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Storm Water Management Plan

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STORMWATER MANAGEMENT PLAN

for

97 Cumberland Avenue
Portland, Maine

prepared for

Peter Dugas
243 State Street
Portland, ME 04101

March 2014

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TABLE OF CONTENTS

STORMWATER MANAGEMENT PLAN

97 Cumberland Avenue
Portland, Maine

I. Introduction

This Stormwater Management Plan has been prepared to address the potential impacts associated with this project due to the proposed modification in stormwater runoff characteristics. The stormwater management controls that are outlined in this plan have been designed based on commonly accepted engineering methods and to comply with applicable regulatory requirements.

II. Existing Conditions

The site is located at 97 Cumberland Avenue and behind the 7-Eleven Convenience Store on Washington Ave. The lot has been occupied as a residential house for many years until it was recently demolished due to the declining condition of the structure. The pre-existing home was located in the far northwest corner of the lot. The home was accessed from an existing gravel driveway which is also shared by 93-95 Cumberland Ave. The land cover is mostly lawn and driveway. The topography slopes steeply from east to west towards 7-Eleven. The only other vegetation is evasive plants growing along the fence & retaining wall separating parcel from the 7-Eleven.

A. Surface Water Features

There is no surface water features.

B. Site Topography

The topography slopes steeply at 20% to 30% from east to west at the southerly end and moderately at 3% to 6% central portion of the site. The existing driveway slopes 12% away from Cumberland Ave.

C. Soils

Soil characteristics were obtained from the Soil Conservation Service (SCS) Medium Intensity Soil Survey of Cumberland County. Soils identified on the site are identified below in Table 1. These soil boundaries have been identified on the attached Watershed Maps.

Table 1 – Proximity Soil Types and Characteristics		
Soil Type	Symbol	HSG
Hinckley gravelly Sandy Loam		A

The hydrologic soil group (HSG) designation is based on a rating of the relative permeability of a soil, with Group "A" being extremely permeable such as coarse sand, to Group "D" having low permeability such as clay.

D. Historic Flooding

There are no apparent flooding problems associated with this site. Additionally, the Federal Emergency Management Agency (FEMA) has not identified a flood hazard area on the project site.

III. Proposed Development

The applicant plans to construct a new 5-Unit residential building. Associated work will include a new paved access drive, concrete block retaining wall and an Infiltration Basin.

A. Alterations to Land Cover

The proposed development will include a new three story residential building with five living units. The proposed development includes an approximately 2,900 sf of new impervious area footprint including 1,790 for the building foot print and 1,110 sf of driveway.

V. Regulatory Requirements

A. City of Portland, Maine

This project is required to meet Chapter 500 standards to the regulations of Maine DEP Chapter 500 Stormwater Management Rules, including Basic, General and Flooding standards:

The Stormwater standards will require treatment for runoff from the new impervious area less the existing impervious (prior to November 2005). The net treatment area is approximately 2,280 sf.

VI. Stormwater Management Best Management Practices (BMPs)

Stormwater runoff from the project site will receive water quality treatment and attenuation of peak runoff management through the construction of stormwater BMPs consisting of an Infiltration Basin.

A. Infiltration Basin

The Infiltration Basin will receive stormwater runoff from the access driveway and off-site residential block area up to Romasco Lane (see enclosed watershed map). Stormwater runoff that is collected in Infiltration Basin will pond-up temporarily and filter through the soil media. In larger storms once the surface runoff exceeds basin capacity, runoff will discharge over a rip rap spillway. Overflow Stormwater runoff from the infiltration basin eventually will drain west across the adjacent to the parking lot to Washington Avenue storm drain system. This is similar to the pre-development drainage pattern.

VII. Water Quality Analysis

In accordance with City of Portland Technical Design Manual and Maine DEP Chapter 500 we have provided stormwater quality treatment. We have provided stormwater quality treatment for approximately 2,280 s.f. of impervious surfaces (See Attachment C for Calculations).

VIII. Peak Flow Analysis

In order to evaluate drainage characteristics as a result of the proposed development activities, a quantitative analysis was performed to determine peak rates of runoff for the 2, 10 and 25-year storms in the pre and post-development conditions. The evaluation was performed using the methodology outlined in the USDA Soil Conservation Service's "Urban Hydrology for Small Watersheds - Technical Release #55 (TR-55)". HydroCAD computer software was used to perform the calculations.

The results of the stormwater runoff calculations for the pre-development and post-development conditions are summarized in the tables below.

Pre-development vs. Post-development Peak Flow Summary at Sub-area 1 & Pond 1			
Reach 2	2-year Peak Flow (cfs)	10-year Peak Flow (cfs)	25-year Peak Flow (cfs)
Pre-development	0.45	1.03	1.33
Post-development	0.24	1.04	1.34
Change	-0.21	0.01	0.01

In order to mitigate peak flows and treat this expected increase, infiltration basin will be constructed. The infiltration basin will collect stormwater runoff and limit peak discharge rates to pre-development rates. There is a small decrease in the 2 year event where the majority of the storm events occur.

IX. Conclusions

This Stormwater Management Plan has been designed with erosion and sedimentation controls, inspection and maintenance procedures and general housekeeping requirements to prevent unreasonable impacts to the surrounding environment and to provide a long-term plan for management of stormwater runoff from the site. Stormwater runoff should be adequately managed for the project if carried out in accordance with the design plans.

Prepared by,

SEBAGO TECHNICS, INC.

Steven A. Groves, CPSWQ
Project Engineer

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Senior Project Manager

STATE OF MAINE
ROBERT A. McSORLEY
No. 8588
LICENSED PROFESSIONAL ENGINEER

4/1/14

SAG:sag/jsf

March 26, 2014

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WATERSHED MAP
OF 97 CUMBERLAND AVENUE

SCALE: 1" = 80'

DATE: 03/18/14

LOCATION:
97 CUMBERLAND AVENUE
PORTLAND, MAINE

FOR:
PETER DUGAS

INFORMATION:
IMAGERY ACQUIRED SPRING 2012
GIS DATA FROM THE CITY OF PORTLAND
AND MAINE GIS

14073GIS.mxd

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WATERSHED MAP
OF 97 CUMBERLAND AVENUE

SCALE: 1" = 80'

DATE: 03/18/14

LOCATION:
97 CUMBERLAND AVENUE
PORTLAND, MAINE

FOR:
PETER DUGAS

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GIS DATA FROM THE CITY OF PORTLAND
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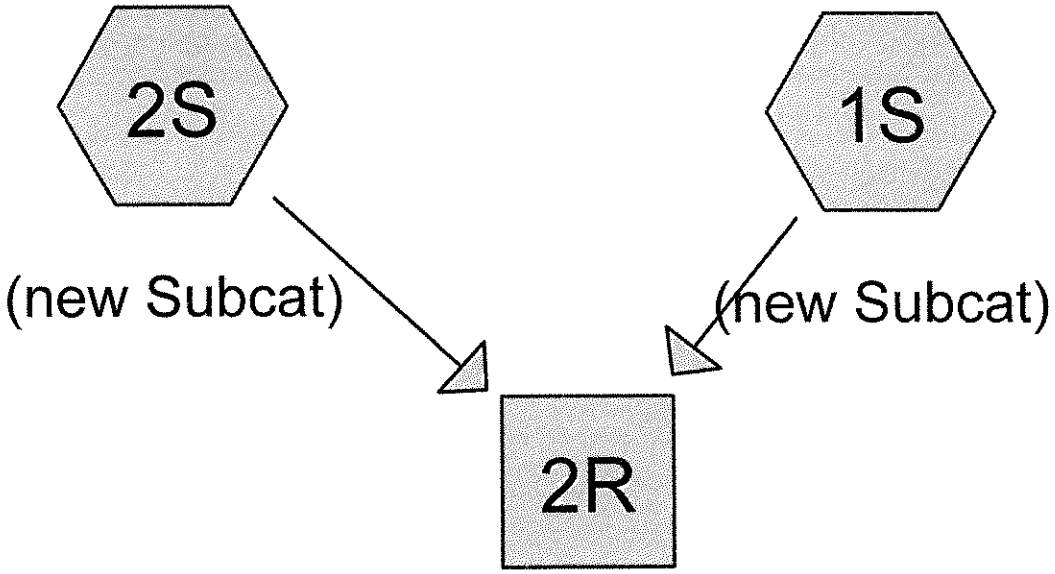
14073GIS.mxd

Attachment A

Hydrocad Output
Pre- and Post-Development Tr-20 Model



Study Point

Subcat Reach Pond Link

Drainage Diagram for 14073-Pre-Development Watershed
Prepared by {enter your company name here} 3/28/2014

Subcatchment 1S: (new Subcat)

Runoff = 0.24 cfs @ 12.09 hrs, Volume= 0.016 af, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2yr Rainfall=3.00"

Area (sf)	CN	Description
8,580	77	1/8 acre lots, 65% imp, HSG A
3,003		Pervious Area
5,577		Impervious Area

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

Subcatchment 2S: (new Subcat)

Runoff = 0.21 cfs @ 12.09 hrs, Volume= 0.014 af, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2yr Rainfall=3.00"

Area (sf)	CN	Description
7,590	77	1/8 acre lots, 65% imp, HSG A
2,657		Pervious Area
4,934		Impervious Area

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

Reach 2R: Study Point

Inflow Area = 0.371 ac, Inflow Depth > 0.98" for 2yr event
Inflow = 0.45 cfs @ 12.09 hrs, Volume= 0.030 af
Outflow = 0.45 cfs @ 12.09 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.0 min

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

Subcatchment 1S: (new Subcat)

Runoff = 0.55 cfs @ 12.08 hrs, Volume= 0.036 af, Depth> 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10yr Rainfall=4.70"

Area (sf)	CN	Description
8,580	77	1/8 acre lots, 65% imp, HSG A
3,003		Pervious Area
5,577		Impervious Area

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

Subcatchment 2S: (new Subcat)

Runoff = 0.48 cfs @ 12.08 hrs, Volume= 0.032 af, Depth> 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10yr Rainfall=4.70"

Area (sf)	CN	Description
7,590	77	1/8 acre lots, 65% imp, HSG A
2,657		Pervious Area
4,934		Impervious Area

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

Reach 2R: Study Point

Inflow Area = 0.371 ac, Inflow Depth > 2.21" for 10yr event
Inflow = 1.03 cfs @ 12.08 hrs, Volume= 0.068 af
Outflow = 1.03 cfs @ 12.08 hrs, Volume= 0.068 af, Atten= 0%, Lag= 0.0 min

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

Subcatchment 1S: (new Subcat)

Runoff = 0.70 cfs @ 12.08 hrs, Volume= 0.047 af, Depth> 2.84"

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

Area (sf)	CN	Description
8,580	77	1/8 acre lots, 65% imp, HSG A
3,003		Pervious Area
5,577		Impervious Area

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

Subcatchment 2S: (new Subcat)

Runoff = 0.62 cfs @ 12.08 hrs, Volume= 0.041 af, Depth> 2.84"

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

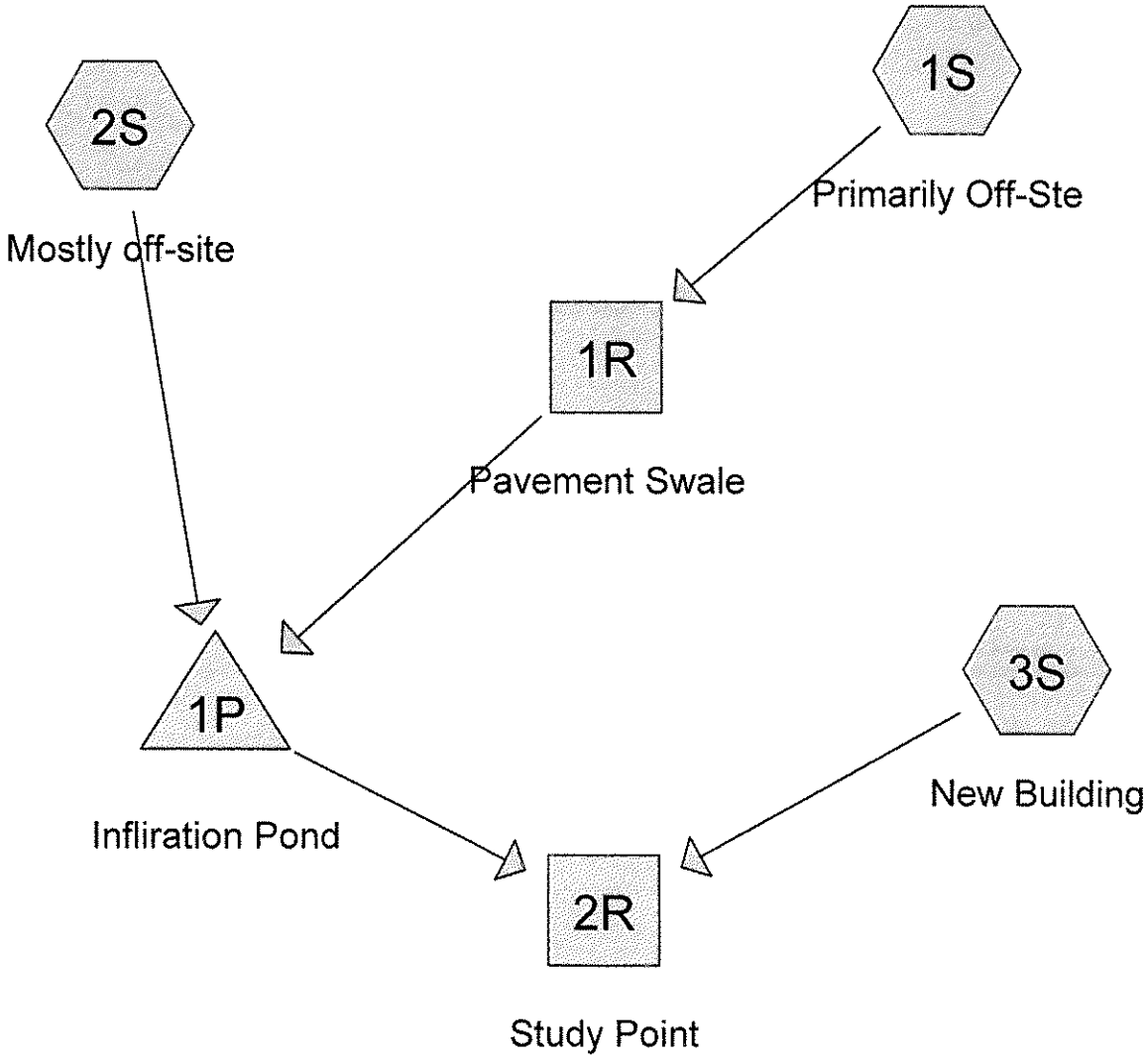
Area (sf)	CN	Description
7,590	77	1/8 acre lots, 65% imp, HSG A
2,657		Pervious Area
4,934		Impervious Area

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

Reach 2R: Study Point

Inflow Area = 0.371 ac, Inflow Depth > 2.84" for 25yr event
Inflow = 1.33 cfs @ 12.08 hrs, Volume= 0.088 af
Outflow = 1.33 cfs @ 12.08 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.0 min

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



Subcat Reach Pond Link

Drainage Diagram for 14073-Post-Development Watershed
Prepared by {enter your company name here} 4/1/2014

Area Listing (all nodes)

Area (acres)	CN	Description (subcats)
0.022	39	>75% Grass cover, Good, HSG A (3S)
0.282	77	1/8 acre lots, 65% imp, HSG A (1S,2S)
0.067	98	Paved parking & roofs (3S)
0.371		

Subcatchment 1S: Primarily Off-Ste

Runoff = 0.19 cfs @ 12.08 hrs, Volume= 0.013 af, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs
Type III 24-hr 2yr Rainfall=3.00"

Area (sf)	CN	Description
6,704	77	1/8 acre lots, 65% imp, HSG A
2,346		Pervious Area
4,358		Impervious Area

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

Subcatchment 2S: Mostly off-site

Runoff = 0.16 cfs @ 12.08 hrs, Volume= 0.010 af, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs
Type III 24-hr 2yr Rainfall=3.00"

Area (sf)	CN	Description
5,590	77	1/8 acre lots, 65% imp, HSG A
1,957		Pervious Area
3,634		Impervious Area

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

Subcatchment 3S: New Building

Runoff = 0.15 cfs @ 12.08 hrs, Volume= 0.010 af, Depth> 1.34"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs
Type III 24-hr 2yr Rainfall=3.00"

Area (sf)	CN	Description
2,900	98	Paved parking & roofs
945	39	>75% Grass cover, Good, HSG A
3,845	83	Weighted Average
945		Pervious Area
2,900		Impervious Area

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

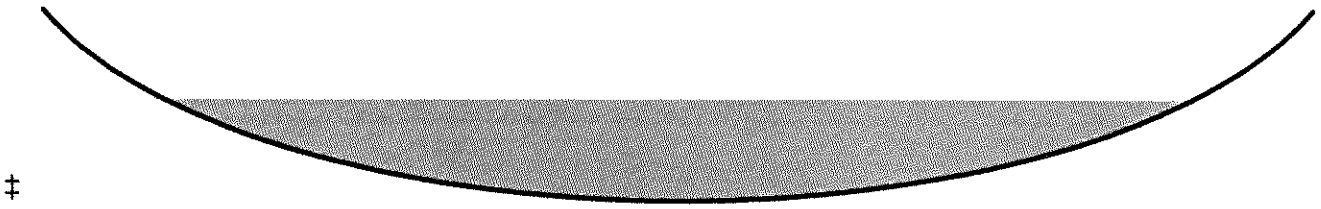
Reach 1R: Pavement Swale

Inflow Area = 0.154 ac, Inflow Depth > 0.98" for 2yr event
Inflow = 0.19 cfs @ 12.08 hrs, Volume= 0.013 af
Outflow = 0.19 cfs @ 12.11 hrs, Volume= 0.013 af, Atten= 3%, Lag= 1.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs
Max. Velocity= 1.23 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.50 fps, Avg. Travel Time= 2.2 min

Peak Storage= 10 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 0.10', Capacity at Bank-Full= 0.75 cfs

6.00' x 0.10' deep Parabolic Channel, n= 0.013 Asphalt, smooth
Length= 65.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -0.65'



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Reach 2R: Study Point

Inflow Area = 0.371 ac, Inflow Depth > 0.55" for 2yr event
Inflow = 0.24 cfs @ 12.24 hrs, Volume= 0.017 af
Outflow = 0.24 cfs @ 12.24 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs

Pond 1P: Infliration Pond

Inflow Area = 0.282 ac, Inflow Depth > 0.98" for 2yr event
Inflow = 0.34 cfs @ 12.10 hrs, Volume= 0.023 af
Outflow = 0.19 cfs @ 12.25 hrs, Volume= 0.019 af, Atten= 46%, Lag= 9.4 min
Discarded = 0.02 cfs @ 12.25 hrs, Volume= 0.012 af
Primary = 0.17 cfs @ 12.25 hrs, Volume= 0.007 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs / 4
Peak Elev= 84.57' @ 12.25 hrs Surf.Area= 325 sf Storage= 295 cf

Plug-Flow detention time= 114.1 min calculated for 0.019 af (81% of inflow)
Center-of-Mass det. time= 62.2 min (876.2 - 814.0)

Volume	Invert	Avail.Storage	Storage Description
#1	83.00'	453 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
83.00	60	0	0
84.00	220	140	140
85.00	405	313	453

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.400 in/hr Exfiltration over Surface area**
#2	Primary	84.50'	**4.0' 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=0.02 cfs @ 12.25 hrs HW=84.57' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.17 cfs @ 12.25 hrs HW=84.57' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.17 cfs @ 0.62 fps)

Subcatchment 1S: Primarily Off-Ste

Runoff = 0.44 cfs @ 12.08 hrs, Volume= 0.028 af, Depth> 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs
Type III 24-hr 10yr Rainfall=4.70"

Area (sf)	CN	Description
6,704	77	1/8 acre lots, 65% imp, HSG A
2,346		Pervious Area
4,358		Impervious Area

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

Subcatchment 2S: Mostly off-site

Runoff = 0.37 cfs @ 12.08 hrs, Volume= 0.024 af, Depth> 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs
Type III 24-hr 10yr Rainfall=4.70"

Area (sf)	CN	Description
5,590	77	1/8 acre lots, 65% imp, HSG A
1,957		Pervious Area
3,634		Impervious Area

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

Subcatchment 3S: New Building

Runoff = 0.31 cfs @ 12.08 hrs, Volume= 0.020 af, Depth> 2.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs
Type III 24-hr 10yr Rainfall=4.70"

Area (sf)	CN	Description
2,900	98	Paved parking & roofs
945	39	>75% Grass cover, Good, HSG A
3,845	83	Weighted Average
945		Pervious Area
2,900		Impervious Area

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

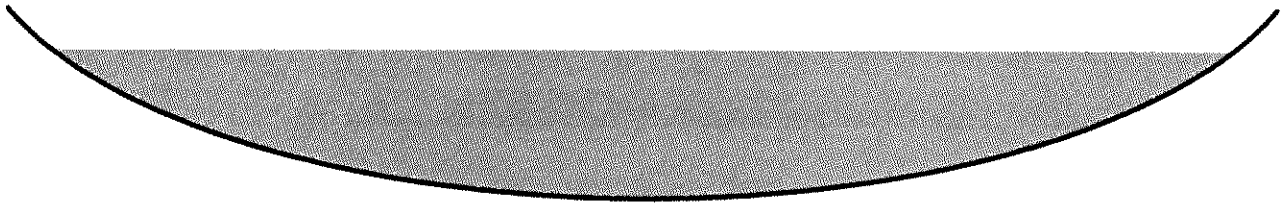
Reach 1R: Pavement Swale

Inflow Area = 0.154 ac, Inflow Depth > 2.21" for 10yr event
Inflow = 0.44 cfs @ 12.08 hrs, Volume= 0.028 af
Outflow = 0.43 cfs @ 12.10 hrs, Volume= 0.028 af, Atten= 3%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs
Max. Velocity= 1.59 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.59 fps, Avg. Travel Time= 1.8 min

Peak Storage= 18 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 0.10', Capacity at Bank-Full= 0.75 cfs

6.00' x 0.10' deep Parabolic Channel, n= 0.013 Asphalt, smooth
Length= 65.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -0.65'



‡

Reach 2R: Study Point

Inflow Area = 0.371 ac, Inflow Depth > 1.70" for 10yr event
Inflow = 1.04 cfs @ 12.10 hrs, Volume= 0.052 af
Outflow = 1.04 cfs @ 12.10 hrs, Volume= 0.052 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs

Pond 1P: Infliration Pond

Inflow Area = 0.282 ac, Inflow Depth > 2.20" for 10yr event
Inflow = 0.79 cfs @ 12.09 hrs, Volume= 0.052 af
Outflow = 0.77 cfs @ 12.11 hrs, Volume= 0.046 af, Atten= 3%, Lag= 1.0 min
Discarded = 0.02 cfs @ 12.11 hrs, Volume= 0.013 af
Primary = 0.75 cfs @ 12.11 hrs, Volume= 0.032 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs / 4
Peak Elev= 84.68' @ 12.11 hrs Surf.Area= 346 sf Storage= 334 cf

Plug-Flow detention time= 55.0 min calculated for 0.046 af (88% of inflow)
Center-of-Mass det. time= 18.6 min (814.3 - 795.7)

Volume	Invert	Avail.Storage	Storage Description
#1	83.00'	453 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
83.00	60	0	0
84.00	220	140	140
85.00	405	313	453

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.400 in/hr Exfiltration over Surface area**
#2	Primary	84.50'	**4.0' 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=0.02 cfs @ 12.11 hrs HW=84.68' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.74 cfs @ 12.11 hrs HW=84.68' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.74 cfs @ 1.02 fps)

Subcatchment 1S: Primarily Off-Ste

Runoff = 0.57 cfs @ 12.08 hrs, Volume= 0.036 af, Depth> 2.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs
Type III 24-hr 25yr Rainfall=5.50"

Area (sf)	CN	Description
6,704	77	1/8 acre lots, 65% imp, HSG A
2,346		Pervious Area
4,358		Impervious Area

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

Subcatchment 2S: Mostly off-site

Runoff = 0.47 cfs @ 12.08 hrs, Volume= 0.030 af, Depth> 2.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs
Type III 24-hr 25yr Rainfall=5.50"

Area (sf)	CN	Description
5,590	77	1/8 acre lots, 65% imp, HSG A
1,957		Pervious Area
3,634		Impervious Area

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

Subcatchment 3S: New Building

Runoff = 0.38 cfs @ 12.07 hrs, Volume= 0.025 af, Depth> 3.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs
Type III 24-hr 25yr Rainfall=5.50"

Area (sf)	CN	Description
2,900	98	Paved parking & roofs
945	39	>75% Grass cover, Good, HSG A
3,845	83	Weighted Average
945		Pervious Area
2,900		Impervious Area

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

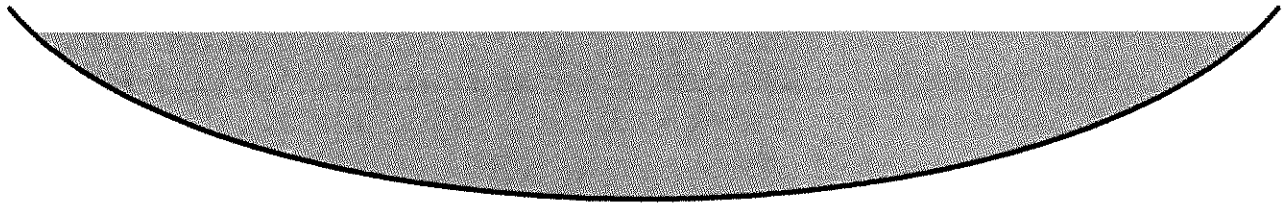
Reach 1R: Pavement Swale

Inflow Area = 0.154 ac, Inflow Depth > 2.84" for 25yr event
Inflow = 0.57 cfs @ 12.08 hrs, Volume= 0.036 af
Outflow = 0.55 cfs @ 12.09 hrs, Volume= 0.036 af, Atten= 2%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs
Max. Velocity= 1.72 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.62 fps, Avg. Travel Time= 1.7 min

Peak Storage= 21 cf @ 12.08 hrs, Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 0.10', Capacity at Bank-Full= 0.75 cfs

6.00' x 0.10' deep Parabolic Channel, n= 0.013 Asphalt, smooth
Length= 65.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -0.65'



‡

Reach 2R: Study Point

Inflow Area = 0.371 ac, Inflow Depth > 2.32" for 25yr event
Inflow = 1.34 cfs @ 12.09 hrs, Volume= 0.072 af
Outflow = 1.34 cfs @ 12.09 hrs, Volume= 0.072 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs

Pond 1P: Infliration Pond

Inflow Area = 0.282 ac, Inflow Depth > 2.84" for 25yr event
Inflow = 1.02 cfs @ 12.09 hrs, Volume= 0.067 af
Outflow = 0.99 cfs @ 12.10 hrs, Volume= 0.061 af, Atten= 3%, Lag= 0.9 min
Discarded = 0.02 cfs @ 12.10 hrs, Volume= 0.014 af
Primary = 0.97 cfs @ 12.10 hrs, Volume= 0.046 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.03 hrs / 4
Peak Elev= 84.72' @ 12.10 hrs Surf.Area= 353 sf Storage= 345 cf

Plug-Flow detention time= 45.2 min calculated for 0.060 af (90% of inflow)
Center-of-Mass det. time= 14.6 min (804.5 - 789.9)

Volume	Invert	Avail.Storage	Storage Description
#1	83.00'	453 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
83.00	60	0	0
84.00	220	140	140
85.00	405	313	453

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.400 in/hr Exfiltration over Surface area**
#2	Primary	84.50'	**4.0' 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=0.02 cfs @ 12.10 hrs HW=84.72' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.96 cfs @ 12.10 hrs HW=84.72' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.96 cfs @ 1.11 fps)

Attachment B

Inspection and Maintenance

General Maintenance Criteria
Infiltration Basin

Preventive maintenance is vital for the long-term effectiveness of an infiltration system.

1. Fertilization: Fertilization of the area over the infiltration bed should be avoided unless absolutely necessary to establish vegetation.

2. Snow Storage Prohibited: Snow removed from any on-site or off-site areas may not be stored over an infiltration area

3. Mowing: A basin with a turf lining should have its side-slopes and floor mowed at least twice a year to prevent woody growth. Mowing operations may be difficult since the basin floor may remain wet for extended periods. If a low maintenance vegetation is used, basin mowing can be performed in the normally dry months. Clippings should be removed to minimize the amount of organic material accumulating in the basin.

4. Monitoring and Inspections: Inspect the infiltration system several times in the first year of operation and at least annually thereafter. Conduct the inspections after large storms to check for surface ponding at the inlet that may indicate clogging. Water levels in the observation well should be recorded over several days after the storm to ensure that the system drains within 72 hours after filling.

4. Sediment Removal and Maintenance of System Performance: Sediment must be removed from the system at least annually to prevent deterioration of system performance. The pre-treatment inlets should be checked periodically and cleaned out when accumulated sediment occupies more than 10% of available capacity. The system must be rehabilitated or replaced if its performance is degraded to the point that applicable stormwater standards are not met.

Attachment C

Treatment Calculations

Determination of Water Quality Volume Calculations

Calculation of Minimum Required Water Quality Volume for Treatment

Maine DEP Stormwater regulations require the treatment of 95% of impervious area, and 80% developed area.

so;

Proposed Impervious 4,110sf

Existing impervious incl. Demolish Home & gravel drives 1,830sf

95% treatment of Impervious = (4,110s.f. -1,830 sf)x 95% = 2,166 s.f.

80% treatment of developed area = = 0s.f. No change the site is 100% developed

Additional areas outside of pavement will revert back to natural conditions and are not considered landscape/developed area

Based on the calculations above, treatment would be required on 2,166 sf of impervious area. Since impervious loading areas and driveways are a more intense use, the treatment portion of the proposed developed will be collected from mainly the loading areas /drives. Therefore, calculations have been completed to determine the required water quality volume required for treatment.

Proposed Treatment Volume

Area to drain to proposed treatment **Infiltration Basin** = 2,166 s.f. impervious (drives/parking), and 0 landscaped area

2,166 s.f. x 1" = **180 c.f.** water quality volume required **297c.f.** provided Infiltration Basin,

Attachment D

Soil Map