



CONSULTING ENGINEERS

STORMWATER MANAGEMENT REPORT

515 ROOSEVELT TRAIL CONDOMINIUM

515 ROOSEVELT TRAIL

WINDHAM, MAINE

A. Narrative

JTSH Holdings, LLC is proposing to develop property located at 515 Roosevelt Trail in Windham as a 5-unit condominium project. The development will be served by public water, common subsurface septic and underground electric, telephone and cable. The property is approximately 2.12± acres, is located in the Medium Density Residential Zoning District and is identified as a portion of lot 30 on the Town of Windham Assessors Map 48. The property is undeveloped and consists predominantly of woodland. In general, the site drains northeasterly and southeasterly to Ditch Brook which abuts the property to the northeast.

B. Alterations to Land Cover

As stated above, the property currently supports woodland growth and is undeveloped. After the completion of the project, the site will contain approximately 18,120 square feet of impervious area consisting of the buildings (5 condominiums) and paved road and driveways and a total developed area of approximately 44,237± square feet. The proposed project will disturb approximately 46,411± square feet; however approximately 2,174± square feet of disturbed area, associated with Filter Basins and stormwater conveyances will be allowed to return to meadow. This new impervious and developed area will require stormwater treatment as part of the Town's subdivision review.

The site is moderately steep (5-8%) in the area of the proposed development and steeper closer to Ditch Brook (10-20%). The onsite soils as identified on the Medium Intensity Soil Maps for Cumberland County, Maine published by the Natural Resources Conservation Service are listed below in Table 1 and included as on the enclosed Soils Map identified as Attachment 1 of this report.

Table 1 – Onsite Soils		
Map Unit Symbol	Soil Name	Hydrologic Soils Group
BuB	Lamoine Silt Loam	C/D
DeB	Deerfield Loamy Sand	A
Ls	Limerick-Saco Silt Loams	B/D
	Scantic Silt Loam	D

C. Methodology and Modeling Assumptions

The proposed stormwater management system has been designed utilizing Best Management Practices (BMPs) to maintain existing drainage patterns while providing stormwater quality improvement measures. The goal of the storm drainage design is to remove potential pollutants while promoting filtration of runoff generated by the development.

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 Appendix H of the MDEP, Chapter 500 Stormwater Management, last revised in 2015. 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. General Standard

The Windham Land Use Ordinance requires that projects requiring Subdivision Review shall comply with Section 4B-General Standards of the MDEP Chapter 500 Stormwater Management. This document outlines the requirement of the project to provide stormwater quality treatment for no less than 95% of the new impervious surface and 80% of the total new developed area associated with the project. The water quality requirements will be met with the utilization of a stone berm level spreaders discharging to a forested buffer, two (2) underdrained soil filter basins ("Filter Basin") and roof dripedges installed on each of the condominium buildings. As a result of the proposed stormwater infrastructure, the project provides water quality treatment for over 96% of the site's new impervious surfaces and more than 80% of the new developed areas. Calculations can be found on the Post-Developed Watershed Map, SWP-2, and included as Attachment 2 of this report.

F. Flooding Standards

The proposed project is required by the Town of Windham to also meet the Flooding Standard outlined in the MDEP Chapter 500 requiring the project to 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. To maintain these rates, two (2) underdrained filter basins, sized to provide treatment requirements of the General Standard, have been analyzed.

Study point 1 (shown on the watershed maps as SP1) provides an analysis point along the northerly property limits, where stormwater runoff from the site is tributary to Ditch Brook.

Study point 2 (SP2) provides an analysis point at the southeast corner of the property, where stormwater runoff flows to the southeast along Roosevelt Trail and into an existing driveway culvert within the Roosevelt Trail ROW within the frontage of the southeasterly abutting property.

Study point 3 (SP3) provides an analysis point along the southeasterly property limits, where stormwater runoff flows on to the neighbor to the southeast of the project site. This discharge is ultimately also tributary to Ditch Brook and is routed to SP1 through the offsite flow paths.

Table 1 – Peak Rates of Stormwater Runoff						
Study Point	2-Year (cfs)		10-Year (cfs)		25-Year (cfs)	
	Pre	Post	Pre	Post	Pre	Post
SP1	2.21	2.05	4.28	3.97	6.03	6.19
SP2	0.32	0.27	0.60	0.70	0.83	0.93
SP3	0.42	0.28	0.85	0.54	1.20	0.77

As illustrated in the table above, the project's design reduces the peak stormwater discharge from the site onto the abutting property to the southeast at Study Point 3 (SP3) in all the modeled storm events. Study Point 1 (SP1) indicates that Ditch Brook will experience a reduction in the peak stormwater discharge in the 2-yr and 10-yr storm events and an increase in the 25-yr event of 0.16 cfs. The model also indicates that at Study Point 2, within the Roosevelt Trail ROW, will experience a reduction in the peak stormwater discharge in the 2-yr storm events and an increase in the 10-yr and 25-yr event of 0.10 cfs. This increase in stormwater discharge of 0.10 cfs will not likely have any significant impact on downstream flooding potential, in particular the existing driveway culvert directly downstream of the study point appears to have the capacity to convey the additional flow.

Study Point 1 (SP1), analyzes the peak discharge from the project site tributary to Ditch Brook. The table above illustrates that the hydrologic model for the project indicates the project will increase the peak discharge to Ditch Brook in the 25-yr storm event. While stormwater discharge to Ditch Brook is not likely to have any negative impact on the potential downstream flooding, due to the increase in peak discharge resulting from the proposed project design at SP1, the project proponent's are requesting that the Planning Board consider granting a waiver from the Town's Stormwater Performance Design Standard, Sec. 911.J.6.

The watershed maps showing pre-development and post-development drainage patterns are included in the plan set and the computations performed with the HydroCAD software program are included as Attachment 3 of this report. In addition, a post-developed model evaluating the proposed Filter Basins under a scenario where the underdrain filter does not function during the 25-year and 100-year storm events has also been included in Attachment 3.

G. Maintenance of common facilities or property

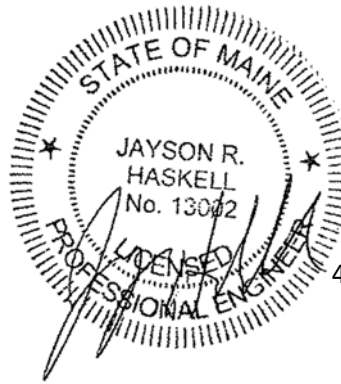
The homeowner's association will be responsible for the maintenance of the stormwater facilities. Enclosed as Attachment 4 is an Inspection, Maintenance and Housekeeping Plan for the project.

Prepared by:

DM ROMA CONSULTING ENGINEERS

Jayson R. Haskell

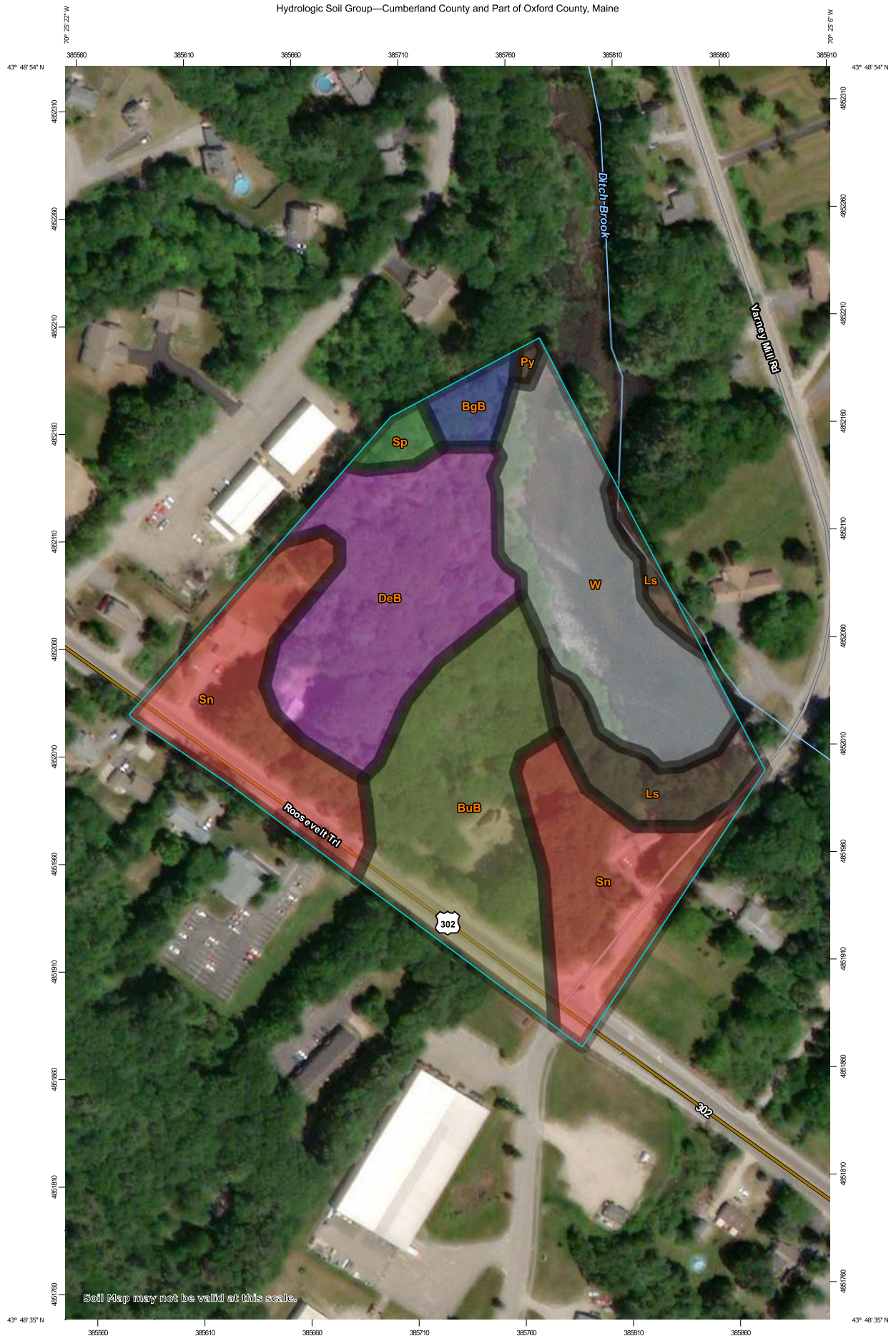
Jayson R. Haskell, P.E.
Southern Maine Regional Manager



4-4-19

ATTACHMENT 1

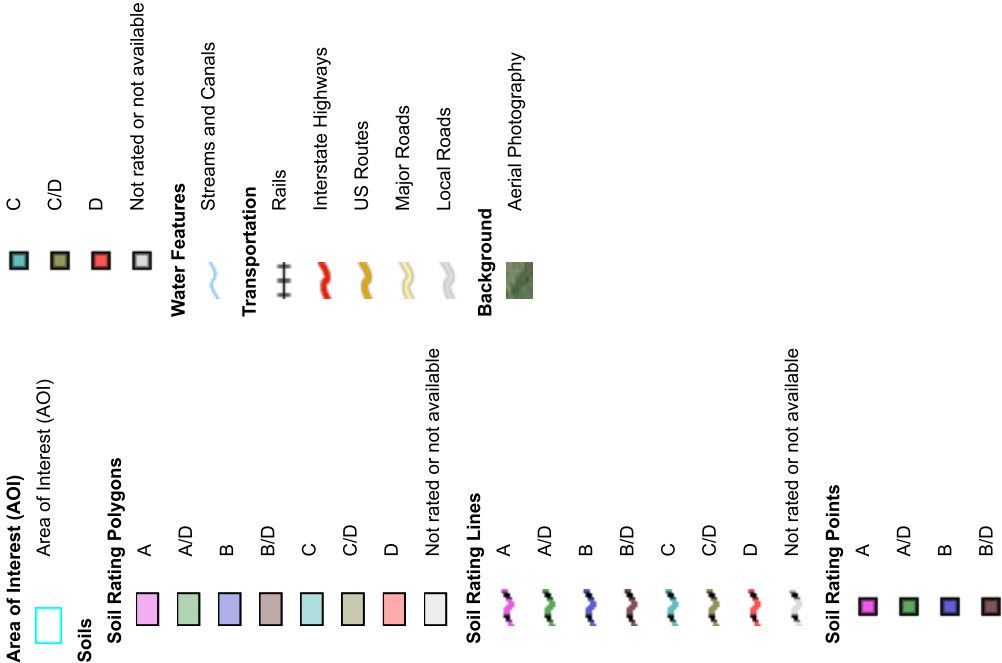
SOILS MAP



Map Scale: 1:1,630 if printed on B portrait (11" x 17") sheet.
 0 20 40 80 120 Meters
 0 50 100 200 300 Feet
 Map projection: Web Mercator Corner coordinates: WGS84 Edge ticks: UTM Zone 19N WGS84



MAP LEGEND



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:
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 15, Sep 6, 2018

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

Date(s) aerial images were photographed: Sep 5, 2013—Oct 22, 2017

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BgB	Belgrade very fine sandy loam, 0 to 8 percent slopes	B	0.3	2.4%
BuB	Lamoine silt loam, 3 to 8 percent slopes	C/D	2.7	21.5%
DeB	Deerfield loamy fine sand, 3 to 8 percent slopes	A	2.7	21.0%
Ls	Limerick-Saco silt loams	B/D	1.0	7.5%
Py	Podunk fine sandy loam, 0 to 3 percent slopes, occasionally flooded	B/D	0.0	0.4%
Sn	Scantic silt loam, 0 to 3 percent slopes	D	3.4	26.7%
Sp	Sebago mucky peat	A/D	0.2	1.5%
W	Water		2.4	19.1%
Totals for Area of Interest			12.7	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

ATTACHMENT 2

STORMWATER TREATMENT CALCULATIONS

Stormwater Treatment Table
515 ROOSEVELT TRAIL CONDOMINIUM

	Total Watershed Area (SF)	New Driveway and Road Impervious Area (SF)	New Building Area (SF)*	New Landscaped Area (SF)	Existing/Offsite Impervious Area (SF)**	Existing/Offsite Landscaped Area (SF)**	Existing Undeveloped Area (SF)	Treatment Provided	New Impervious Area Treated In Treatment Device (SF)	New Landscaped Area Treated In Treatment Device (SF)	Treatment Device
WS-10	34,745	329	0	4,031	2,329	2,412	25,643	NO	0	0	NONE
WS-11	19,510	702	8,060	10,748	0	0	0	YES	702	10,748	FB1
WS-20	3,755	352	0	417	1,426	1,085	475	NO	0	0	NONE
WS-21	4,898	2,711	0	2,187	0	0	0	YES	2,711	2,187	FB2
WS-30	8,558	0	0	3,511	0	0	5,047	NO	0	0	NONE
WS-40	21,458	5,966	0	5,223	0	0	10,269	YES	5,966	5,223	FORESTED BFR
WS-41	6,143	0	0	0	0	0	6,143	NO	0	0	NONE
Total	99,067	10,060	8,060	26,117					9,379	18,158	

* All new buildings shall install a roofline drip edge to provide treatment for the rooftop impervious surface. The building's impervious area is included in the watershed and overall treatment calculations below, but not included in the BMP sizing calculations for each treatment device.

** The project is not taking credit for the Existing or Offsite impervious and landscaped areas, but are included in the BMP sizing calculations for each treatment device.

New Impervious Area = 18,120 sf
Impervious Area Requiring Treatment (95%) = 17,214 sf
Impervious Area Treatment Provided = 17,439 sf
96% New Impervious Area Treated

New Developed Area = 44,237 sf
Developed Area Requiring Treatment (80%) = 35,390 sf
Developed Area Treatment Provided = 35,597 sf
80% New Developed Area Treated

Filter Basin FB-1

Tributary Impervious Area= 702 sf (WS-11 Impervious Area)
Tributary Landscaped Area= 10,748 sf (WS-11 Landscaped Area)

Water Quality Volume (WQV) Calculation

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

WQV (Required) = 417 cf

Stage Storage Volume

Elevation	Area (sf)	Storage (cf)
236.5	627	0
238	1,263	1,314

Outlet Elevation = 237.25
Storage Volume Provided = 576 cf > Required

Filter Bottom Calculation

Filter Area (Required) = 5% x Impervious Area + 2% x Landscaped Area

Filter Area Required = 250 sf

Filter Area Provided = 627 sf > Required

Filter Basin FB-2

Tributary Impervious Area= 2,711 sf (WS-21 Impervious Area)
Tributary Landscaped Area= 2,187 sf (WS-21 Landscaped Area)

Water Quality Volume (WQV) Calculation

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

WQV (Required) = 299 cf

Stage Storage Volume

Elevation	Area (sf)	Storage (cf)
241	209	0
243.1	739	358

Outlet Elevation = 242.00
Storage Volume Provided = 310 cf > Required

Filter Bottom Calculation

Filter Area (Required) = 5% x Impervious Area + 2% x Landscaped Area

Filter Area Required = 179 sf

Filter Area Provided = 209 sf > Required

Forested Stormwater Buffer With Level Spreader

Soil: Lamoine silt loam; Limerick-Saco silt loams; Scantic silt loam

Class: silt loam

HSG: C/D; B/D; D ~ D soils requirements applied

Buffer Length= 150 ft

Berm Length Per Acre Impervious = 150 ft

Berm Length Per Acre Landscape = 45 ft

Tributary Impervious Area = 5,966 (WS-40 Impervious area)

Tributary Landscaped Area = 5,223 (WS-40 Landscaped area)

Required Berm Length: 26 ft

Provided Berm Length: 26 ft

Typical Drip Edge Sizing Calculations

Tributary Impervious Area = 806 sf (Half-roof area of each unit)
Tributary Landscaped Area= 0 sf

Water Quality Volume (WQV) Calculation

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

WQV (Required) = 67 cf

Drip Edge sizing:

Width 2 feet

Depth 2 feet

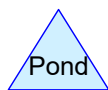
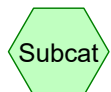
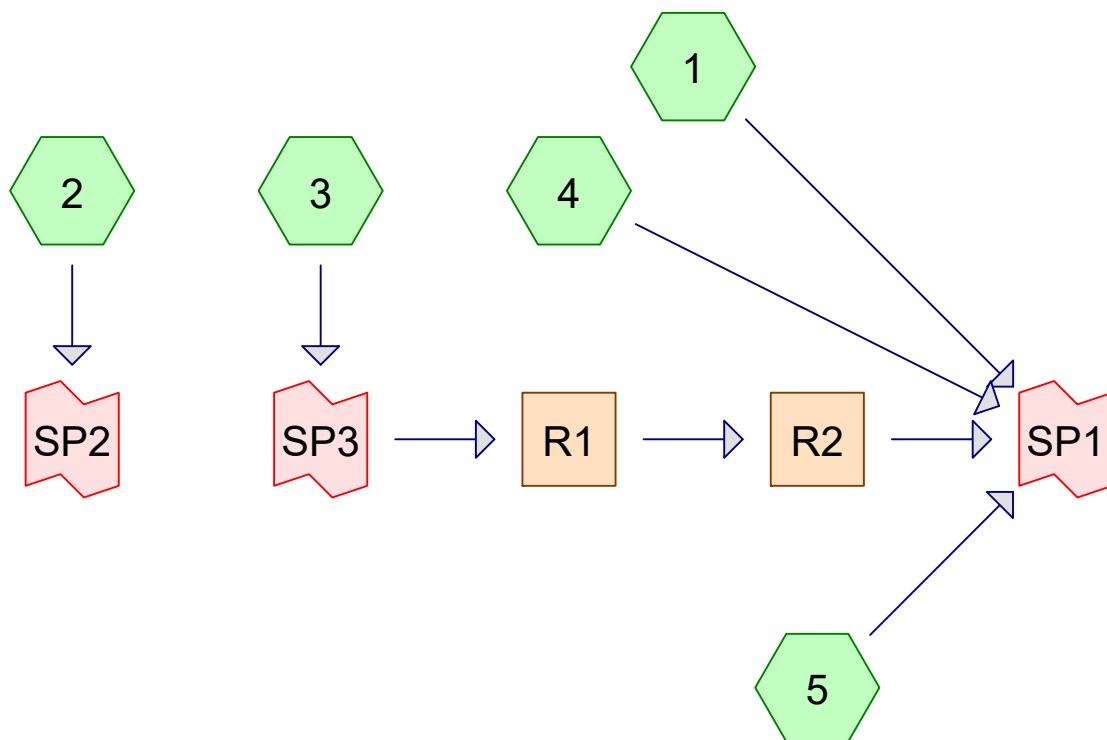
Length 44 feet

% Void (crushed stone) 40%

Total Volume Provided: 70 cf > Required

ATTACHMENT 3

HYDROCAD OUTPUT



Routing Diagram for 18088 - PRE

Prepared by DM Roma Consulting Engineers, Printed 4/4/2019
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18088 - PRE

Prepared by DM Roma Consulting Engineers

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Type III 24-hr 2-Year Rainfall=3.10"

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1: Runoff Area=53,162 sf 1.98% Impervious Runoff Depth=0.74"
Flow Length=344' Tc=23.9 min CN=WQ Runoff=0.64 cfs 3,272 cf

Subcatchment2: Runoff Area=12,209 sf 16.55% Impervious Runoff Depth=1.54"
Flow Length=148' Tc=20.1 min CN=WQ Runoff=0.32 cfs 1,571 cf

Subcatchment3: Runoff Area=15,755 sf 0.51% Impervious Runoff Depth=1.27"
Flow Length=94' Slope=0.0741 '/' Tc=12.3 min CN=WQ Runoff=0.42 cfs 1,668 cf

Subcatchment4: Runoff Area=13,866 sf 0.00% Impervious Runoff Depth=1.26"
Flow Length=188' Tc=16.8 min CN=79 Runoff=0.33 cfs 1,458 cf

Subcatchment5: Runoff Area=33,474 sf 12.51% Impervious Runoff Depth=1.48"
Flow Length=256' Tc=18.7 min UI Adjusted CN=WQ Runoff=0.88 cfs 4,120 cf

Reach R1: Avg. Flow Depth=0.10' Max Vel=1.34 fps Inflow=0.42 cfs 1,668 cf
n=0.030 L=201.9' S=0.0406 '/' Capacity=31.18 cfs Outflow=0.41 cfs 1,668 cf

Reach R2: Avg. Flow Depth=0.12' Max Vel=1.03 fps Inflow=0.41 cfs 1,668 cf
n=0.035 L=122.8' S=0.0244 '/' Capacity=701.28 cfs Outflow=0.41 cfs 1,668 cf

Link SP1: Inflow=2.21 cfs 10,519 cf
Primary=2.21 cfs 10,519 cf

Link SP2: Inflow=0.32 cfs 1,571 cf
Primary=0.32 cfs 1,571 cf

Link SP3: Inflow=0.42 cfs 1,668 cf
Primary=0.42 cfs 1,668 cf

Total Runoff Area = 128,466 sf Runoff Volume = 12,090 cf Average Runoff Depth = 1.13"
94.28% Pervious = 121,124 sf 5.72% Impervious = 7,342 sf

Summary for Subcatchment 1:

Runoff = 0.64 cfs @ 12.35 hrs, Volume= 3,272 cf, Depth= 0.74"

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

Area (sf)	CN	Description
* 0	98	Ex. shed, unconnected roofs
* 1,051	98	Roosevelt Trail, ex. paved roads
1,288	80	>75% Grass cover, Good, HSG D
23,451	32	Woods/grass comb., Good, HSG A
27,372	79	Woods/grass comb., Good, HSG D
53,162		Weighted Average
52,111		98.02% Pervious Area
1,051		1.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.9	150	0.0448	0.11		Sheet Flow, SEG A to B Woods: Light underbrush n= 0.400 P2= 3.10"
1.8	119	0.0495	1.11		Shallow Concentrated Flow, SEG B to C Woodland Kv= 5.0 fps
0.2	75	0.0603	6.51	114.51	Channel Flow, SEG C to D Area= 17.6 sf Perim= 35.7' r= 0.49' n= 0.035 Earth, dense weeds
23.9	344	Total			

Summary for Subcatchment 2:

Runoff = 0.32 cfs @ 12.28 hrs, Volume= 1,571 cf, Depth= 1.54"

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

Area (sf)	CN	Description
* 81	98	Ex. shed, unconnected roofs
* 1,940	98	Roosevelt Trail, ex. paved roads
3,071	80	>75% Grass cover, Good, HSG D
7,117	79	Woods/grass comb., Good, HSG D
12,209		Weighted Average
10,188		83.45% Pervious Area
2,021		16.55% Impervious Area
81		4.01% Unconnected

18088 - PRE

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Type III 24-hr 2-Year Rainfall=3.10"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	67	0.0308	0.08		Sheet Flow, SEG A to B Woods: Light underbrush n= 0.400 P2= 3.10"
6.8	81	0.0342	0.20		Sheet Flow, SEG B to C Grass: Short n= 0.150 P2= 3.10"
20.1	148	Total			

Summary for Subcatchment 3:

Runoff = 0.42 cfs @ 12.18 hrs, Volume= 1,668 cf, Depth= 1.27"

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

Area (sf)	CN	Description
* 81	98	Ex. shed, unconnected roofs
15,674	79	Woods/grass comb., Good, HSG D
15,755		Weighted Average
15,674		99.49% Pervious Area
81		0.51% Impervious Area
81		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	94	0.0741	0.13		Sheet Flow, SEG A to B Woods: Light underbrush n= 0.400 P2= 3.10"

Summary for Subcatchment 4:

Runoff = 0.33 cfs @ 12.24 hrs, Volume= 1,458 cf, Depth= 1.26"

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

Area (sf)	CN	Description
13,866	79	Woods/grass comb., Good, HSG D
13,866		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	147	0.0900	0.15		Sheet Flow, SEG A to B Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	41	0.0860	1.47		Shallow Concentrated Flow, SEG B to C Woodland Kv= 5.0 fps
16.8	188	Total			

Summary for Subcatchment 5:

Runoff = 0.88 cfs @ 12.26 hrs, Volume= 4,120 cf, Depth= 1.48"

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

Area (sf)	CN	Adj	Description
* 4,189	98	98	Ex. houses/garage/shed, unconnected roofs
7,406	80	80	>75% Grass cover, Good, HSG D
21,879	79	79	Woods/grass comb., Good, HSG D
33,474			Weighted Average
29,285			87.49% Pervious Area
4,189			12.51% Impervious Area
4,189			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0408	0.13		Sheet Flow, SEG A to B Grass: Dense n= 0.240 P2= 3.10"
11.9	83	0.0623	0.12		Sheet Flow, SEG B to C Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	123	0.0244	4.18	441.47	Channel Flow, Seg C to D Area= 105.7 sf Perim= 211.5' r= 0.50' n= 0.035 Earth, dense weeds
18.7	256	Total			

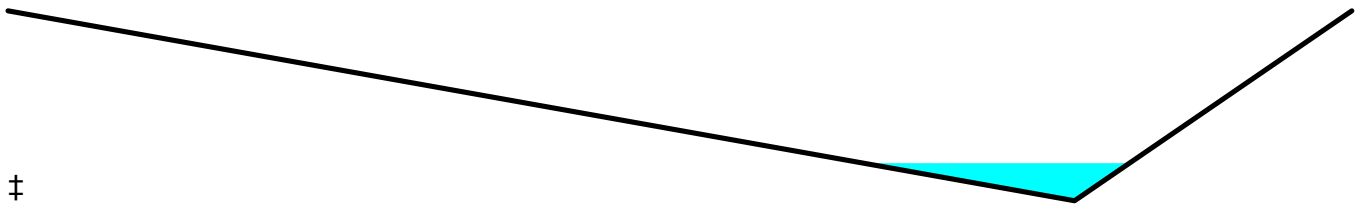
Summary for Reach R1:

Inflow Area = 15,755 sf, 0.51% Impervious, Inflow Depth = 1.27" for 2-Year event
Inflow = 0.42 cfs @ 12.18 hrs, Volume= 1,668 cf
Outflow = 0.41 cfs @ 12.22 hrs, Volume= 1,668 cf, Atten= 2%, Lag= 2.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.34 fps, Min. Travel Time= 2.5 min
Avg. Velocity= 0.47 fps, Avg. Travel Time= 7.1 min

Peak Storage= 62 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 0.50' Flow Area= 7.9 sf, Capacity= 31.18 cfs

0.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 50.0 13.0 ' ' Top Width= 31.50'
Length= 201.9' Slope= 0.0406 ' '
Inlet Invert= 240.20', Outlet Invert= 232.00'

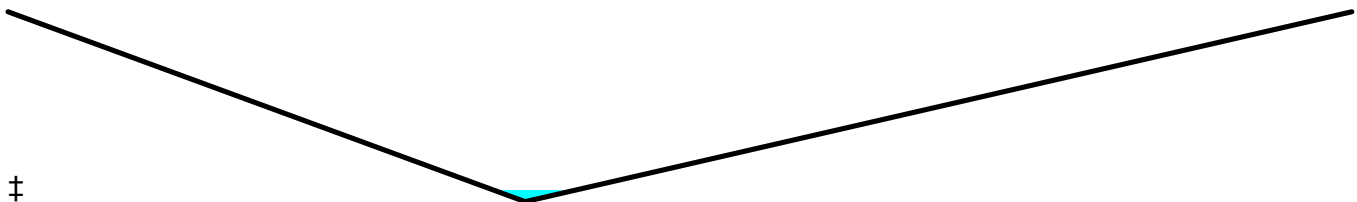
**Summary for Reach R2:**

Inflow Area = 15,755 sf, 0.51% Impervious, Inflow Depth = 1.27" for 2-Year event
 Inflow = 0.41 cfs @ 12.22 hrs, Volume= 1,668 cf
 Outflow = 0.41 cfs @ 12.25 hrs, Volume= 1,668 cf, Atten= 2%, Lag= 1.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 1.03 fps, Min. Travel Time= 2.0 min
 Avg. Velocity= 0.44 fps, Avg. Travel Time= 4.7 min

Peak Storage= 48 cf @ 12.25 hrs
 Average Depth at Peak Storage= 0.12'
 Bank-Full Depth= 2.00' Flow Area= 105.7 sf, Capacity= 701.28 cfs

Custom cross-section, Length= 122.8' Slope= 0.0244 '/'
 Constant n= 0.035
 Inlet Invert= 232.00', Outlet Invert= 229.00'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	232.00	0.00
40.69	230.00	2.00
105.73	232.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
2.00	105.7	105.8	12,984	701.28

Summary for Link SP1:

Inflow Area = 116,257 sf, 4.58% Impervious, Inflow Depth = 1.09" for 2-Year event
 Inflow = 2.21 cfs @ 12.27 hrs, Volume= 10,519 cf
 Primary = 2.21 cfs @ 12.27 hrs, Volume= 10,519 cf, Atten= 0%, Lag= 0.0 min

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

Summary for Link SP2:

Inflow Area = 12,209 sf, 16.55% Impervious, Inflow Depth = 1.54" for 2-Year event
Inflow = 0.32 cfs @ 12.28 hrs, Volume= 1,571 cf
Primary = 0.32 cfs @ 12.28 hrs, Volume= 1,571 cf, Atten= 0%, Lag= 0.0 min

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

Summary for Link SP3:

Inflow Area = 15,755 sf, 0.51% Impervious, Inflow Depth = 1.27" for 2-Year event
Inflow = 0.42 cfs @ 12.18 hrs, Volume= 1,668 cf
Primary = 0.42 cfs @ 12.18 hrs, Volume= 1,668 cf, Atten= 0%, Lag= 0.0 min

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

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1: Runoff Area=53,162 sf 1.98% Impervious Runoff Depth=1.42"
Flow Length=344' Tc=23.9 min CN=WQ Runoff=1.25 cfs 6,279 cf

Subcatchment2: Runoff Area=12,209 sf 16.55% Impervious Runoff Depth=2.80"
Flow Length=148' Tc=20.1 min CN=WQ Runoff=0.60 cfs 2,846 cf

Subcatchment3: Runoff Area=15,755 sf 0.51% Impervious Runoff Depth=2.47"
Flow Length=94' Slope=0.0741 '/' Tc=12.3 min CN=WQ Runoff=0.85 cfs 3,243 cf

Subcatchment4: Runoff Area=13,866 sf 0.00% Impervious Runoff Depth=2.46"
Flow Length=188' Tc=16.8 min CN=79 Runoff=0.66 cfs 2,843 cf

Subcatchment5: Runoff Area=33,474 sf 12.51% Impervious Runoff Depth=2.72"
Flow Length=256' Tc=18.7 min UI Adjusted CN=WQ Runoff=1.65 cfs 7,582 cf

Reach R1: Avg. Flow Depth=0.13' Max Vel=1.60 fps Inflow=0.85 cfs 3,243 cf
n=0.030 L=201.9' S=0.0406 '/' Capacity=31.18 cfs Outflow=0.83 cfs 3,243 cf

Reach R2: Avg. Flow Depth=0.16' Max Vel=1.22 fps Inflow=0.83 cfs 3,243 cf
n=0.035 L=122.8' S=0.0244 '/' Capacity=701.28 cfs Outflow=0.81 cfs 3,243 cf

Link SP1: Inflow=4.28 cfs 19,948 cf
Primary=4.28 cfs 19,948 cf

Link SP2: Inflow=0.60 cfs 2,846 cf
Primary=0.60 cfs 2,846 cf

Link SP3: Inflow=0.85 cfs 3,243 cf
Primary=0.85 cfs 3,243 cf

Total Runoff Area = 128,466 sf Runoff Volume = 22,794 cf Average Runoff Depth = 2.13"
94.28% Pervious = 121,124 sf 5.72% Impervious = 7,342 sf

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1: Runoff Area=53,162 sf 1.98% Impervious Runoff Depth=2.05"
Flow Length=344' Tc=23.9 min CN=WQ Runoff=1.77 cfs 9,067 cf

Subcatchment2: Runoff Area=12,209 sf 16.55% Impervious Runoff Depth=3.87"
Flow Length=148' Tc=20.1 min CN=WQ Runoff=0.83 cfs 3,935 cf

Subcatchment3: Runoff Area=15,755 sf 0.51% Impervious Runoff Depth=3.51"
Flow Length=94' Slope=0.0741 '/' Tc=12.3 min CN=WQ Runoff=1.20 cfs 4,611 cf

Subcatchment4: Runoff Area=13,866 sf 0.00% Impervious Runoff Depth=3.50"
Flow Length=188' Tc=16.8 min CN=79 Runoff=0.94 cfs 4,046 cf

Subcatchment5: Runoff Area=33,474 sf 12.51% Impervious Runoff Depth=3.78"
Flow Length=256' Tc=18.7 min UI Adjusted CN=WQ Runoff=2.30 cfs 10,548 cf

Reach R1: Avg. Flow Depth=0.15' Max Vel=1.75 fps Inflow=1.20 cfs 4,611 cf
n=0.030 L=201.9' S=0.0406 '/' Capacity=31.18 cfs Outflow=1.18 cfs 4,611 cf

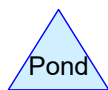
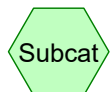
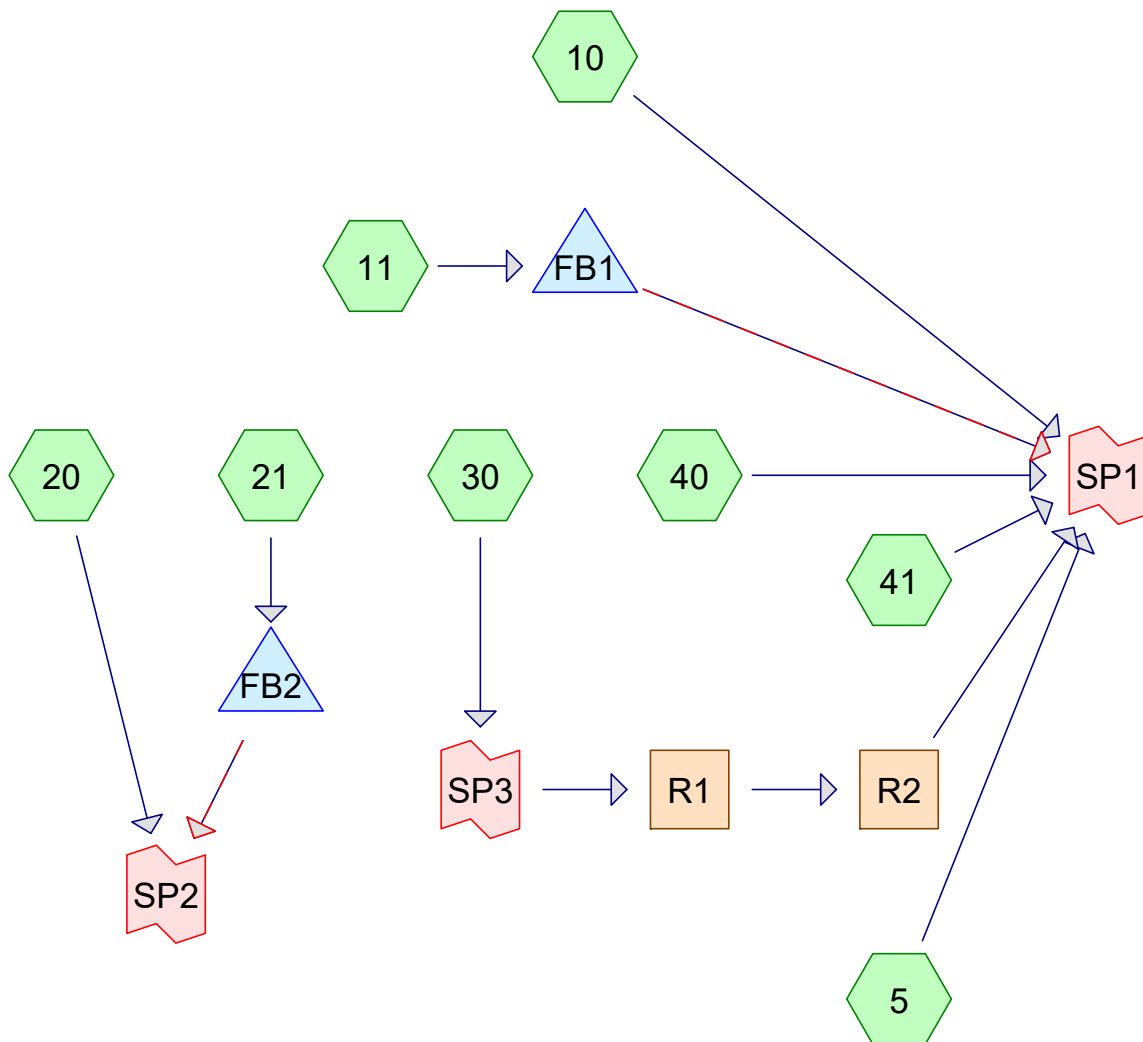
Reach R2: Avg. Flow Depth=0.18' Max Vel=1.34 fps Inflow=1.18 cfs 4,611 cf
n=0.035 L=122.8' S=0.0244 '/' Capacity=701.28 cfs Outflow=1.17 cfs 4,611 cf

Link SP1: Inflow=6.03 cfs 28,272 cf
Primary=6.03 cfs 28,272 cf

Link SP2: Inflow=0.83 cfs 3,935 cf
Primary=0.83 cfs 3,935 cf

Link SP3: Inflow=1.20 cfs 4,611 cf
Primary=1.20 cfs 4,611 cf

Total Runoff Area = 128,466 sf Runoff Volume = 32,208 cf Average Runoff Depth = 3.01"
94.28% Pervious = 121,124 sf 5.72% Impervious = 7,342 sf



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Type III 24-hr 2-Year Rainfall=3.10"

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment5: Runoff Area=33,474 sf 12.51% Impervious Runoff Depth=1.48"
 Flow Length=256' Tc=18.7 min UI Adjusted CN=WQ Runoff=0.88 cfs 4,120 cf

Subcatchment10: Runoff Area=34,744 sf 7.65% Impervious Runoff Depth=0.84"
 Flow Length=554' Tc=29.1 min CN=WQ Runoff=0.43 cfs 2,418 cf

Subcatchment11: Runoff Area=19,509 sf 44.91% Impervious Runoff Depth=1.59"
 Flow Length=268' Tc=12.5 min CN=WQ Runoff=0.62 cfs 2,587 cf

Subcatchment20: Runoff Area=3,755 sf 47.35% Impervious Runoff Depth=2.04"
 Flow Length=76' Tc=8.2 min CN=WQ Runoff=0.17 cfs 639 cf

Subcatchment21: Runoff Area=4,898 sf 55.35% Impervious Runoff Depth=2.18"
 Flow Length=103' Tc=6.0 min CN=WQ Runoff=0.26 cfs 889 cf

Subcatchment30: Runoff Area=8,558 sf 0.00% Impervious Runoff Depth=1.27"
 Flow Length=54' Tc=7.0 min CN=WQ Runoff=0.28 cfs 909 cf

Subcatchment40: Runoff Area=21,458 sf 27.80% Impervious Runoff Depth=1.72"
 Flow Length=322' Tc=30.9 min CN=WQ Runoff=0.52 cfs 3,083 cf

Subcatchment41: Runoff Area=6,143 sf 0.00% Impervious Runoff Depth=1.26"
 Flow Length=150' Slope=0.1054 '/' Tc=15.5 min CN=79 Runoff=0.15 cfs 646 cf

Reach R1: Avg. Flow Depth=0.08' Max Vel=1.29 fps Inflow=0.28 cfs 909 cf
 n=0.030 L=157.8' S=0.0494 '/' Capacity=34.40 cfs Outflow=0.26 cfs 909 cf

Reach R2: Avg. Flow Depth=0.10' Max Vel=0.91 fps Inflow=0.26 cfs 909 cf
 n=0.035 L=122.8' S=0.0244 '/' Capacity=701.28 cfs Outflow=0.25 cfs 909 cf

Pond FB1: Peak Elev=237.01' Storage=1,427 cf Inflow=0.62 cfs 2,587 cf
 Primary=0.03 cfs 2,587 cf Secondary=0.00 cfs 0 cf Outflow=0.03 cfs 2,587 cf

Pond FB2: Peak Elev=242.04' Storage=329 cf Inflow=0.26 cfs 889 cf
 Primary=0.00 cfs 583 cf Secondary=0.14 cfs 307 cf Outflow=0.14 cfs 889 cf

Link SP1: Inflow=2.05 cfs 13,763 cf
 Primary=2.05 cfs 13,763 cf

Link SP2: Inflow=0.27 cfs 1,529 cf
 Primary=0.27 cfs 1,529 cf

Link SP3: Inflow=0.28 cfs 909 cf
 Primary=0.28 cfs 909 cf

Total Runoff Area = 132,539 sf Runoff Volume = 15,292 cf Average Runoff Depth = 1.38"
80.33% Pervious = 106,475 sf 19.67% Impervious = 26,064 sf

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Type III 24-hr 2-Year Rainfall=3.10"

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Summary for Subcatchment 5:

Runoff = 0.88 cfs @ 12.26 hrs, Volume= 4,120 cf, Depth= 1.48"

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

Area (sf)	CN	Adj	Description
* 4,189	98	98	Ex. houses/garage/shed, unconnected roofs
7,406	80	80	>75% Grass cover, Good, HSG D
21,879	79	79	Woods/grass comb., Good, HSG D
33,474			Weighted Average
29,285			87.49% Pervious Area
4,189			12.51% Impervious Area
4,189			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0408	0.13		Sheet Flow, SEG A to B Grass: Dense n= 0.240 P2= 3.10"
11.9	83	0.0623	0.12		Sheet Flow, SEG B to C Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	123	0.0244	4.18	441.47	Channel Flow, Seg C to D Area= 105.7 sf Perim= 211.5' r= 0.50' n= 0.035 Earth, dense weeds
18.7	256	Total			

Summary for Subcatchment 10:

Runoff = 0.43 cfs @ 12.41 hrs, Volume= 2,418 cf, Depth= 0.84"

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

Area (sf)	CN	Description
* 2,329	98	Roosevelt Trail, exist. paved roads
* 329	98	Proposed road, paved parking
1,322	39	>75% Grass cover, Good, HSG A
5,122	80	>75% Grass cover, Good, HSG D
0	30	Meadow, non-grazed, HSG A
0	78	Meadow, non-grazed, HSG D
14,069	32	Woods/grass comb., Good, HSG A
11,573	79	Woods/grass comb., Good, HSG D
34,744		Weighted Average
32,086		92.35% Pervious Area
2,658		7.65% Impervious Area

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Type III 24-hr 2-Year Rainfall=3.10"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	111	0.0198	0.12		Sheet Flow, SEG A to B Grass: Dense n= 0.240 P2= 3.10"
11.9	209	0.0034	0.29		Shallow Concentrated Flow, SEG B to C Woodland Kv= 5.0 fps
0.2	52	0.0270	5.08	38.11	Trap/Vee/Rect Channel Flow, SEG C to D Bot.W=0.00' D=1.00' Z= 3.0 & 12.0 ' Top.W=15.00' n= 0.030 Earth, grassed & winding
0.9	61	0.0471	1.09		Shallow Concentrated Flow, SEG D to E Woodland Kv= 5.0 fps
0.3	121	0.0525	6.07	106.85	Channel Flow, SEG E to F Area= 17.6 sf Perim= 35.7' r= 0.49' n= 0.035 Earth, dense weeds
29.1	554	Total			

Summary for Subcatchment 11:

Runoff = 0.62 cfs @ 12.17 hrs, Volume= 2,587 cf, Depth= 1.59"

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

Area (sf)	CN	Description
* 0	98	Roosevelt Trail, exist. paved roads
* 702	98	Proposed road & driveway, paved parking
8,060	98	Unconnected roofs, HSG A
6,288	39	>75% Grass cover, Good, HSG A
4,459	80	>75% Grass cover, Good, HSG D
0	32	Woods/grass comb., Good, HSG A
0	79	Woods/grass comb., Good, HSG D
19,509		Weighted Average
10,747		55.09% Pervious Area
8,762		44.91% Impervious Area
8,060		91.99% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	91	0.0268	0.13		Sheet Flow, SEG A to B Grass: Dense n= 0.240 P2= 3.10"
0.5	177	0.0310	5.83	23.31	Trap/Vee/Rect Channel Flow, SEG B to C Bot.W=1.00' D=1.00' Z= 3.0 ' Top.W=7.00' n= 0.030 Earth, grassed & winding
12.5	268	Total			

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Type III 24-hr 2-Year Rainfall=3.10"

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Summary for Subcatchment 20:

Runoff = 0.17 cfs @ 12.12 hrs, Volume= 639 cf, Depth= 2.04"

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

	Area (sf)	CN	Description
*	1,426	98	Roosevelt Trail, exist. paved roads
*	352	98	Proposed road, paved parking
	0	39	>75% Grass cover, Good, HSG A
	1,502	80	>75% Grass cover, Good, HSG D
	284	78	Meadow, non-grazed, HSG D
	0	32	Woods/grass comb., Good, HSG A
	191	79	Woods/grass comb., Good, HSG D
	3,755		Weighted Average
	1,977		52.65% Pervious Area
	1,778		47.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	16	0.0203	0.94		Sheet Flow, SEG A to B Smooth surfaces n= 0.011 P2= 3.10"
2.2	17	0.0669	0.13		Sheet Flow, SEG B to C Grass: Dense n= 0.240 P2= 3.10"
2.9	12	0.0432	0.07		Sheet Flow, SEG C to D Woods: Light underbrush n= 0.400 P2= 3.10"
2.8	31	0.0460	0.18		Sheet Flow, SEG D to E Grass: Short n= 0.150 P2= 3.10"
8.2	76	Total			

Summary for Subcatchment 21:

Runoff = 0.26 cfs @ 12.09 hrs, Volume= 889 cf, Depth= 2.18"

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

	Area (sf)	CN	Description
*	0	98	Roosevelt Trail, exist. paved roads
*	2,711	98	Proposed road & driveway, paved parking
	0	98	Unconnected roofs, HSG A
	0	39	>75% Grass cover, Good, HSG A
	2,187	80	>75% Grass cover, Good, HSG D
	0	32	Woods/grass comb., Good, HSG A
	0	79	Woods/grass comb., Good, HSG D
	4,898		Weighted Average
	2,187		44.65% Pervious Area
	2,711		55.35% Impervious Area

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Type III 24-hr 2-Year Rainfall=3.10"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	16	0.0203	0.94		Sheet Flow, SEG A to B Smooth surfaces n= 0.011 P2= 3.10"
0.3	71	0.0154	4.52	28.39	Trap/Vee/Rect Channel Flow, SEG B to C Bot.W=0.00' D=0.50' Z= 0.2 & 50.0 ' Top.W=25.10' n= 0.016 Asphalt, rough
0.1	16	0.0824	4.62		Shallow Concentrated Flow, SEG C to D Unpaved Kv= 16.1 fps
0.7	103	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 30:

Runoff = 0.28 cfs @ 12.11 hrs, Volume= 909 cf, Depth= 1.27"

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

Area (sf)	CN	Description
*	0	98 Roosevelt Trail, exist. paved roads
*	0	98 Proposed road, paved parking
	0	39 >75% Grass cover, Good, HSG A
3,511	80	>75% Grass cover, Good, HSG D
1,889	78	Meadow, non-grazed, HSG D
0	32	Woods/grass comb., Good, HSG A
3,158	79	Woods/grass comb., Good, HSG D
8,558		Weighted Average
8,558		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	29	0.0937	0.17		Sheet Flow, SEG A to B Grass: Dense n= 0.240 P2= 3.10"
4.1	25	0.0811	0.10		Sheet Flow, SEG B to C Woods: Light underbrush n= 0.400 P2= 3.10"
7.0	54	Total			

Summary for Subcatchment 40:

Runoff = 0.52 cfs @ 12.43 hrs, Volume= 3,083 cf, Depth= 1.72"

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

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Type III 24-hr 2-Year Rainfall=3.10"

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Area (sf)	CN	Description
* 0	98	Roosevelt Trail, exist. paved roads
* 5,966	98	Proposed road & driveway, paved parking
0	98	Unconnected roofs, HSG A
0	39	>75% Grass cover, Good, HSG A
5,223	80	>75% Grass cover, Good, HSG D
0	32	Woods/grass comb., Good, HSG A
10,269	79	Woods/grass comb., Good, HSG D
21,458		Weighted Average
15,492		72.20% Pervious Area
5,966		27.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	150	0.0611	0.19		Sheet Flow, SEG A to B Grass: Dense n= 0.240 P2= 3.10"
0.1	22	0.1342	5.49		Shallow Concentrated Flow, SEG B to C Grassed Waterway Kv= 15.0 fps
18.0	150	0.0730	0.14		Sheet Flow, SEG C to D (after LEVEL SPREADER) Woods: Light underbrush n= 0.400 P2= 3.10"
30.9	322	Total			

Summary for Subcatchment 41:

Runoff = 0.15 cfs @ 12.22 hrs, Volume= 646 cf, Depth= 1.26"

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

Area (sf)	CN	Description
6,143	79	Woods/grass comb., Good, HSG D
6,143		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	150	0.1054	0.16		Sheet Flow, SEG A to B Woods: Light underbrush n= 0.400 P2= 3.10"

Summary for Reach R1:Inflow Area = 8,558 sf, 0.00% Impervious, Inflow Depth = 1.27" for 2-Year event
Inflow = 0.28 cfs @ 12.11 hrs, Volume= 909 cf
Outflow = 0.26 cfs @ 12.14 hrs, Volume= 909 cf, Atten= 5%, Lag= 1.9 minRouting by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.29 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 0.56 fps, Avg. Travel Time= 4.7 minPeak Storage= 32 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 0.50' Flow Area= 7.9 sf, Capacity= 34.40 cfs

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Type III 24-hr 2-Year Rainfall=3.10"

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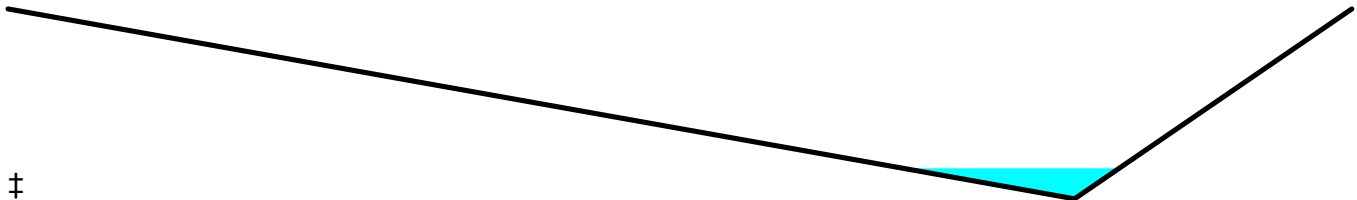
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0.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 50.0 13.0 '/' Top Width= 31.50'

Length= 157.8' Slope= 0.0494 '/'

Inlet Invert= 239.80', Outlet Invert= 232.00'

**Summary for Reach R2:**

Inflow Area = 8,558 sf, 0.00% Impervious, Inflow Depth = 1.27" for 2-Year event

Inflow = 0.26 cfs @ 12.14 hrs, Volume= 909 cf

Outflow = 0.25 cfs @ 12.17 hrs, Volume= 909 cf, Atten= 4%, Lag= 1.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Max. Velocity= 0.91 fps, Min. Travel Time= 2.2 min

Avg. Velocity= 0.43 fps, Avg. Travel Time= 4.8 min

Peak Storage= 34 cf @ 12.17 hrs

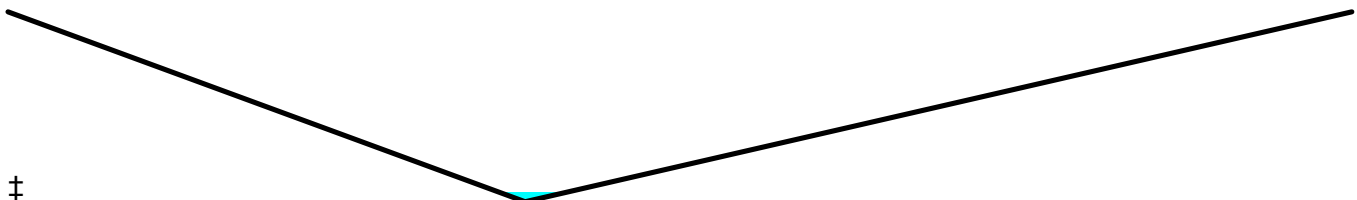
Average Depth at Peak Storage= 0.10'

Bank-Full Depth= 2.00' Flow Area= 105.7 sf, Capacity= 701.28 cfs

Custom cross-section, Length= 122.8' Slope= 0.0244 '/'

Constant n= 0.035

Inlet Invert= 232.00', Outlet Invert= 229.00'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	232.00	0.00
40.69	230.00	2.00
105.73	232.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
2.00	105.7	105.8	12,984	701.28

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Type III 24-hr 2-Year Rainfall=3.10"

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Summary for Pond FB1:

Inflow Area = 19,509 sf, 44.91% Impervious, Inflow Depth = 1.59" for 2-Year event
 Inflow = 0.62 cfs @ 12.17 hrs, Volume= 2,587 cf
 Outflow = 0.03 cfs @ 15.86 hrs, Volume= 2,587 cf, Atten= 96%, Lag= 221.5 min
 Primary = 0.03 cfs @ 15.86 hrs, Volume= 2,587 cf
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 237.01' @ 15.86 hrs Surf.Area= 2,354 sf Storage= 1,427 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 510.5 min (1,290.2 - 779.7)

Volume	Invert	Avail.Storage	Storage Description		
#1	236.00'	4,232 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
236.00	627	124.4	0	0	627
237.00	2,340	230.0	1,393	1,393	3,610
238.00	3,370	330.0	2,839	4,232	8,076

Device	Routing	Invert	Outlet Devices
#1	Primary	233.05'	0.7" Vert. Orifice/Grate C= 0.600
#2	Device 1	233.83'	4.0" Round Culvert L= 61.9' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 233.83' / 233.50' S= 0.0053 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf
#3	Device 2	233.83'	4.0" Vert. Orifice/Grate C= 0.600
#4	Device 3	236.00'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 231.00'
#5	Secondary	237.05'	10.0' long x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.03 cfs @ 15.86 hrs HW=237.01' TW=0.00' (Dynamic Tailwater)

↑ **1=Orifice/Grate** (Orifice Controls 0.03 cfs @ 9.55 fps)
 ↑ **2=Culvert** (Passes 0.03 cfs of 0.40 cfs potential flow)
 ↑ **3=Orifice/Grate** (Passes 0.03 cfs of 0.73 cfs potential flow)
 ↑ **4=Exfiltration** (Passes 0.03 cfs of 0.15 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=236.00' TW=0.00' (Dynamic Tailwater)

↑ **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond FB2:

Inflow Area = 4,898 sf, 55.35% Impervious, Inflow Depth = 2.18" for 2-Year event
 Inflow = 0.26 cfs @ 12.09 hrs, Volume= 889 cf
 Outflow = 0.14 cfs @ 12.23 hrs, Volume= 889 cf, Atten= 45%, Lag= 8.7 min
 Primary = 0.00 cfs @ 12.23 hrs, Volume= 583 cf
 Secondary = 0.14 cfs @ 12.23 hrs, Volume= 307 cf

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Type III 24-hr 2-Year Rainfall=3.10"

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Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Peak Elev= 242.04' @ 12.23 hrs Surf.Area= 435 sf Storage= 329 cf

Plug-Flow detention time= 453.7 min calculated for 889 cf (100% of inflow)

Center-of-Mass det. time= 454.5 min (1,235.2 - 780.8)

Volume	Invert	Avail.Storage	Storage Description			
#1	241.00'	942 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
241.00	209	62.3	0	0	209	
242.00	424	81.1	310	310	435	
243.10	739	105.4	632	942	810	

Device	Routing	Invert	Outlet Devices
#1	Primary	238.50'	0.3" Vert. 5/16" Orifice At End of Pipe C= 0.600
#2	Device 1	238.83'	4.0" Round Culvert L= 32.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 238.83' / 238.50' S= 0.0103 ' /' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf
#3	Device 2	238.83'	4.0" Vert. Orifice/Grate C= 0.600
#4	Device 3	241.00'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 231.00'
#5	Secondary	242.00'	6.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 12.23 hrs HW=242.04' TW=0.00' (Dynamic Tailwater)↑ **1=5/16" Orifice At End of Pipe** (Orifice Controls 0.00 cfs @ 9.05 fps)↑ **2=Culvert** (Passes 0.00 cfs of 0.52 cfs potential flow)↑ **3=Orifice/Grate** (Passes 0.00 cfs of 0.73 cfs potential flow)↑ **4=Exfiltration** (Passes 0.00 cfs of 0.03 cfs potential flow)**Secondary OutFlow** Max=0.13 cfs @ 12.23 hrs HW=242.04' TW=0.00' (Dynamic Tailwater)↑ **5=Broad-Crested Rectangular Weir** (Weir Controls 0.13 cfs @ 0.52 fps)**Summary for Link SP1:**

Inflow Area = 123,886 sf, 17.42% Impervious, Inflow Depth = 1.33" for 2-Year event

Inflow = 2.05 cfs @ 12.30 hrs, Volume= 13,763 cf

Primary = 2.05 cfs @ 12.30 hrs, Volume= 13,763 cf, Atten= 0%, Lag= 0.0 min

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

Summary for Link SP2:

Inflow Area = 8,653 sf, 51.88% Impervious, Inflow Depth = 2.12" for 2-Year event
Inflow = 0.27 cfs @ 12.22 hrs, Volume= 1,529 cf
Primary = 0.27 cfs @ 12.22 hrs, Volume= 1,529 cf, Atten= 0%, Lag= 0.0 min

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

Summary for Link SP3:

Inflow Area = 8,558 sf, 0.00% Impervious, Inflow Depth = 1.27" for 2-Year event
Inflow = 0.28 cfs @ 12.11 hrs, Volume= 909 cf
Primary = 0.28 cfs @ 12.11 hrs, Volume= 909 cf, Atten= 0%, Lag= 0.0 min

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

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Type III 24-hr 10-Year Rainfall=4.60"

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment5: Runoff Area=33,474 sf 12.51% Impervious Runoff Depth=2.72"
 Flow Length=256' Tc=18.7 min UI Adjusted CN=WQ Runoff=1.65 cfs 7,582 cf

Subcatchment10: Runoff Area=34,744 sf 7.65% Impervious Runoff Depth=1.54"
 Flow Length=554' Tc=29.1 min CN=WQ Runoff=0.80 cfs 4,447 cf

Subcatchment11: Runoff Area=19,509 sf 44.91% Impervious Runoff Depth=2.58"
 Flow Length=268' Tc=12.5 min CN=WQ Runoff=0.98 cfs 4,199 cf

Subcatchment20: Runoff Area=3,755 sf 47.35% Impervious Runoff Depth=3.39"
 Flow Length=76' Tc=8.2 min CN=WQ Runoff=0.29 cfs 1,061 cf

Subcatchment21: Runoff Area=4,898 sf 55.35% Impervious Runoff Depth=3.55"
 Flow Length=103' Tc=6.0 min CN=WQ Runoff=0.42 cfs 1,450 cf

Subcatchment30: Runoff Area=8,558 sf 0.00% Impervious Runoff Depth=2.48"
 Flow Length=54' Tc=7.0 min CN=WQ Runoff=0.54 cfs 1,767 cf

Subcatchment40: Runoff Area=21,458 sf 27.80% Impervious Runoff Depth=3.01"
 Flow Length=322' Tc=30.9 min CN=WQ Runoff=0.93 cfs 5,384 cf

Subcatchment41: Runoff Area=6,143 sf 0.00% Impervious Runoff Depth=2.46"
 Flow Length=150' Slope=0.1054 '/' Tc=15.5 min CN=79 Runoff=0.30 cfs 1,260 cf

Reach R1: Avg. Flow Depth=0.10' Max Vel=1.53 fps Inflow=0.54 cfs 1,767 cf
 n=0.030 L=157.8' S=0.0494 '/' Capacity=34.40 cfs Outflow=0.52 cfs 1,767 cf

Reach R2: Avg. Flow Depth=0.13' Max Vel=1.09 fps Inflow=0.52 cfs 1,767 cf
 n=0.035 L=122.8' S=0.0244 '/' Capacity=701.28 cfs Outflow=0.51 cfs 1,767 cf

Pond FB1: Peak Elev=237.12' Storage=1,669 cf Inflow=0.98 cfs 4,199 cf
 Primary=0.03 cfs 3,014 cf Secondary=0.43 cfs 1,186 cf Outflow=0.46 cfs 4,199 cf

Pond FB2: Peak Elev=242.09' Storage=350 cf Inflow=0.42 cfs 1,450 cf
 Primary=0.00 cfs 624 cf Secondary=0.41 cfs 826 cf Outflow=0.41 cfs 1,450 cf

Link SP1: Inflow=3.97 cfs 24,638 cf
 Primary=3.97 cfs 24,638 cf

Link SP2: Inflow=0.70 cfs 2,511 cf
 Primary=0.70 cfs 2,511 cf

Link SP3: Inflow=0.54 cfs 1,767 cf
 Primary=0.54 cfs 1,767 cf

Total Runoff Area = 132,539 sf Runoff Volume = 27,149 cf Average Runoff Depth = 2.46"
80.33% Pervious = 106,475 sf 19.67% Impervious = 26,064 sf

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Type III 24-hr 25-Year Rainfall=5.80"

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment5: Runoff Area=33,474 sf 12.51% Impervious Runoff Depth=3.78"
 Flow Length=256' Tc=18.7 min UI Adjusted CN=WQ Runoff=2.30 cfs 10,548 cf

Subcatchment10: Runoff Area=34,744 sf 7.65% Impervious Runoff Depth=2.18"
 Flow Length=554' Tc=29.1 min CN=WQ Runoff=1.11 cfs 6,313 cf

Subcatchment11: Runoff Area=19,509 sf 44.91% Impervious Runoff Depth=3.45"
 Flow Length=268' Tc=12.5 min CN=WQ Runoff=1.28 cfs 5,604 cf

Subcatchment20: Runoff Area=3,755 sf 47.35% Impervious Runoff Depth=4.51"
 Flow Length=76' Tc=8.2 min CN=WQ Runoff=0.39 cfs 1,411 cf

Subcatchment21: Runoff Area=4,898 sf 55.35% Impervious Runoff Depth=4.69"
 Flow Length=103' Tc=6.0 min CN=WQ Runoff=0.55 cfs 1,913 cf

Subcatchment30: Runoff Area=8,558 sf 0.00% Impervious Runoff Depth=3.52"
 Flow Length=54' Tc=7.0 min CN=WQ Runoff=0.77 cfs 2,511 cf

Subcatchment40: Runoff Area=21,458 sf 27.80% Impervious Runoff Depth=4.10"
 Flow Length=322' Tc=30.9 min CN=WQ Runoff=1.26 cfs 7,329 cf

Subcatchment41: Runoff Area=6,143 sf 0.00% Impervious Runoff Depth=3.50"
 Flow Length=150' Slope=0.1054 '/' Tc=15.5 min CN=79 Runoff=0.43 cfs 1,793 cf

Reach R1: Avg. Flow Depth=0.12' Max Vel=1.67 fps Inflow=0.77 cfs 2,511 cf
 n=0.030 L=157.8' S=0.0494 '/' Capacity=34.40 cfs Outflow=0.75 cfs 2,511 cf

Reach R2: Avg. Flow Depth=0.15' Max Vel=1.19 fps Inflow=0.75 cfs 2,511 cf
 n=0.035 L=122.8' S=0.0244 '/' Capacity=701.28 cfs Outflow=0.73 cfs 2,511 cf

Pond FB1: Peak Elev=237.16' Storage=1,784 cf Inflow=1.28 cfs 5,604 cf
 Primary=0.03 cfs 3,213 cf Secondary=0.96 cfs 2,391 cf Outflow=0.99 cfs 5,605 cf

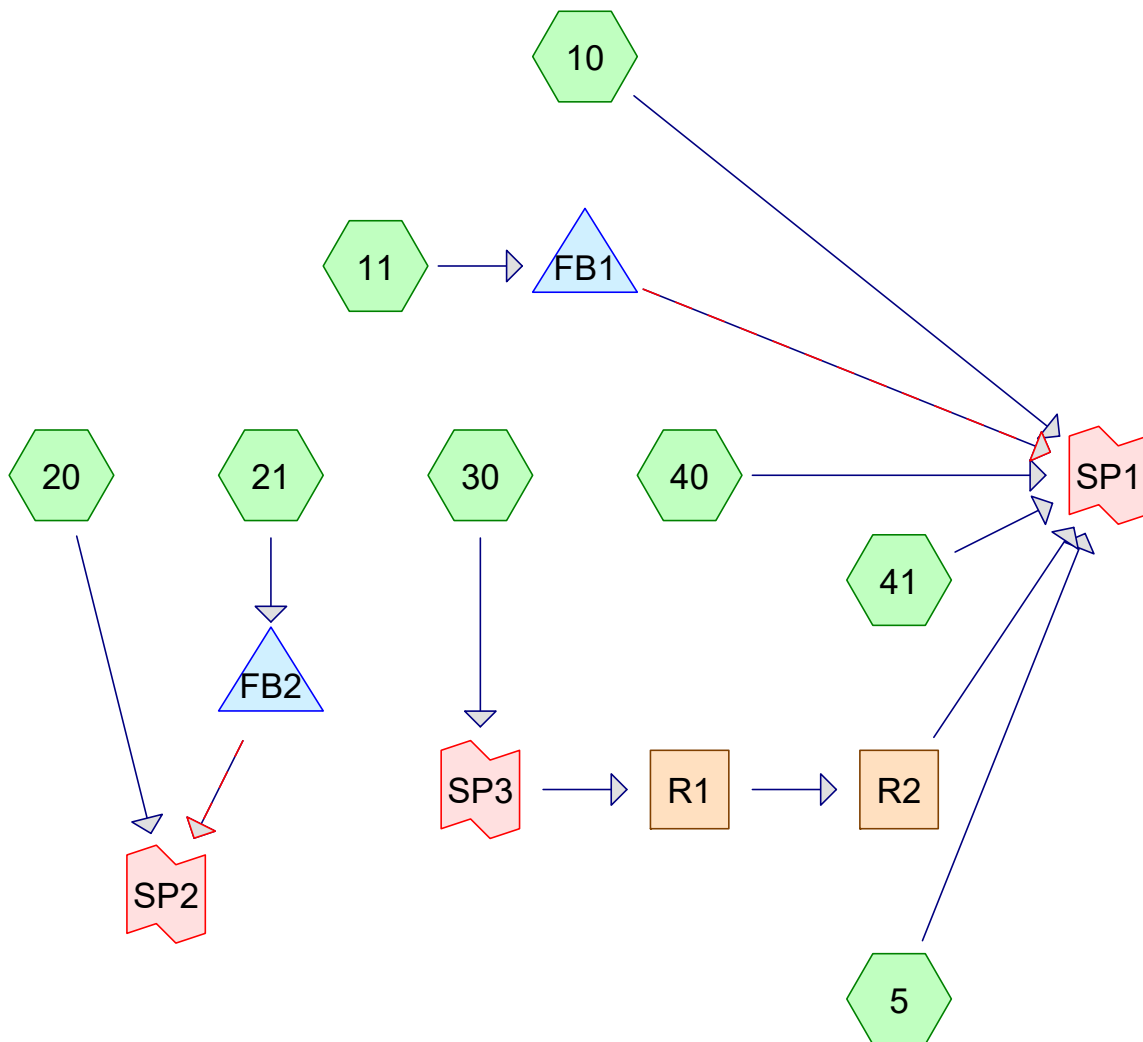
Pond FB2: Peak Elev=242.11' Storage=358 cf Inflow=0.55 cfs 1,913 cf
 Primary=0.00 cfs 639 cf Secondary=0.54 cfs 1,274 cf Outflow=0.54 cfs 1,913 cf

Link SP1: Inflow=6.19 cfs 34,098 cf
 Primary=6.19 cfs 34,098 cf

Link SP2: Inflow=0.93 cfs 3,324 cf
 Primary=0.93 cfs 3,324 cf

Link SP3: Inflow=0.77 cfs 2,511 cf
 Primary=0.77 cfs 2,511 cf

Total Runoff Area = 132,539 sf Runoff Volume = 37,421 cf Average Runoff Depth = 3.39"
80.33% Pervious = 106,475 sf 19.67% Impervious = 26,064 sf



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Type III 24-hr 25-Year Rainfall=5.80"

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment5: Runoff Area=33,474 sf 12.51% Impervious Runoff Depth=3.78"
Flow Length=256' Tc=18.7 min UI Adjusted CN=WQ Runoff=2.30 cfs 10,548 cf

Subcatchment10: Runoff Area=34,744 sf 7.65% Impervious Runoff Depth=2.18"
Flow Length=554' Tc=29.1 min CN=WQ Runoff=1.11 cfs 6,313 cf

Subcatchment11: Runoff Area=19,509 sf 44.91% Impervious Runoff Depth=3.45"
Flow Length=268' Tc=12.5 min CN=WQ Runoff=1.28 cfs 5,604 cf

Subcatchment20: Runoff Area=3,755 sf 47.35% Impervious Runoff Depth=4.51"
Flow Length=76' Tc=8.2 min CN=WQ Runoff=0.39 cfs 1,411 cf

Subcatchment21: Runoff Area=4,898 sf 55.35% Impervious Runoff Depth=4.69"
Flow Length=103' Tc=6.0 min CN=WQ Runoff=0.55 cfs 1,913 cf

Subcatchment30: Runoff Area=8,558 sf 0.00% Impervious Runoff Depth=3.52"
Flow Length=54' Tc=7.0 min CN=WQ Runoff=0.77 cfs 2,511 cf

Subcatchment40: Runoff Area=21,458 sf 27.80% Impervious Runoff Depth=4.10"
Flow Length=322' Tc=30.9 min CN=WQ Runoff=1.26 cfs 7,329 cf

Subcatchment41: Runoff Area=6,143 sf 0.00% Impervious Runoff Depth=3.50"
Flow Length=150' Slope=0.1054 '/' Tc=15.5 min CN=79 Runoff=0.43 cfs 1,793 cf

Reach R1: Avg. Flow Depth=0.12' Max Vel=1.67 fps Inflow=0.77 cfs 2,511 cf
n=0.030 L=157.8' S=0.0494 '/' Capacity=34.40 cfs Outflow=0.75 cfs 2,511 cf

Reach R2: Avg. Flow Depth=0.15' Max Vel=1.19 fps Inflow=0.75 cfs 2,511 cf
n=0.035 L=122.8' S=0.0244 '/' Capacity=701.28 cfs Outflow=0.73 cfs 2,511 cf

Pond FB1: Peak Elev=237.18' Storage=1,826 cf Inflow=1.28 cfs 5,604 cf
Primary=0.00 cfs 0 cf Secondary=1.19 cfs 4,093 cf Outflow=1.19 cfs 4,093 cf

Pond FB2: Peak Elev=242.11' Storage=358 cf Inflow=0.55 cfs 1,913 cf
Primary=0.00 cfs 0 cf Secondary=0.54 cfs 1,603 cf Outflow=0.54 cfs 1,603 cf

Link SP1: Inflow=6.34 cfs 32,586 cf
Primary=6.34 cfs 32,586 cf

Link SP2: Inflow=0.93 cfs 3,014 cf
Primary=0.93 cfs 3,014 cf

Link SP3: Inflow=0.77 cfs 2,511 cf
Primary=0.77 cfs 2,511 cf

Total Runoff Area = 132,539 sf Runoff Volume = 37,421 cf Average Runoff Depth = 3.39"
80.33% Pervious = 106,475 sf 19.67% Impervious = 26,064 sf

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Type III 24-hr 25-Year Rainfall=5.80"

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Summary for Subcatchment 5:

Runoff = 2.30 cfs @ 12.26 hrs, Volume= 10,548 cf, Depth= 3.78"

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

Area (sf)	CN	Adj	Description
* 4,189	98	98	Ex. houses/garage/shed, unconnected roofs
7,406	80	80	>75% Grass cover, Good, HSG D
21,879	79	79	Woods/grass comb., Good, HSG D
33,474			Weighted Average
29,285			87.49% Pervious Area
4,189			12.51% Impervious Area
4,189			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0408	0.13		Sheet Flow, SEG A to B Grass: Dense n= 0.240 P2= 3.10"
11.9	83	0.0623	0.12		Sheet Flow, SEG B to C Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	123	0.0244	4.18	441.47	Channel Flow, Seg C to D Area= 105.7 sf Perim= 211.5' r= 0.50' n= 0.035 Earth, dense weeds
18.7	256	Total			

Summary for Subcatchment 10:

Runoff = 1.11 cfs @ 12.40 hrs, Volume= 6,313 cf, Depth= 2.18"

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

Area (sf)	CN	Description
* 2,329	98	Roosevelt Trail, exist. paved roads
* 329	98	Proposed road, paved parking
1,322	39	>75% Grass cover, Good, HSG A
5,122	80	>75% Grass cover, Good, HSG D
0	30	Meadow, non-grazed, HSG A
0	78	Meadow, non-grazed, HSG D
14,069	32	Woods/grass comb., Good, HSG A
11,573	79	Woods/grass comb., Good, HSG D
34,744		Weighted Average
32,086		92.35% Pervious Area
2,658		7.65% Impervious Area

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Type III 24-hr 25-Year Rainfall=5.80"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	111	0.0198	0.12		Sheet Flow, SEG A to B Grass: Dense n= 0.240 P2= 3.10"
11.9	209	0.0034	0.29		Shallow Concentrated Flow, SEG B to C Woodland Kv= 5.0 fps
0.2	52	0.0270	5.08	38.11	Trap/Vee/Rect Channel Flow, SEG C to D Bot.W=0.00' D=1.00' Z= 3.0 & 12.0 ' Top.W=15.00' n= 0.030 Earth, grassed & winding
0.9	61	0.0471	1.09		Shallow Concentrated Flow, SEG D to E Woodland Kv= 5.0 fps
0.3	121	0.0525	6.07	106.85	Channel Flow, SEG E to F Area= 17.6 sf Perim= 35.7' r= 0.49' n= 0.035 Earth, dense weeds
29.1	554	Total			

Summary for Subcatchment 11:

Runoff = 1.28 cfs @ 12.17 hrs, Volume= 5,604 cf, Depth= 3.45"

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

Area (sf)	CN	Description
* 0	98	Roosevelt Trail, exist. paved roads
* 702	98	Proposed road & driveway, paved parking
8,060	98	Unconnected roofs, HSG A
6,288	39	>75% Grass cover, Good, HSG A
4,459	80	>75% Grass cover, Good, HSG D
0	32	Woods/grass comb., Good, HSG A
0	79	Woods/grass comb., Good, HSG D
19,509		Weighted Average
10,747		55.09% Pervious Area
8,762		44.91% Impervious Area
8,060		91.99% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	91	0.0268	0.13		Sheet Flow, SEG A to B Grass: Dense n= 0.240 P2= 3.10"
0.5	177	0.0310	5.83	23.31	Trap/Vee/Rect Channel Flow, SEG B to C Bot.W=1.00' D=1.00' Z= 3.0 ' Top.W=7.00' n= 0.030 Earth, grassed & winding
12.5	268	Total			

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Type III 24-hr 25-Year Rainfall=5.80"

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Summary for Subcatchment 20:

Runoff = 0.39 cfs @ 12.11 hrs, Volume= 1,411 cf, Depth= 4.51"

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

	Area (sf)	CN	Description
*	1,426	98	Roosevelt Trail, exist. paved roads
*	352	98	Proposed road, paved parking
	0	39	>75% Grass cover, Good, HSG A
	1,502	80	>75% Grass cover, Good, HSG D
	284	78	Meadow, non-grazed, HSG D
	0	32	Woods/grass comb., Good, HSG A
	191	79	Woods/grass comb., Good, HSG D
	3,755		Weighted Average
	1,977		52.65% Pervious Area
	1,778		47.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	16	0.0203	0.94		Sheet Flow, SEG A to B Smooth surfaces n= 0.011 P2= 3.10"
2.2	17	0.0669	0.13		Sheet Flow, SEG B to C Grass: Dense n= 0.240 P2= 3.10"
2.9	12	0.0432	0.07		Sheet Flow, SEG C to D Woods: Light underbrush n= 0.400 P2= 3.10"
2.8	31	0.0460	0.18		Sheet Flow, SEG D to E Grass: Short n= 0.150 P2= 3.10"
8.2	76	Total			

Summary for Subcatchment 21:

Runoff = 0.55 cfs @ 12.09 hrs, Volume= 1,913 cf, Depth= 4.69"

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

	Area (sf)	CN	Description
*	0	98	Roosevelt Trail, exist. paved roads
*	2,711	98	Proposed road & driveway, paved parking
	0	98	Unconnected roofs, HSG A
	0	39	>75% Grass cover, Good, HSG A
	2,187	80	>75% Grass cover, Good, HSG D
	0	32	Woods/grass comb., Good, HSG A
	0	79	Woods/grass comb., Good, HSG D
	4,898		Weighted Average
	2,187		44.65% Pervious Area
	2,711		55.35% Impervious Area

18088 - POST-SPILLWAY

Type III 24-hr 25-Year Rainfall=5.80"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	16	0.0203	0.94		Sheet Flow, SEG A to B Smooth surfaces n= 0.011 P2= 3.10"
0.3	71	0.0154	4.52	28.39	Trap/Vee/Rect Channel Flow, SEG B to C Bot.W=0.00' D=0.50' Z= 0.2 & 50.0 ' Top.W=25.10' n= 0.016 Asphalt, rough
0.1	16	0.0824	4.62		Shallow Concentrated Flow, SEG C to D Unpaved Kv= 16.1 fps
0.7	103	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 30:

Runoff = 0.77 cfs @ 12.10 hrs, Volume= 2,511 cf, Depth= 3.52"

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

Area (sf)	CN	Description
*	0	98 Roosevelt Trail, exist. paved roads
*	0	98 Proposed road, paved parking
	0	39 >75% Grass cover, Good, HSG A
3,511	80	>75% Grass cover, Good, HSG D
1,889	78	Meadow, non-grazed, HSG D
0	32	Woods/grass comb., Good, HSG A
3,158	79	Woods/grass comb., Good, HSG D
8,558		Weighted Average
8,558		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	29	0.0937	0.17		Sheet Flow, SEG A to B Grass: Dense n= 0.240 P2= 3.10"
4.1	25	0.0811	0.10		Sheet Flow, SEG B to C Woods: Light underbrush n= 0.400 P2= 3.10"
7.0	54	Total			

Summary for Subcatchment 40:

Runoff = 1.26 cfs @ 12.42 hrs, Volume= 7,329 cf, Depth= 4.10"

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

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Type III 24-hr 25-Year Rainfall=5.80"

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Area (sf)	CN	Description
* 0	98	Roosevelt Trail, exist. paved roads
* 5,966	98	Proposed road & driveway, paved parking
0	98	Unconnected roofs, HSG A
0	39	>75% Grass cover, Good, HSG A
5,223	80	>75% Grass cover, Good, HSG D
0	32	Woods/grass comb., Good, HSG A
10,269	79	Woods/grass comb., Good, HSG D
21,458		Weighted Average
15,492		72.20% Pervious Area
5,966		27.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	150	0.0611	0.19		Sheet Flow, SEG A to B Grass: Dense n= 0.240 P2= 3.10"
0.1	22	0.1342	5.49		Shallow Concentrated Flow, SEG B to C Grassed Waterway Kv= 15.0 fps
18.0	150	0.0730	0.14		Sheet Flow, SEG C to D (after LEVEL SPREADER) Woods: Light underbrush n= 0.400 P2= 3.10"
30.9	322	Total			

Summary for Subcatchment 41:

Runoff = 0.43 cfs @ 12.21 hrs, Volume= 1,793 cf, Depth= 3.50"

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

Area (sf)	CN	Description
6,143	79	Woods/grass comb., Good, HSG D
6,143		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	150	0.1054	0.16		Sheet Flow, SEG A to B Woods: Light underbrush n= 0.400 P2= 3.10"

Summary for Reach R1:

Inflow Area = 8,558 sf, 0.00% Impervious, Inflow Depth = 3.52" for 25-Year event
Inflow = 0.77 cfs @ 12.10 hrs, Volume= 2,511 cf
Outflow = 0.75 cfs @ 12.12 hrs, Volume= 2,511 cf, Atten= 3%, Lag= 1.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.67 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.67 fps, Avg. Travel Time= 3.9 min

Peak Storage= 70 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 0.50' Flow Area= 7.9 sf, Capacity= 34.40 cfs

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Type III 24-hr 25-Year Rainfall=5.80"

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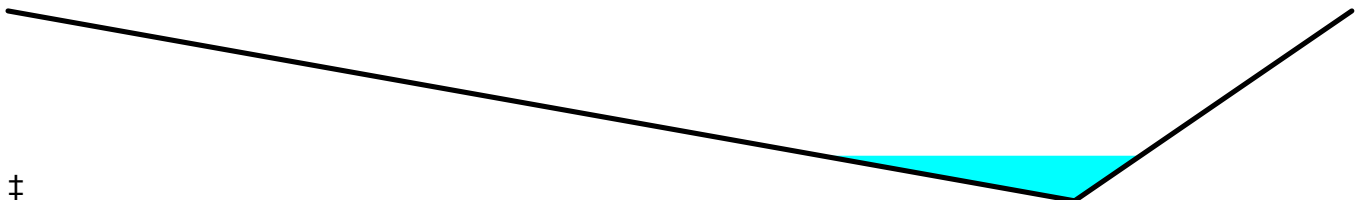
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0.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 50.0 13.0 '/' Top Width= 31.50'

Length= 157.8' Slope= 0.0494 '/'

Inlet Invert= 239.80', Outlet Invert= 232.00'

**Summary for Reach R2:**

Inflow Area = 8,558 sf, 0.00% Impervious, Inflow Depth = 3.52" for 25-Year event

Inflow = 0.75 cfs @ 12.12 hrs, Volume= 2,511 cf

Outflow = 0.73 cfs @ 12.15 hrs, Volume= 2,511 cf, Atten= 2%, Lag= 1.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Max. Velocity= 1.19 fps, Min. Travel Time= 1.7 min

Avg. Velocity= 0.51 fps, Avg. Travel Time= 4.0 min

Peak Storage= 75 cf @ 12.15 hrs

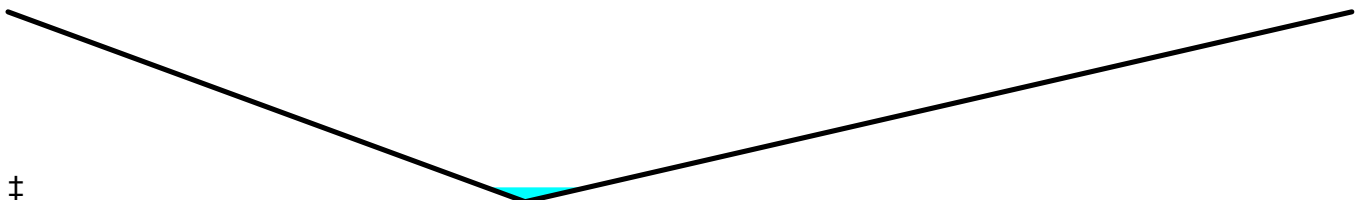
Average Depth at Peak Storage= 0.15'

Bank-Full Depth= 2.00' Flow Area= 105.7 sf, Capacity= 701.28 cfs

Custom cross-section, Length= 122.8' Slope= 0.0244 '/'

Constant n= 0.035

Inlet Invert= 232.00', Outlet Invert= 229.00'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	232.00	0.00
40.69	230.00	2.00
105.73	232.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
2.00	105.7	105.8	12,984	701.28

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Type III 24-hr 25-Year Rainfall=5.80"

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Summary for Pond FB1:

Inflow Area = 19,509 sf, 44.91% Impervious, Inflow Depth = 3.45" for 25-Year event
 Inflow = 1.28 cfs @ 12.17 hrs, Volume= 5,604 cf
 Outflow = 1.19 cfs @ 12.22 hrs, Volume= 4,093 cf, Atten= 7%, Lag= 3.2 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
 Secondary = 1.19 cfs @ 12.22 hrs, Volume= 4,093 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 237.18' @ 12.22 hrs Surf.Area= 2,510 sf Storage= 1,826 cf

Plug-Flow detention time= 176.8 min calculated for 4,088 cf (73% of inflow)
 Center-of-Mass det. time= 83.1 min (859.5 - 776.4)

Volume	Invert	Avail.Storage	Storage Description		
#1	236.00'	4,232 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
236.00	627	124.4	0	0	627
237.00	2,340	230.0	1,393	1,393	3,610
238.00	3,370	330.0	2,839	4,232	8,076

Device	Routing	Invert	Outlet Devices
#1	Primary	233.05'	0.7" Vert. Orifice/Grate X 0.00 C= 0.600
#2	Device 1	233.83'	4.0" Round Culvert L= 61.9' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 233.83' / 233.50' S= 0.0053 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf
#3	Device 2	233.83'	4.0" Vert. Orifice/Grate C= 0.600
#4	Device 3	236.00'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 231.00'
#5	Secondary	237.05'	10.0' long x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=236.00' TW=0.00' (Dynamic Tailwater)

↑ **1=Orifice/Grate** (Controls 0.00 cfs)
 ↑ **2=Culvert** (Passes 0.00 cfs of 0.33 cfs potential flow)
 ↑ **3=Orifice/Grate** (Passes 0.00 cfs of 0.59 cfs potential flow)
 ↑ **4=Exfiltration** (Passes 0.00 cfs of 0.03 cfs potential flow)

Secondary OutFlow Max=1.17 cfs @ 12.22 hrs HW=237.18' TW=0.00' (Dynamic Tailwater)

↑ **5=Broad-Crested Rectangular Weir** (Weir Controls 1.17 cfs @ 0.92 fps)

Summary for Pond FB2:

Inflow Area = 4,898 sf, 55.35% Impervious, Inflow Depth = 4.69" for 25-Year event
 Inflow = 0.55 cfs @ 12.09 hrs, Volume= 1,913 cf
 Outflow = 0.54 cfs @ 12.11 hrs, Volume= 1,603 cf, Atten= 2%, Lag= 1.1 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
 Secondary = 0.54 cfs @ 12.11 hrs, Volume= 1,603 cf

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Type III 24-hr 25-Year Rainfall=5.80"

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Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Peak Elev= 242.11' @ 12.11 hrs Surf.Area= 452 sf Storage= 358 cf

Plug-Flow detention time= 122.8 min calculated for 1,601 cf (84% of inflow)

Center-of-Mass det. time= 54.7 min (824.4 - 769.6)

Volume	Invert	Avail.Storage	Storage Description
#1	241.00'	942 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
241.00	209	62.3	0	0	209
242.00	424	81.1	310	310	435
243.10	739	105.4	632	942	810

Device	Routing	Invert	Outlet Devices
#1	Primary	238.50'	0.3" Vert. 5/16" Orifice At End of Pipe X 0.00 C= 0.600
#2	Device 1	238.83'	4.0" Round Culvert L= 32.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 238.83' / 238.50' S= 0.0103 ' /' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf
#3	Device 2	238.83'	4.0" Vert. Orifice/Grate C= 0.600
#4	Device 3	241.00'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 231.00'
#5	Secondary	242.00'	6.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=241.00' TW=0.00' (Dynamic Tailwater)↑ **1=5/16" Orifice At End of Pipe** (Controls 0.00 cfs)↑ **2=Culvert** (Passes 0.00 cfs of 0.43 cfs potential flow)↑ **3=Orifice/Grate** (Passes 0.00 cfs of 0.59 cfs potential flow)↑ **4=Exfiltration** (Passes 0.00 cfs of 0.01 cfs potential flow)**Secondary OutFlow** Max=0.54 cfs @ 12.11 hrs HW=242.11' TW=0.00' (Dynamic Tailwater)↑ **5=Broad-Crested Rectangular Weir** (Weir Controls 0.54 cfs @ 0.82 fps)**Summary for Link SP1:**

Inflow Area = 123,886 sf, 17.42% Impervious, Inflow Depth = 3.16" for 25-Year event
 Inflow = 6.34 cfs @ 12.26 hrs, Volume= 32,586 cf
 Primary = 6.34 cfs @ 12.26 hrs, Volume= 32,586 cf, Atten= 0%, Lag= 0.0 min

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

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Summary for Link SP2:

Inflow Area = 8,653 sf, 51.88% Impervious, Inflow Depth = 4.18" for 25-Year event
Inflow = 0.93 cfs @ 12.11 hrs, Volume= 3,014 cf
Primary = 0.93 cfs @ 12.11 hrs, Volume= 3,014 cf, Atten= 0%, Lag= 0.0 min

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

Summary for Link SP3:

Inflow Area = 8,558 sf, 0.00% Impervious, Inflow Depth = 3.52" for 25-Year event
Inflow = 0.77 cfs @ 12.10 hrs, Volume= 2,511 cf
Primary = 0.77 cfs @ 12.10 hrs, Volume= 2,511 cf, Atten= 0%, Lag= 0.0 min

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

ATTACHMENT 4

INSPECTION, MAINTENANCE & HOUSEKEEPING PLAN



INSPECTION, MAINTENANCE, AND HOUSEKEEPING PLAN
(Prepared by Jayson Haskell, PE #13002)

515 ROOSEVELT TRAIL CONDOMINIUM
WINDHAM, MAINE

Responsible Party

Owner: JTSH Holdings, LLC
P.O. Box 232
Windham, Maine 04062

The owners are 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 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 Maine Department of Environmental Protection (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 generating more than 0.5 inch of rainfall over a 24-hour period 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 Town 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.

Housekeeping

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 Town 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 Town'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. Storm Drains:** Inspect storm drains 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 storm drain's outlet.
 - D. Underdrained Filter Basin:** The filter basins are not intended to function as snow storage areas. Inspector to verify that winter plowing operations are not dumping or pushing snow into the basins. The basins shall also not be used for vehicle or heavy equipment storage. Basin should be inspected after several major storm

events (0.5 inches rainfall over 24 hours) to determine drawdown time during the first year. Basins to be inspected every six months thereafter with at least one inspection after a major storm event. The basin should drain dry within 24 to 48 hours following a one-inch storm. If ponding exceeds 48 hours, the top of the filter bed must be rototilled to reestablish the soil's filtration capacity. If water ponds on the surface of the bed for more than 72 hours, the top several inches of the filter shall be replaced with fresh material. Inspect for debris and sediment build up in the basin and remove as needed. Mowing of the basin can only occur semi-annually to a height of no less than 6 inches utilizing a hand-held string trimmer or push-mower. Any bare areas or erosion rills 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.

- E. Emergency Spillway:** Spillways should be inspected semi-annually and following major storm events for the first year and every six months thereafter to remove any obstructions to flow. Any woody vegetation growing through riprap lining must be removed. Replace riprap on areas where any underlying filter fabric is showing through the stone or where stones have been dislodged.
- F. Roofline Dripedge:** The dripedges should be inspected semi-annually and following major storm events for the first year and every six months thereafter. The reservoir crushed stone should drain within 48 hours following a one-inch storm. If ponding exceeds 48 hours, the stone reservoir course shall be removed and the filter bed be rototilled to reestablish the soil's filtration capacity. If water ponds in the reservoir course for more than 72 hours, the top several inches of the filter shall be replaced with fresh material. Inspect for debris and sediment build up at surface and remove as needed. The dripedges are part of the stormwater management plan and cannot be paved over or altered in anyway.
- G. Buffers:** Wooded buffers must remain fully wooded and have no disturbance to the duff layer. Stormwater runoff should enter the buffer as sheet flow, and any observed channelization of flows or erosion should be corrected immediately. Activities that may result in disturbance of the duff layer are prohibited in a buffer.
- H. Regular Maintenance:** Clear accumulations of winter sand along parking areas 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.
- I. 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 and MDEP 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.

Re-certification

As a requirement of the Town, the stormwater infrastructure shall be inspected yearly by a qualified third party inspector. The third party inspector shall perform an initial inspection to determine the status of the stormwater management facilities. If the initial inspection identifies any deficiencies with the facilities, the same third party inspector shall re-inspect the facilities after they have been maintained or repaired to determine if they are performing as intended. Once the site is satisfactory, the third party inspector shall submit the Annual Stormwater Management Facilities Certification form and report to the Office of Code Enforcement. The certification form shall be submitted to the Town prior to May 1 of each year. A copy of the approval form has been included at the end of this document.

Duration of Maintenance

Perform maintenance as described

INSPECTION AND MAINTENANCE LOG

515 ROOSEVELT TRAIL CONDOMINIUM WINDHAM, MAINE (SHEET 1 OF 2)

The following stormwater management and erosion control items shall be inspected and maintained as prescribed in the Maintenance Plan with recommended frequencies as identified below. The owner is responsible for keeping this maintenance log on file for a minimum of five years and shall provide a copy to the Town upon request. Inspections are to be performed by a qualified third-party inspector and all corrective actions shall be performed by personnel familiar with stormwater management systems and erosion controls.

Maintenance Item	Maintenance Event	Date Performed	Responsible Personnel	Comments
Vegetated Areas	Inspect slopes and embankments early in Spring.			
Ditches, swales and other open channels	Inspect after major rainfall event.			
	Inspect for erosion or slumping and repair			
	Mowed at least annually			
Storm Drains	Inspect semiannually and after major rainfall.			
	Repair erosion at outlet of pipe.			
	Repair displaced riprap.			
Emergency Spillway	Inspect and remove obstructions and wood vegetation as necessary.			
	Replace riprap as necessary.			
Roofline Dripedge	Check after each rainfall event to ensure that stone drains within 24-48 hours.			
	Inspect semi-annually for erosion or sediment accumulation and repair as necessary.			
Buffers	Inspect for erosion and channelized flow semiannually.			
	Remove accumulated sediment semiannually.			
	Inspect vegetation cover and reestablish as needed.			
Regular Maintenance	Clear accumulation of winter sand in paved areas annually.			

INSPECTION AND MAINTENANCE LOG

515 ROOSEVELT TRAIL CONDOMINIUM WINDHAM, MAINE (SHEET 2 OF 2)

Maintenance Item	Maintenance Event	Date Performed	Responsible Personnel	Comments
Underdrained Filter Basin	Check after each rainfall event to ensure that pond drains within 24-48 hours.			
	Replace top several inches of filter if pond does not drain within 72 hours.			
	Mow grass no more than twice a year to no less than 6 inches in height.			
	Inspect semi-annually for erosion or sediment accumulation and repair as necessary.			
	Inspector to verify basin not utilized for snow storage			
	Inspector to verify basin not utilized for vehicle or heavy equipment storage.			

APPENDIX 1

**Annual Stormwater Management Facilities Certification
(to be sent to Municipal Enforcement Authority)**

I, _____ (print or type name), certify the following:

1. I am making this annual stormwater management facilities certification for the following property: _____ (print or type name of subdivision, condominium or other development) located at _____ (print or type address), (the "property");

2. The owner, operator, tenant, lessee or homeowners' association of the property is: _____ (name(s) of owner, operator, tenant, lessee, homeowners' association or other party having control over the property);

3. I am the owner, operator, tenant, lessee or president of the homeowners' association, or am a qualified third party inspector hired by the same (circle one);

4. I have knowledge of erosion and stormwater control and have reviewed the approved post-construction stormwater management plan for the property;

5. On _____, 20__, I inspected or had inspected by _____, a qualified third-party inspector, the stormwater management facilities, including but not limited to parking areas, catch basins, drainage swales, detention basins and ponds, pipes and related structures required by the approved post-construction stormwater management plan for the property;

6. At the time of my inspection of the stormwater management facilities on the property, I or the qualified third-party inspector identified the following need(s) for routine maintenance or deficiencies in the stormwater management facilities:

7. On _____, 20__, I took or had taken the following routine maintenance or the following corrective action(s) to address the deficiencies in the stormwater management facilities stated in 6 above:

8. As of the date of this certification, the stormwater management facilities are functioning as intended by the approved post-construction stormwater management plan for the property

Date: _____, 20__

By: _____
Signature

Print Name

STATE OF MAINE

_____, ss

_____, 20__

Personally appeared the above-named _____, the
_____ of _____, and acknowledged the foregoing annual
certification to be said person's free act and deed in said capacity.

Before me,

Notary Public/Attorney at Law

Print Name:

Mail this certification to the Town of Windham at the following address:

**Office of Code Enforcement
Town of Windham
8 School Road
Windham, ME 04062**