Subcatchment 11: Runoff Area=35,540 sf 60.69% Impervious Runoff Depth>1.86"
 Flow Length=93' Tc=6.0 min CN=90 Runoff=1.84 cfs 0.127 af

Subcatchment 12: Runoff Area=18,865 sf 58.55% Impervious Runoff Depth>1.70"
 Flow Length=157' Tc=15.7 min CN=88 Runoff=0.68 cfs 0.061 af

Subcatchment 13: Runoff Area=19,470 sf 99.18% Impervious Runoff Depth>2.59"
 Flow Length=103' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=1.27 cfs 0.096 af

Subcatchment 14: Runoff Area=19,545 sf 45.74% Impervious Runoff Depth>0.45"
 Flow Length=175' Tc=6.0 min CN=65 Runoff=0.19 cfs 0.017 af

Subcatchment 15: Runoff Area=10,515 sf 100.00% Impervious Runoff Depth>2.59"
 Flow Length=60' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=0.69 cfs 0.052 af

Subcatchment 16: Runoff Area=5,595 sf 0.00% Impervious Runoff Depth=0.00"
 Tc=6.0 min CN=38 Runoff=0.00 cfs 0.000 af

Subcatchment 17: Runoff Area=66,915 sf 12.15% Impervious Runoff Depth>0.56"
 Flow Length=385' Tc=21.0 min CN=68 Runoff=0.61 cfs 0.071 af

Subcatchment OS10: Runoff Area=189,485 sf 0.00% Impervious Runoff Depth=0.00"
 Flow Length=878' Tc=25.2 min CN=31 Runoff=0.00 cfs 0.000 af

Subcatchment OS11: Runoff Area=1,625 sf 0.00% Impervious Runoff Depth=0.00"
 Flow Length=45' Slope=0.0700 '/' Tc=7.1 min CN=36 Runoff=0.00 cfs 0.000 af

Reach R10: FIELD INLET Avg. Flow Depth=0.34' Max Vel=2.64 fps Inflow=0.61 cfs 0.071 af
 12.0" Round Pipe n=0.013 L=98.0' S=0.0050 '/' Capacity=2.52 cfs Outflow=0.61 cfs 0.071 af

Reach R11: Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
 n=0.025 L=252.0' S=0.0200 '/' Capacity=64.69 cfs Outflow=0.00 cfs 0.000 af

Reach R12: FIELD INLET Avg. Flow Depth=0.17' Max Vel=1.82 fps Inflow=0.19 cfs 0.017 af
 15.0" Round Pipe n=0.013 L=100.0' S=0.0050 '/' Capacity=4.57 cfs Outflow=0.18 cfs 0.017 af

Reach R13: Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
 n=0.025 L=139.0' S=0.0100 '/' Capacity=40.35 cfs Outflow=0.00 cfs 0.000 af

Pond CB1: Peak Elev=335.11' Inflow=1.42 cfs 0.167 af
 12.0" Round Culvert n=0.013 L=61.0' S=0.0066 '/' Outflow=1.42 cfs 0.167 af

Pond CB3: Peak Elev=339.59' Inflow=0.84 cfs 0.069 af
 15.0" Round Culvert n=0.013 L=175.0' S=0.0051 '/' Outflow=0.84 cfs 0.069 af

Pond IB-1: INFILTRATION BASIN 1 Peak Elev=334.85' Storage=6,959 cf Inflow=3.26 cfs 0.294 af
 Discarded=0.18 cfs 0.138 af Primary=0.18 cfs 0.023 af Outflow=0.37 cfs 0.160 af

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Pond IB-2:

Peak Elev=337.90' Storage=1,155 cf Inflow=0.84 cfs 0.069 af
Discarded=0.08 cfs 0.064 af Primary=0.00 cfs 0.000 af Outflow=0.08 cfs 0.064 af

Pond R4: REACH 4

Peak Elev=335.10' Inflow=0.68 cfs 0.084 af
15.0" Round Culvert n=0.025 L=41.0' S=0.0083 '/' Outflow=0.68 cfs 0.084 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

Subcatchment 11: Runoff Area=35,540 sf 60.69% Impervious Runoff Depth>3.39"
 Flow Length=93' Tc=6.0 min CN=90 Runoff=3.25 cfs 0.230 af

Subcatchment 12: Runoff Area=18,865 sf 58.55% Impervious Runoff Depth>3.18"
 Flow Length=157' Tc=15.7 min CN=88 Runoff=1.25 cfs 0.115 af

Subcatchment 13: Runoff Area=19,470 sf 99.18% Impervious Runoff Depth>4.15"
 Flow Length=103' Slope=0.0100 '/ Tc=6.0 min CN=98 Runoff=2.01 cfs 0.154 af

Subcatchment 14: Runoff Area=19,545 sf 45.74% Impervious Runoff Depth>1.33"
 Flow Length=175' Tc=6.0 min CN=65 Runoff=0.71 cfs 0.050 af

Subcatchment 15: Runoff Area=10,515 sf 100.00% Impervious Runoff Depth>4.15"
 Flow Length=60' Slope=0.0100 '/ Tc=6.0 min CN=98 Runoff=1.08 cfs 0.083 af

Subcatchment 16: Runoff Area=5,595 sf 0.00% Impervious Runoff Depth>0.09"
 Tc=6.0 min CN=38 Runoff=0.00 cfs 0.001 af

Subcatchment 17: Runoff Area=66,915 sf 12.15% Impervious Runoff Depth>1.52"
 Flow Length=385' Tc=21.0 min CN=68 Runoff=1.90 cfs 0.194 af

Subcatchment OS10: Runoff Area=189,485 sf 0.00% Impervious Runoff Depth>0.00"
 Flow Length=878' Tc=25.2 min CN=31 Runoff=0.00 cfs 0.000 af

Subcatchment OS11: Runoff Area=1,625 sf 0.00% Impervious Runoff Depth>0.05"
 Flow Length=45' Slope=0.0700 '/ Tc=7.1 min CN=36 Runoff=0.00 cfs 0.000 af

Reach R10: FIELD INLET Avg. Flow Depth=0.65' Max Vel=3.52 fps Inflow=1.90 cfs 0.194 af
 12.0" Round Pipe n=0.013 L=98.0' S=0.0050 '/ Capacity=2.52 cfs Outflow=1.89 cfs 0.194 af

Reach R11: Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
 n=0.025 L=252.0' S=0.0200 '/ Capacity=64.69 cfs Outflow=0.00 cfs 0.000 af

Reach R12: FIELD INLET Avg. Flow Depth=0.33' Max Vel=2.70 fps Inflow=0.71 cfs 0.050 af
 15.0" Round Pipe n=0.013 L=100.0' S=0.0050 '/ Capacity=4.57 cfs Outflow=0.69 cfs 0.050 af

Reach R13: Avg. Flow Depth=0.00' Max Vel=0.36 fps Inflow=0.00 cfs 0.000 af
 n=0.025 L=139.0' S=0.0100 '/ Capacity=40.35 cfs Outflow=0.00 cfs 0.000 af

Pond CB1: Peak Elev=335.59' Inflow=2.87 cfs 0.349 af
 12.0" Round Culvert n=0.013 L=61.0' S=0.0066 '/ Outflow=2.87 cfs 0.349 af

Pond CB3: Peak Elev=339.83' Inflow=1.75 cfs 0.133 af
 15.0" Round Culvert n=0.013 L=175.0' S=0.0051 '/ Outflow=1.75 cfs 0.133 af

Pond IB-1: INFILTRATION BASIN 1 Peak Elev=335.19' Storage=8,224 cf Inflow=6.08 cfs 0.579 af
 Discarded=0.26 cfs 0.156 af Primary=3.71 cfs 0.270 af Outflow=3.98 cfs 0.427 af

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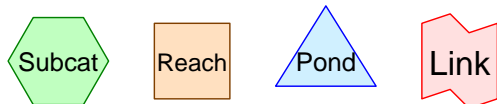
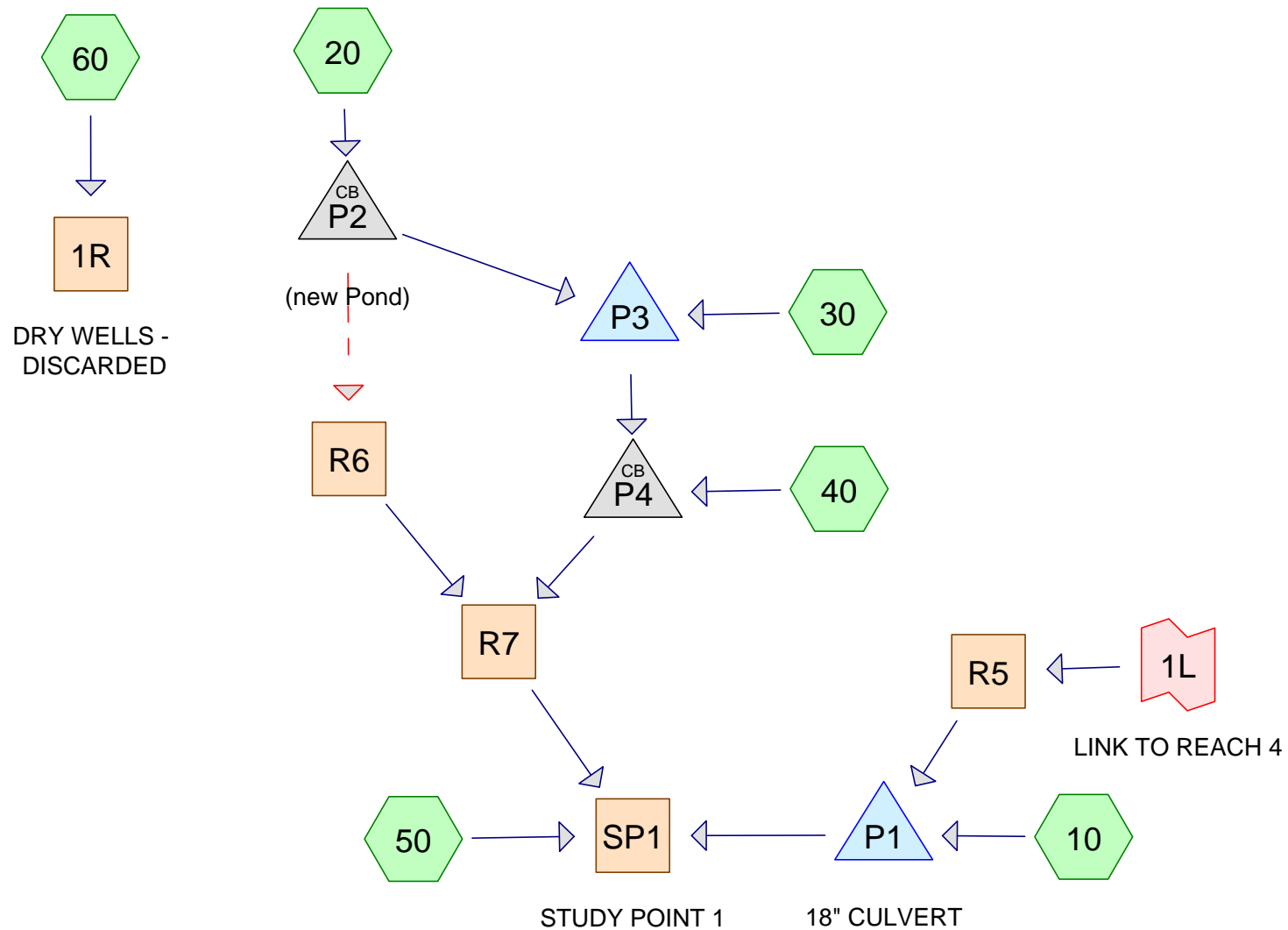
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Pond IB-2:

Peak Elev=338.90' Storage=2,865 cf Inflow=1.75 cfs 0.134 af
Discarded=0.11 cfs 0.090 af Primary=0.00 cfs 0.000 af Outflow=0.11 cfs 0.090 af

Pond R4: REACH 4

Peak Elev=336.77' Inflow=4.80 cfs 0.385 af
15.0" Round Culvert n=0.025 L=41.0' S=0.0083 ' / ' Outflow=4.80 cfs 0.385 af



Routing Diagram for 15021-POST 2
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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

Subcatchment 10: Runoff Area=29,330 sf 48.82% Impervious Runoff Depth>3.70"
 Flow Length=178' Slope=0.0100 '/' Tc=19.2 min CN=86 Runoff=2.10 cfs 0.207 af

Subcatchment 20: Runoff Area=343,265 sf 4.92% Impervious Runoff Depth>0.09"
 Flow Length=1,500' Tc=33.5 min CN=34 Runoff=0.13 cfs 0.057 af

Subcatchment 30: Runoff Area=14,240 sf 45.96% Impervious Runoff Depth>2.93"
 Flow Length=271' Tc=6.0 min CN=78 Runoff=1.18 cfs 0.080 af

Subcatchment 40: Runoff Area=1,205 sf 45.64% Impervious Runoff Depth>3.41"
 Tc=6.0 min CN=83 Runoff=0.11 cfs 0.008 af

Subcatchment 50: Runoff Area=28,235 sf 31.20% Impervious Runoff Depth>2.14"
 Flow Length=329' Tc=12.5 min CN=69 Runoff=1.39 cfs 0.116 af

Subcatchment 60: Runoff Area=26,590 sf 77.55% Impervious Runoff Depth>3.60"
 Flow Length=214' Tc=9.8 min CN=85 Runoff=2.35 cfs 0.183 af

Reach 1R: DRY WELLS - DISCARDED Inflow=2.35 cfs 0.183 af
 Outflow=2.35 cfs 0.183 af

Reach R5: Avg. Flow Depth=0.40' Max Vel=3.31 fps Inflow=6.99 cfs 0.546 af
 n=0.025 L=130.0' S=0.0200 '/' Capacity=312.85 cfs Outflow=6.91 cfs 0.546 af

Reach R6: Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
 n=0.025 L=87.0' S=0.0700 '/' Capacity=1,421.84 cfs Outflow=0.00 cfs 0.000 af

Reach R7: Avg. Flow Depth=0.11' Max Vel=2.14 fps Inflow=0.54 cfs 0.110 af
 n=0.025 L=142.0' S=0.0300 '/' Capacity=930.81 cfs Outflow=0.54 cfs 0.109 af

Reach SP1: STUDY POINT 1 Inflow=6.37 cfs 0.972 af
 Outflow=6.37 cfs 0.972 af

Pond P1: 18" CULVERT Peak Elev=335.90' Storage=7,065 cf Inflow=8.99 cfs 0.753 af
 18.0" Round Culvert n=0.025 L=40.0' S=0.0070 '/' Outflow=5.29 cfs 0.747 af

Pond P2: (new Pond) Peak Elev=341.82' Inflow=0.13 cfs 0.057 af
 Primary=0.13 cfs 0.057 af Secondary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.057 af

Pond P3: Peak Elev=339.51' Storage=1,626 cf Inflow=1.18 cfs 0.137 af
 Outflow=0.49 cfs 0.102 af

Pond P4: Peak Elev=335.74' Inflow=0.54 cfs 0.110 af
 12.0" Round Culvert n=0.025 L=40.0' S=0.0083 '/' Outflow=0.54 cfs 0.110 af

Link 1L: LINK 25-YEAR Primary Outflow Imported from 15021-POST~Pond R4.hce Inflow=6.99 cfs 0.546 af
 Area= 8.438 ac 21.63% Imperv. Primary=6.99 cfs 0.546 af

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

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Summary for Subcatchment 10:

Runoff = 2.10 cfs @ 12.26 hrs, Volume= 0.207 af, Depth> 3.70"

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
*	14,320	98	Pavement and Roof
	1,620	89	Gravel roads, HSG C
	1,100	71	Meadow, non-grazed, HSG C
	12,290	74	>75% Grass cover, Good, HSG C
	29,330	86	Weighted Average
	15,010		51.18% Pervious Area
	14,320		48.82% Impervious Area

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"
0.7	28	0.0100	0.70		Shallow Concentrated Flow, B TO C
					Short Grass Pasture Kv= 7.0 fps
19.2	178	Total			

Summary for Subcatchment 20:

Runoff = 0.13 cfs @ 15.22 hrs, Volume= 0.057 af, Depth> 0.09"

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
	304,480	30	Woods, Good, HSG A
	260	70	Woods, Good, HSG C
	18,740	30	Meadow, non-grazed, HSG A
	2,910	89	Gravel roads, HSG C
*	16,875	98	Buildings and Pavement
	343,265	34	Weighted Average
	326,390		95.08% Pervious Area
	16,875		4.92% 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
20.8	150	0.0530	0.12		Sheet Flow, A TO B Woods: Light underbrush n= 0.400 P2= 3.00"
11.0	1,040	0.1000	1.58		Shallow Concentrated Flow, B TO C Woodland Kv= 5.0 fps
0.5	60	0.1000	2.21		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
0.1	20	0.7500	6.06		Shallow Concentrated Flow, D TO E Short Grass Pasture Kv= 7.0 fps
1.1	230	0.0300	3.52		Shallow Concentrated Flow, E TO F Paved Kv= 20.3 fps
33.5	1,500	Total			

Summary for Subcatchment 30:

Runoff = 1.18 cfs @ 12.09 hrs, Volume= 0.080 af, Depth> 2.93"

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
* 6,545	98	Pavement and Roof
2,455	39	>75% Grass cover, Good, HSG A
2,580	74	>75% Grass cover, Good, HSG C
70	30	Meadow, non-grazed, HSG A
2,590	71	Meadow, non-grazed, HSG C
14,240	78	Weighted Average
7,695		54.04% Pervious Area
6,545		45.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	43	0.5000	0.50		Sheet Flow, A TO B Grass: Short n= 0.150 P2= 3.00"
0.9	228	0.0100	4.31	17.25	Trap/Vee/Rect Channel Flow, B TO C Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.025
3.7					Direct Entry, 6 MINUTE MIN. TC
6.0	271	Total			

Summary for Subcatchment 40:

Runoff = 0.11 cfs @ 12.09 hrs, Volume= 0.008 af, Depth> 3.41"

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
* 550	98	Pavement
655	71	Meadow, non-grazed, HSG C
1,205	83	Weighted Average
655		54.36% Pervious Area
550		45.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 MINUTE MIN. TC

Summary for Subcatchment 50:

Runoff = 1.39 cfs @ 12.18 hrs, Volume= 0.116 af, Depth> 2.14"

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
* 8,810	98	Pavement
5,910	30	Woods, Good, HSG A
1,600	70	Woods, Good, HSG C
5,810	74	>75% Grass cover, Good, HSG C
4,245	71	Meadow, non-grazed, HSG C
1,860	30	Meadow, non-grazed, HSG A
28,235	69	Weighted Average
19,425		68.80% Pervious Area
8,810		31.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	112	0.2000	0.19		Sheet Flow, A TO B
					Woods: Light underbrush n= 0.400 P2= 3.00"
0.1	17	0.0200	2.87		Shallow Concentrated Flow, B TO C
					Paved Kv= 20.3 fps
2.7	200	0.0300	1.21		Shallow Concentrated Flow, C TO D
					Short Grass Pasture Kv= 7.0 fps
12.5	329	Total			

Summary for Subcatchment 60:

Runoff = 2.35 cfs @ 12.14 hrs, Volume= 0.183 af, Depth> 3.60"

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"

15021-POST 2

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

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	Area (sf)	CN	Description
*	20,620	98	Pavement and Buildings
	1,430	76	Gravel roads, HSG A
	2,390	30	Meadow, non-grazed, HSG A
	2,150	30	Woods, Good, HSG A
	26,590	85	Weighted Average
	5,970		22.45% Pervious Area
	20,620		77.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	60	0.1300	0.14		Sheet Flow, A TO B Woods: Light underbrush n= 0.400 P2= 3.00"
2.5	48	0.1500	0.32		Sheet Flow, B TO C Grass: Short n= 0.150 P2= 3.00"
0.0	17	0.7500	6.06		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
0.3	89	0.0500	4.54		Shallow Concentrated Flow, D TO E Paved Kv= 20.3 fps
9.8	214	Total			

Summary for Reach 1R: DRY WELLS - DISCARDED

Inflow Area = 0.610 ac, 77.55% Impervious, Inflow Depth > 3.60" for 25-YEAR event
 Inflow = 2.35 cfs @ 12.14 hrs, Volume= 0.183 af
 Outflow = 2.35 cfs @ 12.14 hrs, Volume= 0.183 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 R5:

Inflow Area = 8.438 ac, 21.63% Impervious, Inflow Depth > 0.78" for 25-YEAR event
 Inflow = 6.99 cfs @ 12.21 hrs, Volume= 0.546 af
 Outflow = 6.91 cfs @ 12.24 hrs, Volume= 0.546 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= 3.31 fps, Min. Travel Time= 0.7 min

Avg. Velocity= 1.13 fps, Avg. Travel Time= 1.9 min

Peak Storage= 274 cf @ 12.22 hrs

Average Depth at Peak Storage= 0.40'

Bank-Full Depth= 2.00' Flow Area= 36.0 sf, Capacity= 312.85 cfs

2.00' x 2.00' deep channel, n= 0.025

Side Slope Z-value= 8.0 '/' Top Width= 34.00'

Length= 130.0' Slope= 0.0200 '/'

Inlet Invert= 0.00', Outlet Invert= -2.60'

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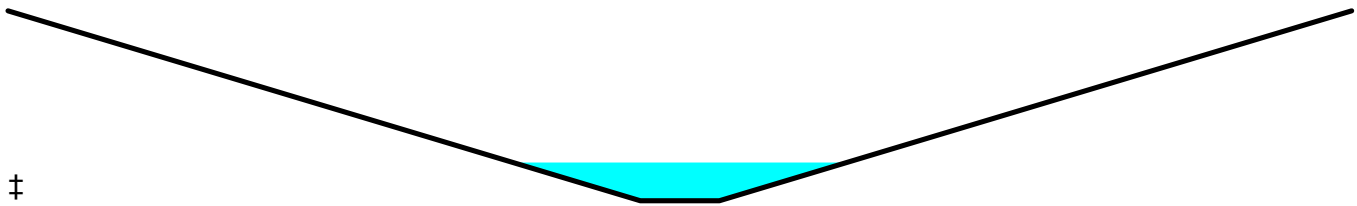
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Type III 24-hr 25-YEAR Rainfall=5.50"

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**Summary for Reach R6:**

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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

Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min

Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs

Average Depth at Peak Storage= 0.00'

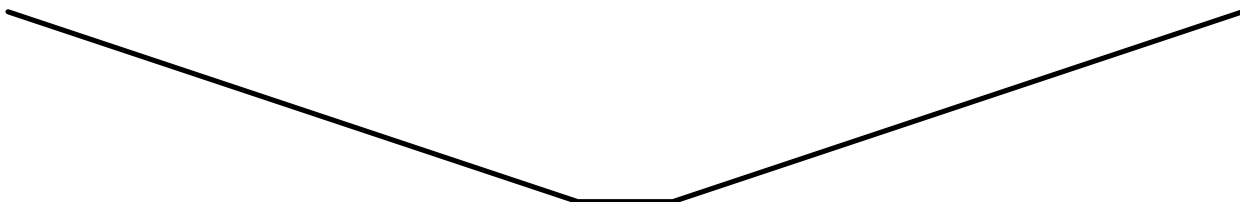
Bank-Full Depth= 4.00' Flow Area= 56.0 sf, Capacity= 1,421.84 cfs

2.00' x 4.00' deep channel, n= 0.025

Side Slope Z-value= 3.0 '/' Top Width= 26.00'

Length= 87.0' Slope= 0.0700 '/'

Inlet Invert= 0.00', Outlet Invert= -6.09'

**Summary for Reach R7:**

Inflow Area = 8.235 ac, 6.68% Impervious, Inflow Depth > 0.16" for 25-YEAR event

Inflow = 0.54 cfs @ 12.33 hrs, Volume= 0.110 af

Outflow = 0.54 cfs @ 12.37 hrs, Volume= 0.109 af, Atten= 0%, Lag= 2.5 min

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

Max. Velocity= 2.14 fps, Min. Travel Time= 1.1 min

Avg. Velocity = 1.31 fps, Avg. Travel Time= 1.8 min

Peak Storage= 35 cf @ 12.34 hrs

Average Depth at Peak Storage= 0.11'

Bank-Full Depth= 4.00' Flow Area= 56.0 sf, Capacity= 930.81 cfs

2.00' x 4.00' deep channel, n= 0.025

Side Slope Z-value= 3.0 '/' Top Width= 26.00'

Length= 142.0' Slope= 0.0300 '/'

Inlet Invert= 0.00', Outlet Invert= -4.26'

15021-POST 2

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

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**Summary for Reach SP1: STUDY POINT 1**

Inflow Area = 17.994 ac, 16.15% Impervious, Inflow Depth > 0.65" for 25-YEAR event
 Inflow = 6.37 cfs @ 12.44 hrs, Volume= 0.972 af
 Outflow = 6.37 cfs @ 12.44 hrs, Volume= 0.972 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 P1: 18" CULVERT

Inflow Area = 9.111 ac, 23.64% Impervious, Inflow Depth > 0.99" for 25-YEAR event
 Inflow = 8.99 cfs @ 12.24 hrs, Volume= 0.753 af
 Outflow = 5.29 cfs @ 12.56 hrs, Volume= 0.747 af, Atten= 41%, Lag= 19.1 min
 Primary = 5.29 cfs @ 12.56 hrs, Volume= 0.747 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 335.90' @ 12.56 hrs Surf.Area= 9,495 sf Storage= 7,065 cf

Plug-Flow detention time= 21.4 min calculated for 0.745 af (99% of inflow)
 Center-of-Mass det. time= 18.5 min (804.2 - 785.7)

Volume	Invert	Avail.Storage	Storage Description
#1	334.00'	8,060 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
334.00	10	0	0
335.00	2,940	1,475	1,475
336.00	10,230	6,585	8,060

Device	Routing	Invert	Outlet Devices
#1	Primary	334.23'	18.0" Round Culvert L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 334.23' / 333.95' S= 0.0070 1' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=5.28 cfs @ 12.56 hrs HW=335.90' (Free Discharge)↑ **1=Culvert** (Barrel Controls 5.28 cfs @ 3.36 fps)

15021-POST 2

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

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Summary for Pond P2: (new Pond)

Inflow Area = 7.880 ac, 4.92% Impervious, Inflow Depth > 0.09" for 25-YEAR event
 Inflow = 0.13 cfs @ 15.22 hrs, Volume= 0.057 af
 Outflow = 0.13 cfs @ 15.22 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.13 cfs @ 15.22 hrs, Volume= 0.057 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= 341.82' @ 15.22 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	341.64'	15.0" Round Culvert L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 341.64' / 339.22' S= 0.0605 1' Cc= 0.900 n= 0.025, Flow Area= 1.23 sf
#2	Secondary	342.85'	6.0' 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

Primary OutFlow Max=0.13 cfs @ 15.22 hrs HW=341.82' (Free Discharge)

↑**1=Culvert** (Inlet Controls 0.13 cfs @ 1.15 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=341.64' (Free Discharge)

↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P3:

Inflow Area = 8.207 ac, 6.55% Impervious, Inflow Depth > 0.20" for 25-YEAR event
 Inflow = 1.18 cfs @ 12.09 hrs, Volume= 0.137 af
 Outflow = 0.49 cfs @ 12.33 hrs, Volume= 0.102 af, Atten= 58%, Lag= 14.5 min
 Primary = 0.49 cfs @ 12.33 hrs, Volume= 0.102 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 339.51' @ 12.33 hrs Surf.Area= 1,285 sf Storage= 1,626 cf

Plug-Flow detention time= 133.4 min calculated for 0.102 af (74% of inflow)
 Center-of-Mass det. time= 59.9 min (929.1 - 869.2)

Volume	Invert	Avail.Storage	Storage Description
#1	337.00'	2,320 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
337.00	10	0	0
338.00	510	260	260
339.00	1,045	778	1,038
340.00	1,520	1,283	2,320

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

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Device	Routing	Invert	Outlet Devices
#1	Primary	339.40'	6.0' 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

Primary OutFlow Max=0.48 cfs @ 12.33 hrs HW=339.50' (Free Discharge)↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.48 cfs @ 0.77 fps)**Summary for Pond P4:**

Inflow Area = 8.235 ac, 6.68% Impervious, Inflow Depth > 0.16" for 25-YEAR event
Inflow = 0.54 cfs @ 12.33 hrs, Volume= 0.110 af
Outflow = 0.54 cfs @ 12.33 hrs, Volume= 0.110 af, Atten= 0%, Lag= 0.0 min
Primary = 0.54 cfs @ 12.33 hrs, Volume= 0.110 af

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

Peak Elev= 335.74' @ 12.33 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	335.23'	12.0" Round Culvert L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 335.23' / 334.90' S= 0.0083 '/ Cc= 0.900 n= 0.025, Flow Area= 0.79 sf

Primary OutFlow Max=0.53 cfs @ 12.33 hrs HW=335.74' (Free Discharge)↑**1=Culvert** (Barrel Controls 0.53 cfs @ 1.93 fps)**Summary for Link 1L: LINK TO REACH 4**

Inflow Area = 8.438 ac, 21.63% Impervious, Inflow Depth > 0.78" for 25-YEAR event
Inflow = 6.99 cfs @ 12.21 hrs, Volume= 0.546 af
Primary = 6.99 cfs @ 12.21 hrs, Volume= 0.546 af, Atten= 0%, Lag= 0.0 min

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

25-YEAR Primary Outflow Imported from 15021-POST~Pond R4.hce

15021-POST 2

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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

Subcatchment 10: Runoff Area=29,330 sf 48.82% Impervious Runoff Depth>1.54"
 Flow Length=178' Slope=0.0100 '/' Tc=19.2 min CN=86 Runoff=0.90 cfs 0.087 af

Subcatchment 20: Runoff Area=343,265 sf 4.92% Impervious Runoff Depth=0.00"
 Flow Length=1,500' Tc=33.5 min CN=34 Runoff=0.00 cfs 0.000 af

Subcatchment 30: Runoff Area=14,240 sf 45.96% Impervious Runoff Depth>1.04"
 Flow Length=271' Tc=6.0 min CN=78 Runoff=0.41 cfs 0.028 af

Subcatchment 40: Runoff Area=1,205 sf 45.64% Impervious Runoff Depth>1.34"
 Tc=6.0 min CN=83 Runoff=0.05 cfs 0.003 af

Subcatchment 50: Runoff Area=28,235 sf 31.20% Impervious Runoff Depth>0.60"
 Flow Length=329' Tc=12.5 min CN=69 Runoff=0.34 cfs 0.032 af

Subcatchment 60: Runoff Area=26,590 sf 77.55% Impervious Runoff Depth>1.48"
 Flow Length=214' Tc=9.8 min CN=85 Runoff=0.99 cfs 0.075 af

Reach 1R: DRY WELLS - DISCARDED Inflow=0.99 cfs 0.075 af
 Outflow=0.99 cfs 0.075 af

Reach R5: Avg. Flow Depth=0.13' Max Vel=1.75 fps Inflow=0.68 cfs 0.084 af
 n=0.025 L=130.0' S=0.0200 '/' Capacity=312.85 cfs Outflow=0.67 cfs 0.084 af

Reach R6: Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
 n=0.025 L=87.0' S=0.0700 '/' Capacity=1,421.84 cfs Outflow=0.00 cfs 0.000 af

Reach R7: Avg. Flow Depth=0.02' Max Vel=1.16 fps Inflow=0.05 cfs 0.003 af
 n=0.025 L=142.0' S=0.0300 '/' Capacity=930.81 cfs Outflow=0.04 cfs 0.003 af

Reach SP1: STUDY POINT 1 Inflow=1.42 cfs 0.201 af
 Outflow=1.42 cfs 0.201 af

Pond P1: 18" CULVERT Peak Elev=334.90' Storage=1,203 cf Inflow=1.57 cfs 0.170 af
 18.0" Round Culvert n=0.025 L=40.0' S=0.0070 '/' Outflow=1.16 cfs 0.166 af

Pond P2: (new Pond) Peak Elev=341.64' Inflow=0.00 cfs 0.000 af
 Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond P3: Peak Elev=339.18' Storage=1,229 cf Inflow=0.41 cfs 0.028 af
 Outflow=0.00 cfs 0.000 af

Pond P4: Peak Elev=335.38' Inflow=0.05 cfs 0.003 af
 12.0" Round Culvert n=0.025 L=40.0' S=0.0083 '/' Outflow=0.05 cfs 0.003 af

Link 1L: LINK 2-YEAR Primary Outflow Imported from 15021-POST~Pond R4.hce Inflow=0.68 cfs 0.084 af
 Area= 8.438 ac 21.63% Imperv. Primary=0.68 cfs 0.084 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

Subcatchment 10: Runoff Area=29,330 sf 48.82% Impervious Runoff Depth>2.99"
 Flow Length=178' Slope=0.0100 '/' Tc=19.2 min CN=86 Runoff=1.71 cfs 0.168 af

Subcatchment 20: Runoff Area=343,265 sf 4.92% Impervious Runoff Depth>0.02"
 Flow Length=1,500' Tc=33.5 min CN=34 Runoff=0.03 cfs 0.011 af

Subcatchment 30: Runoff Area=14,240 sf 45.96% Impervious Runoff Depth>2.29"
 Flow Length=271' Tc=6.0 min CN=78 Runoff=0.92 cfs 0.062 af

Subcatchment 40: Runoff Area=1,205 sf 45.64% Impervious Runoff Depth>2.72"
 Tc=6.0 min CN=83 Runoff=0.09 cfs 0.006 af

Subcatchment 50: Runoff Area=28,235 sf 31.20% Impervious Runoff Depth>1.59"
 Flow Length=329' Tc=12.5 min CN=69 Runoff=1.02 cfs 0.086 af

Subcatchment 60: Runoff Area=26,590 sf 77.55% Impervious Runoff Depth>2.90"
 Flow Length=214' Tc=9.8 min CN=85 Runoff=1.91 cfs 0.148 af

Reach 1R: DRY WELLS - DISCARDED Inflow=1.91 cfs 0.148 af
 Outflow=1.91 cfs 0.148 af

Reach R5: Avg. Flow Depth=0.34' Max Vel=3.01 fps Inflow=4.80 cfs 0.385 af
 n=0.025 L=130.0' S=0.0200 '/' Capacity=312.85 cfs Outflow=4.79 cfs 0.385 af

Reach R6: Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
 n=0.025 L=87.0' S=0.0700 '/' Capacity=1,421.84 cfs Outflow=0.00 cfs 0.000 af

Reach R7: Avg. Flow Depth=0.05' Max Vel=1.44 fps Inflow=0.16 cfs 0.045 af
 n=0.025 L=142.0' S=0.0300 '/' Capacity=930.81 cfs Outflow=0.16 cfs 0.045 af

Reach SP1: STUDY POINT 1 Inflow=4.64 cfs 0.678 af
 Outflow=4.64 cfs 0.678 af

Pond P1: 18" CULVERT Peak Elev=335.62' Storage=4,714 cf Inflow=6.45 cfs 0.552 af
 18.0" Round Culvert n=0.025 L=40.0' S=0.0070 '/' Outflow=4.14 cfs 0.547 af

Pond P2: (new Pond) Peak Elev=341.73' Inflow=0.03 cfs 0.011 af
 Primary=0.03 cfs 0.011 af Secondary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.011 af

Pond P3: Peak Elev=339.45' Storage=1,551 cf Inflow=0.92 cfs 0.074 af
 Outflow=0.15 cfs 0.039 af

Pond P4: Peak Elev=335.51' Inflow=0.16 cfs 0.045 af
 12.0" Round Culvert n=0.025 L=40.0' S=0.0083 '/' Outflow=0.16 cfs 0.045 af

Link 1L: LINK 10-YEAR Primary Outflow Imported from 15021-POST~Pond R4.hce Inflow=4.80 cfs 0.385 af
 Area= 8.438 ac 21.63% Imperv. Primary=4.80 cfs 0.385 af

STORMWATER TREATMENT CALCULATIONS

RETAIL & SELF STORAGE FACILITY - ROOSEVELT TRAIL, WINDHAM, ME

Proposed Development

Total Post Developed Impervious Area=	57,565	sf
Credit for Existing Impervious Area To Be Removed=	12,275	sf
Credit for Proposed Impervious over Existing Impervious=	23,720	sf
Net New Impervious Area =	21,570	sf
New Landscaped/Disturbed Area =	32,920	sf
New Developed Area =	54,490	sf

Treatment Calculations

Required New Impervious Area Treatment (95%)=	20,492	sf
Total Impervious Area Treated =	93,030	sf
% of New Impervious Area Treated =	431.3%	> 95%
Required New Developed Area Treatment (80%) =	43,592	sf
New Landscaped/Disturbed Area Treated =	34,300	sf
Total Developed Area Treated =	127,330	sf
% of New Developed Area Treated =	233.7%	> 75%

Infiltration Basin IB-1 Sizing Calculations

Tributary Impervious Area= 70,145 sf (WS-11, WS-13 & WS-17 Impervious Area)
Tributary Landscaped Area= 20,490 sf (WS-11, WS-13 & WS-17 Landscaped Area)

Channel Protection Volume (CPV) Calculation

CPV (Required) = 1.0"xImpervious Area + 0.4"xLandscaped Area

CPV (Required) = 6,528 cf

Stage Storage Volume

Elevation	Area (sf)	Storage (cf)
331	840	0
332	1,240	1,040
333	1,690	2,505
334	2,380	4,540
335	3,440	7,450

Outlet of Pond Set @ 334.8
Storage Volume @Outlet 6,868 cf > Required

Infiltration Basin IB-2 Sizing Calculations

Tributary Impervious Area= 22,885 sf (WS-14, WS-15, WS-16, OS-10 & OS-11 Impervious Area)
Tributary Landscaped Area= 13,810 sf (WS-14, WS-15, WS-16, OS-10 & OS-11 Landscaped Area)

Channel Protection Volume (CPV) Calculation

CPV (Required) = 1.0"xImpervious Area + 0.4"xLandscaped Area

CPV (Required) = 2,367 cf

Stage Storage Volume

Elevation	Area (sf)	Storage (cf)
337	1090	0
338	1,520	1,305
339	2,015	3,073
340	2,570	5,365
341	3,180	8,240

Outlet of Pond Set @ 340
Storage Volume @Outlet 5,365 cf > Required

INSPECTION, MAINTENANCE, AND HOUSEKEEPING PLAN

Retail & Self Storage Facility Windham, Maine

Responsible Party

Owner: Little Mountain, LLC
3 Old Fort Road
Cape Elizabeth

The owner is responsible for the maintenance of all stormwater management structures and related site components and the keeping of a maintenance log book with service records. Records of all inspections and maintenance work performed must be kept on file with the owner and retained for a minimum of five years. The maintenance log will be made available to the Town and Maine Department of Environmental Protection (MDEP) upon request. At a minimum, the maintenance of stormwater management systems will be performed on the prescribed schedule.

The procedures outlined in this plan are provided as a general overview of the anticipated practices to be utilized on this site. In some instances, additional measures may be required due to unexpected conditions. *The Maine Erosion and Sedimentation Control BMP* and *Stormwater Management for Maine: Best Management Practices* Manuals published by the MDEP should be referenced for additional information.

During Construction

- 1. Inspection and Corrective Action:** It is the contractor's responsibility to comply with the inspection and maintenance procedures outlined in this section. Inspection shall occur on all disturbed and impervious areas, erosion control measures, material 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 24 hours 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 the permit, shall conduct the inspections.
- 2. Maintenance:** Erosion controls shall be maintained in effective operating condition until areas are permanently stabilized. If best management practices (BMPs) need to be repaired, the repair work should be initiated upon discovery of the problem but no later than the end of the next workday. If BMPs need to be maintained or modified, additional BMPs are necessary, or other corrective action is needed, implementation must be completed within seven calendar days and prior to any rainfall event.
- 3. Documentation:** A report 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 the major observations about the operation and maintenance of erosion and sedimentation controls, materials storage areas, and vehicle access points to the parcel. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and location(s) 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 MDEP staff, and a copy must be provided upon request. The owner shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.

Houskeeping

1. **Spill prevention:** Controls must be used to prevent pollutants from construction and waste materials on site to enter stormwater, which includes storage practices to minimize exposure of the materials to stormwater. The site contractor or operator must develop, and implement as necessary, appropriate spill prevention, containment, and response planning measures.
2. **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. Any project proposing infiltration of stormwater must provide adequate pre-treatment of stormwater prior to discharge of stormwater to the infiltration area, or provide for treatment within the infiltration area, in order to prevent the accumulation of fines, reduction in infiltration rate, and consequent flooding and destabilization.
3. **Fugitive sediment and dust:** Actions must be taken to ensure 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, but other water additives may be considered as needed. A stabilized construction entrance (SCE) should be included to minimize tracking of mud and sediment. If off-site tracking occurs, public roads should be swept immediately and no less than once a week and prior to significant storm events. Operations during dry months, that experience fugitive dust problems, should wet down unpaved access roads once a week or more frequently as needed with a water additive to suppress fugitive sediment and dust.
4. **Debris and other materials:** Minimize the exposure of construction debris, building and landscaping materials, trash, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials to precipitation and stormwater runoff. These materials must be prevented from becoming a pollutant source.

- 5. Excavation de-watering:** Excavation de-watering is the removal of water from trenches, foundations, coffer dams, 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 removed from the ponded area, either through gravity or pumping, 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 by the Department.
- 6. Authorized Non-stormwater discharges:** Identify and prevent contamination by non-stormwater discharges. Where allowed non-stormwater discharges exist, they must be identified and steps should be taken to ensure the implementation of appropriate pollution prevention measures for the non-stormwater component(s) of the discharge. Authorized non-stormwater discharges are:
- (a) Discharges from firefighting activity;
 - (b) Fire hydrant flushings;
 - (c) Vehicle washwater if detergents are not used and washing is limited to the exterior of vehicles (engine, undercarriage and transmission washing is prohibited);
 - (d) Dust control runoff in accordance with permit conditions and Appendix (C)(3);
 - (e) Routine external building washdown, not including surface paint removal, that does not involve detergents;
 - (f) Pavement washwater (where spills/leaks of toxic or hazardous materials have not occurred, unless all spilled material had been removed) if detergents are not used;
 - (g) Uncontaminated air conditioning or compressor condensate;
 - (h) Uncontaminated groundwater or spring water;
 - (i) Foundation or footer drain-water where flows are not contaminated;
 - (j) Uncontaminated excavation dewatering (see requirements in Appendix C(5));
 - (k) Potable water sources including waterline flushings; and
 - (l) Landscape irrigation.
- 7. Unauthorized non-stormwater discharges:** Approval from the MDEP does not authorize a discharge that is mixed with a source of non-stormwater, other than those discharges in compliance with Section 6 above. Specifically, the MDEP's approval does not authorize discharges of the following:
- (a) Wastewater from the washout or cleanout of concrete, stucco, paint, form release oils, curing compounds or other construction materials;
 - (b) Fuels, oils or other pollutants used in vehicle and equipment operation and maintenance;
 - (c) Soaps, solvents, or detergents used in vehicle and equipment washing; and
 - (d) Toxic or hazardous substances from a spill or other release.

Post construction

- 1. Inspection and Corrective Action:** All measures must be maintained by the owner in effective operating condition. A person with knowledge of erosion and stormwater control, including the standards and conditions of the permit, shall conduct the inspections. The following areas, facilities, and measures must be inspected, and identified deficiencies must be corrected. Areas, facilities, and measures other than those listed below may also require inspection on a specific site.
 - 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 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 Open Channels:** Inspect ditches, swales, and other open channels in the spring, late fall, and after heavy rains to remove any obstructions to flow, remove accumulated sediments and debris, control 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 on areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones have dislodged. The channel must receive adequate routine maintenance to maintain capacity and prevent or correct any erosion of the channel's bottom or side slopes.
 - C. Culverts:** Inspect culverts in the spring, 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; and to 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 any 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. Infiltration Basin:** Basin should be inspected several times and following major storm events for the first year and once a year thereafter. The basin should drain within 72 hours following a one-inch storm. Sediment must be removed from the system at least annually to prevent deterioration of system performance. Mow drainage swales discharging to the infiltration basins regularly to prevent the

uncontrolled growth of briar and weeds. Any bare areas or erosion rills within the basin shall be repaired with new filter media or sandy loam then seeded and mulched. The basin should also be inspected annually for destabilization of side slopes, embankment settling and other signs of structural failure.

- F. Regular Maintenance:** Clear accumulations of winter sand along parking areas at least once a year, preferably in the spring. Accumulations on pavement may be removed by pavement sweeping. Accumulations of sand along pavement shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader.
- G. Documentation:** Keep a log (report) summarizing inspections, maintenance, and any corrective actions taken. The log must include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean-out of any sediments or debris, indicate where the sediment and debris was disposed after removal. The log must be made accessible to Town staff upon request. The permittee shall retain a copy of the log for a period of at least five years from the completion of permanent stabilization. Attached is a sample log.

Duration of Maintenance

Perform maintenance as described.