24: Water Quality, Stormwater Management and Erosion Control (14-526(b) 3 a)

The proposed site development has been designed in accordance with the City and Maine DEP Chapter 500 Stormwater standards. Please refer to the Stormwater Management Plan, this section. Erosion control features, details and the written plan are shown on the site plans.

SEBAGO TECHNICS

CIVIL ENGINEERING • SURVEYING • LANDSCAPE ARCHITECTURE

Pine State Family Mart
1884 Forest Avenue
Portland ME, 04103

Prepared for

John Chau
75 Arcadia Street
Portland, ME 04103

September 2018

Table of Contents

Contents

Appendices

STORMWATER MANAGEMENT PLAN
Pine State Family Mart
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 and land cover changes. The stormwater management controls that are outlined in this plan have been designed to suit the proposed development and to comply with applicable regulatory requirements.

Project Scope
The proposed development will consist of an 8-bay gas station and related convenience store with a 5,000 square-foot footprint, and a mixed used retail building with a total footprint of 7,800 square-feet. Additionally, the site will include 48 parking spaces, 4 of which are handicap accessible. The project will result in the creation of 1.1 acres of impervious area and 1.6 acres of developed area.

Project Watershed
The proposed development is tributary to the Penobscot River watershed, ultimately draining to the Atlantic Ocean.

Regulatory Requirements
Regulatory requirements for this project consist of the basic, general and flooring standards, each described individually below.

Basic Standard - Chapter 500, Section 4(B)
Since the project will disturb more than one (1) acre of land area, MDEP Basic Standards apply, requiring that grading or other construction activities on the site do not impede or otherwise alter drainage ways to have an unreasonable adverse impact. We have avoided adverse impacts by providing an Erosion & Sedimentation Control Plan, and an Inspection, Maintenance and Housekeeping Plan (Appendix E) to be implemented during construction and post-construction stabilization of the site. These construction requirements have been developed following Best Management Practice guidelines.

General Standard - Chapter 500, Section 4(C)
Since the project will create more than one (1) acre of impervious surface, MDEP General Standards apply, which require a project's stormwater management system to include treatment measures that will mitigate for the increased frequency and duration of channel erosive flows due to runoff from smaller storms, provide for effective treatment of pollutants in stormwater, and mitigate potential temperature impacts. The General Standards require treatment of no less than 95% of the site's created impervious area and no less than 80% of the site's created developed area (landscaped area and impervious area

combined). To mitigate the changes in hydrologic patterns due to the development of this project, a subsurface underdrained soil filter has been implemented into the stormwater management infrastructure. Filtration BMPs are very effective at removing a wide range of pollutants through the use of organic soil filter media.

<u>Flooding Standard - Chapter 500, Section 4(F)</u>
Since the planned project will not create more than three (3) acres of impervious surface, MDEP Flooding Standards are not required to be met. However, through the City of Portland delegated review there are flooding standards that need to be met. The Flooding Standard requires a project's stormwater management system detain, retain, or result in the infiltration of stormwater from 24-hour storms of the 2, 10, 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.

<u>Urban Impaired Stream Standard – Chapter 500, Section 4(E)</u>
The proposed development is not tributary to an Urban Impaired Stream as defined by the Maine Department of Environmental Protection in Chapter 502. Therefore, the project will not be required to meet or exceed the requirements of the Urban Impaired Stream Standard as listed in Section 4(E) of Chapter 500. The Urban Impaired Stream Standard typically requires a project to either pay a compensation fee or mitigate project impacts by reducing or eliminating an off-site or on-site pre-development impervious stormwater source.

II. Existing Conditions

The project site is located in the City of Portland's Riverton section and is bounded by Forest Avenue to the north, Riverton Drive to the west and residential developments to the south and east. The project frontage is on Forest Avenue (Route 302) and will be accessed by drives on Forest Avenue and Riverton Drive. The project site is approximately 1.61 acres in size and has access to Forest Avenue and Riverton Drive. The site is partially wooded, flat and does not contain wetland or other waterbodies.

<u>Soils</u>
Soil characteristics were obtained from the USDA National Resources Conservation Service - Web Soil Survey. The Hydrologic Groups (HSG) of the soils is classified as follows:

Soil Map Symbol	Soil Name	Slope (%)	HSG
WmB	Windsor Loamy Sand	0-8	A

A copy of the hydrologic soil group designation is included in Appendix B.

<u>Flood Zone</u>
The proposed development area of the site is not located in an identified flood zone per the FEMA Flood Insurance Rate Map for the City of Portland, Community Panel 230051 0006 C. A flood insurance rate map is included in Appendix B.

III. Proposed Conditions

Project Scope

The proposed development will consist of an 8-bay gas station and related convenience store with a 5,000 square-foot footprint, and a mixed used retail building with a total footprint of 7,800 square-feet. Additionally, the site will include 48 parking spaces, 4 of which are handicap accessible. The project will result in the creation of 1.1 acres of impervious area and 1.6 acres of developed area.

Surface Cover

The project development will require removal of all of the vegetation on the site. The site will be revegetated in accordance with the City regulations. Neighboring residential uses are buffered and all landscaping plant locations, types and sizes are shown on the enclosed Landscape Plan.

Best Management Practices

The project will utilize a Subsurface Underdrained Soil Filter for stormwater treatment and detention.

IV. Methodology

In order to evaluate drainage characteristics as a result of the proposed development, a quantitative analysis was performed to determine peak runoff rates in the pre-development 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 utilized to perform the calculations.

The peak runoff rates were calculated using a 24-hour duration storm event with a Type-III rainfall distribution. The rainfall amounts for Cumberland County (SE) were obtained from Appendix H of MDEP's Chapter 500: Stormwater Management (effective date August 2015). Rainfall values for Cumberland County SE are listed in the table below.

Storm Frequency Precipitation (in./24 hr) Cumberland County SE	
2-year	3.1
10-year	4.6
25-year	5.8

Runoff curve numbers were determined for each of the watersheds by measuring the area of each hydrologic soil group within each type of land cover. The type of land cover was determined based on survey data, field reconnaissance and aerial photography. Times of concentration were determined from site topographic maps in accordance with SCS procedures.

The hydrologic model incorporates the following design assumptions:

- The minimum time of concentration (Tc) is six minutes, based upon limitations of the TR-55 model.
- A soil infiltration velocity of 6 inches per hour was used based on the designated soil type. The Windsor loamy sand is classified as a soil with an infiltration rate ranging from 6-20 inches per hour. We have used the lowest value in this range to be conservative. Supporting documents for this infiltration rate can be found in Appendix B of this report.

V. Pre-Development Watershed Model

The pre-development watershed plan consists of two subcatchments labeled 1S and 2S in the HydroCAD model. Two locations were identified as Study Points (SP's) for comparing peak runoff rates, and are described below:

SP-1 is located in the south-westerly corner of the lot where runoff leaves the site via closed drainage system located in Riverton Drive. Watershed 1S contributes runoff to this study point with an overall runoff area of approximately 0.93 acres. SP-1 and the associated drainage area are tributary to the Penobscot River Watershed.

SP-2 is located in the south-easterly corner of the lot where runoff leaves the site via overland flow to the adjacent residential property complex. Watershed 2S contributes runoff to this study point with an overall runoff area of approximately 0.07 acres. SP-2 and the associated drainage area are also tributary to Penobscot River Watershed.

VI. Post-Development Watershed Model

The post-development watershed area consists of the same overall area as the pre-development plan.

SP1: Post-development subcatchments 10S and 20S represent the area tributary to SP-1 and SP-2, respectively. The majority of the proposed development area is included within 10S. Watershed 10S includes the buildings, access drives, parking areas, landscaped areas, and the subsurface underdrained soil filter (10P). The overall tributary area associated with SP-1 is 1.5 acres. Watershed 20S includes a small portion of proposed sidewalk, and landscaped areas. The overall tributary area associated with SP-2 is 0.14 acres.

The Best Management Practices have been designed and sized in accordance with DEP BMP standards contained within Chapter 500 and the BMP Manual. Sizing calculations can be found in Appendix A.

VII. Water Quality

A subsurface geotechnical investigation to determine the seasonal high-water table will be performed and test pits will be done in the proposed building areas and stormwater treatment filtration area. Upon completion, the geotechnical investigation report can be provided upon request.

The General Standards are met through the utilization of a subsurface underdrained soil filter that has been implemented into the stormwater management infrastructure. Filtration BMPs are very effective at removing a wide range of pollutants through the use of organic soil filter media. BMP sizing and treatment calculations of this system are provided in Appendix A.

Through the use of the aforementioned BMP 99.69% of new impervious area and 95.70% of new developed area will be receiving treatment. This meets the requirements for the Maine DEP General Standards.

I. Water Quantity

Flooding Standard - Chapter 500, Section 4(F)

Since the planned project will not create more than three (3) acres of impervious surface, MDEP Flooding Standards are not required to be met. However, through the City of Portland delegated review there are flooding standards that need to be met. The Flooding Standard requires a project's stormwater management system detain, retain, or result in the infiltration of stormwater from 24-hour storms of the 2, 10, 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. As such, a runoff 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 utilized to perform the calculations.

The following table presents the results of the stormwater runoff calculations at the study points for the pre-development and post-developed conditions.

Stormwater Peak Runoff Summary Table			
Study Point	**Storm Event**	**Pre-Development (cfs)**	**Post-Development (cfs)**
SP-1	2-year	0.00	0.00
	10-year	0.00	0.00
	25-year	0.02	0.00
SP-2	2-year	0.00	0.00
	10-year	0.00	0.00
	25-year	0.01	0.00

The HydroCAD data output sheets from pre-development (Appendix C) and post-development (Appendix D) models are appended to this report along with stormwater management plans (Appendix F). The models represent the peak runoff rates in the post-development condition at all points of analysis are at or below pre-development runoff rates for the 2, 10, and 25-year storm events with implementation of the proposed stormwater management practices.

II. <u>Conclusion</u>

The proposed development has been designed to manage stormwater runoff through Best Management Practices approved by MDEP. Stormwater BMP's provide treatment to 99.69% (95% required) of impervious areas, and 95.70% (80% required) of the total developed area. Runoff discharging from the site will be at or below pre-development conditions for the 2, 10 and 25-year storm events at all study points. Additionally, erosion and sedimentation controls along with associated maintenance and housekeeping procedures have been outlined to prevent unreasonable impacts on the site and to the surrounding environment.

Prepared by:

SEBAGO TECHNICS, INC.

Richard L. Meek, P.E

Senior Project Engineer

SAH

Appendix A

Regulatory Standards Calculations

Table 1: MDEP GENERAL STANDARD CALCULATIONS

Job # 11142 Pine State Family Mart

AREA ID	WATERSHED SIZE (S.F.)	EXISTING ONSITE IMPERVIOUS AREA TO REMAIN (S.F.)	NEW ONSITE IMPERVIOUS AREA (S.F.)	EXISTING ONSITE LANDSCAPED AREA TO REMAIN (S.F.)	NEW ONSITE LANDSCAPED AREA (S.F.)	NET NEW DEVELOPED AREA (S.F.)	NET EXISTING DEVELOPED AREAS (S.F.)	TREATMENT PROVIDED?	IMPERVIOUS AREA TREATED (S.F.)	LANDSCAPED AREA TREATED* (S.F.)	DEVELOPED AREA TREATED (S.F.)	TREATMENT BMP
10	66,349	147	48,403	2,101	15,698	64,101		YES	48,550	17,799	66,349	SSSF1
20	7,500	296	300	475	4,930	5,230		NO	0	0	0	
TOTAL (S.F.)	**73,849**	**443**	**48,703**	**2,576**	**20,628**	**69,331**	**0**		**48,550**	**17,799**	**66,349**	

TOTAL NEW IMPERVIOUS AREA (S.F.)	**48,703**	**TOTAL DEVELOPED AREA (S.F.)**	**69,331**
TOTAL IMPERVIOUS AREA RECEIVING TREATMENT (S.F.)	**48,550**	**TOTAL DEV. AREA RECEIVING TREATMENT (S.F.)**	**66,349**
% OF IMPERVIOUS AREA RECEIVING TREATMENT	**99.69%**	**% OF DEV. AREA RECEIVING TREATMENT**	**95.70%**

SEBAGO TECHNICS, INC.
75 John Roberts Road Suite 4A
South Portland, Maine 04106
Tel. (207) 200-2100

JOB	11142		
SHEET NO.	1	OF	1
CALCULATED BY	SAH	DATE	9/4/2018
FILE NAME	11142WQC.xls	PRNT DATE	9/10/2018

UNDERDRAINED SUBSURFACE SAND FILTER

Task: Calculate water quality volume per MDEP chapter 500 regulations

References
1. Maine DEP Chapter 500, Section 4.C.(3)(b)
"must detain a runoff volume equal to 1.0 inch times
the subcatchment's impervious area plus 0.4 inch times the subcatchment's landscaped area"

2. Maine DEP Best Management Practices Stormwater Manual, Section 7.3.2
a. "detain runoff volume equal to 1.0 inch times the subcatchment's impervious area
plus 0.4 inch times the subcatchment's landscaped area"
b. "surface area of the sand filter bed and chamber system must be at least
equal to 5% of the impervious area draining to it and 2% of the landscaped area."
c. "treatment flow rate for the Stormtech Isolator Row is the projected one year peak flow rate
for the drainage area feeding the Isolator Row"
Flow rates:

SC-310	0.10	cfs/chamber
SC-740	0.20	cfs/chamber
DC-780	0.20	cfs/chamber
MC-3500	0.30	cfs/chamber

<u>Tributary to Subsurface Sand Filter</u> SSSF1

Landscaped Area	17,799.00	SF			
Impervious Area	48,550.00	SF			

Minimum Surface Area for sand filter and chamber system

Required (2% X Landscaped + 5%" X Impervious)

Total Landscaped Area	17,799.00	SF	Area	356	SF
Total Impervious Area	48,550.00	SF	Area	2428	SF
Required Minimum Surface Area				2783	SF
Provided Surface Area				4080	SF

Treatment Volume

Required (0.4" X Landscaped + 1.0" X Impervious)

Landscaped Area	17,799.00	SF	Volume	593			
Impervious Area	48,550.00	SF	Volume	4046			
Treatment Volume Required				4639	CF	0.106	AF
Provided Treatment Volume				4680	CF	At Elev = 74.86	

Sediment Pre-Treatment

Per Reference 2.c above

One year flow rate out put from Hydrocad:		1.60	cfs
ISO Row sizing for:	**SC-740**	**0.2**	cfs
Total number of Isolator Row Chambers required:		8	Provided one row of 14

Appendix B

Subsurface Investigations

Map Scale: 1:1,170 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 15, 30, 60, 90

Feet: 0, 50, 100, 200, 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

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

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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 13, Sep 11, 2017

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

Date(s) aerial images were photographed: Data not available.

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
WmB	Windsor loamy sand, 0 to 8 percent slopes	A	4.0	100.0%
Totals for Area of Interest			**4.0**	**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

AdA: Adams and Windsor loamy sands, 0 to 5 percent slopes

The Adams component makes up 43 percent of the map unit. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. This component is on terraces on river valleys. The parent material consists of sandy glaciofluvial deposits. Depth to a root restrictive layer is greater than 60 inches.

The Windsor component makes up 43 percent of the map unit. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. This component is on terraces on river valleys. The parent material consists of sandy glaciofluvial deposits. Depth to a root restrictive layer is greater than 60 inches.

Important farmland classification: Statewide	Land capability: 3 s	Vermont Agricultural Value Group: 6

Vermont Residential Onsite Waste Disposal Group and Subgroup: Ia

This unit is well suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The rapid permeability in the substratum is a concern. Backfilling absorption trenches with at least one foot of finer textured material or other site modifications may be necessary to slow the percolation rate enough to allow for thorough filtering of effluent.

PHYSICAL and CHEMICAL PROPERTIES / EROSION FACTORS

Soil name	Depth (In)	Typical texture	Clay (Pct)	Soil reaction (pH)	Permeability (In/Hr)	Organic matter (Pct)	Kw	Kf	T
Adams	0-7	LS	0-5	3.6 - 6.0	6-20	2.0-5.0	.10	.10	5
	7-30	LFS	0-5	4.5 - 6.0	6-20	1.0-3.0	.20	.20	
	30-65	LFS	0-5	4.5 - 6.5	20-100	0.0-0.5	.20	.20	
Windsor	0-6	LS	1-3	4.5 - 6.0	6-20	2.0-4.0	.15	.15	5
	6-23	LS	0-3	4.5 - 6.0	6-20	0.5-2.0	.15	.15	
	23-65	COS	0-2	4.5 - 6.5	6-20	0.0-0.5	.02	.02	

WATER FEATURES / SOIL FEATURES

Soil name	Hydrologic group	Depth to seasonal high water table (Feet)	Flooding Frequency	Flooding Duration	Ponding Frequency	Ponding Duration	Hydric soil?	Depth to bedrock (range in inches)
Adams	A	---	None		None		No	---
Windsor	A	---	None		None		No	---

LAND USE LIMITATIONS

Soil name	Land use	Rating	Reason **
Adams	Dwellings with basements:	Not limited	
Windsor	Dwellings with basements:	Not limited	
Adams	Pond reservoir areas:	Very limited	Seepage
Windsor	Pond reservoir areas:	Very limited	Seepage

AGRICULTURAL YIELD DATA

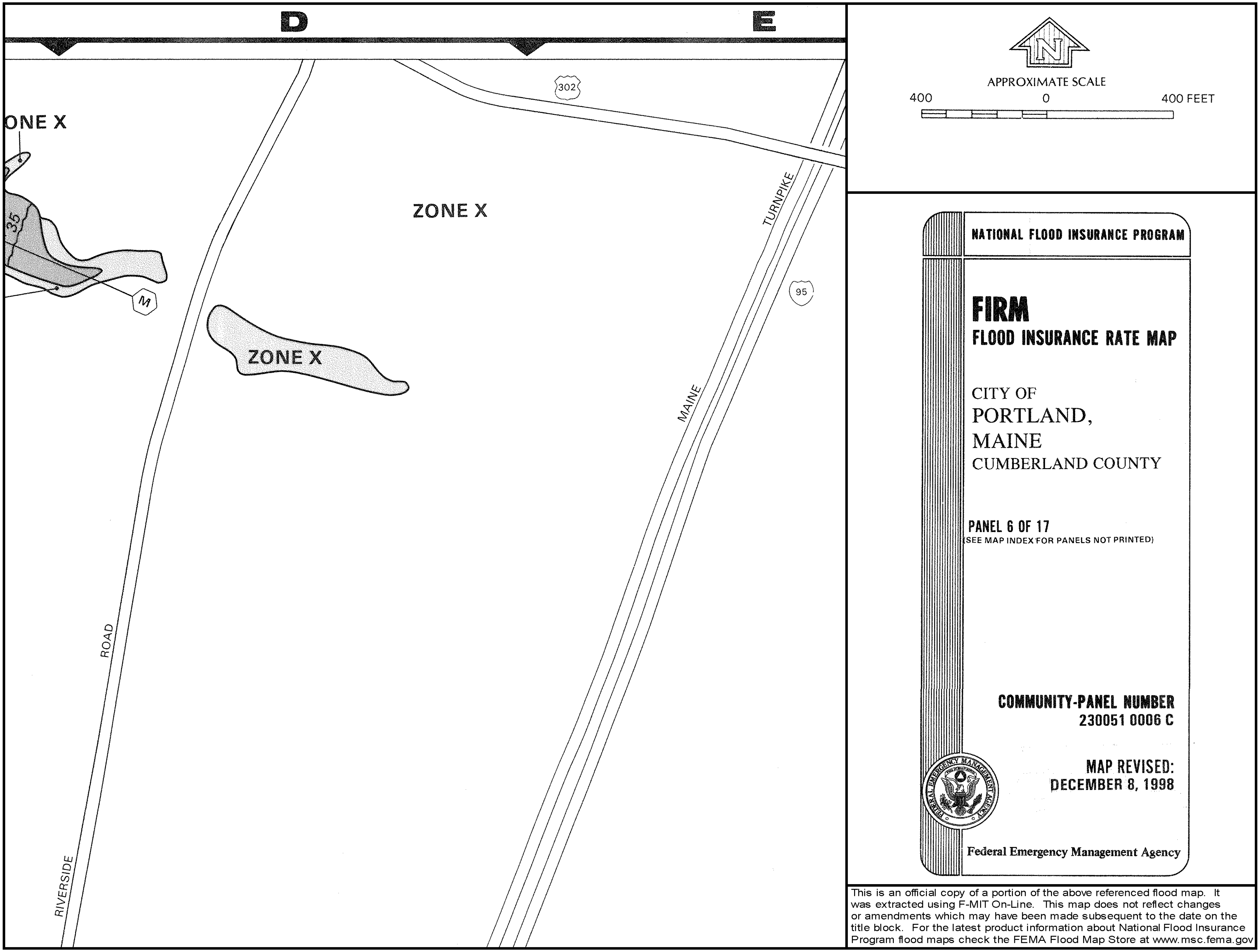
Crop name	Yield / acre
Alfalfa hay	3 Tons
Grass-legume hay	2.5 Tons
Grass-clover	5.5 AUM
Grass hay	2 Tons
Corn silage	14 Tons
Corn silage	16 Tons
Pasture	4.5 AUM
Grass-legume hay	4 Tons

WOODLAND MANAGEMENT

Soil name	Management concern	Rating	Reason
Adams	Harvest equip operability:	Well suited	
Windsor	Harvest equip operability:	Well suited	
Adams	Road suitability:	Well suited	
Windsor	Road suitability:	Well suited	
Adams	Erosion hazard (off-road):	Slight	
Windsor	Erosion hazard (off-road):	Slight	

Vermont natural communities

Hemlock-Northern Hardwood Forest,
Hemlock-White Pine-Northern Hardwood Forest Variant,
White Pine-Northern Hardwood Forest Variant,
Hemlock Forest



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
PORTLAND,
MAINE
CUMBERLAND COUNTY

PANEL 6 OF 17
(SEE MAP INDEX FOR PANELS NOT PRINTED)

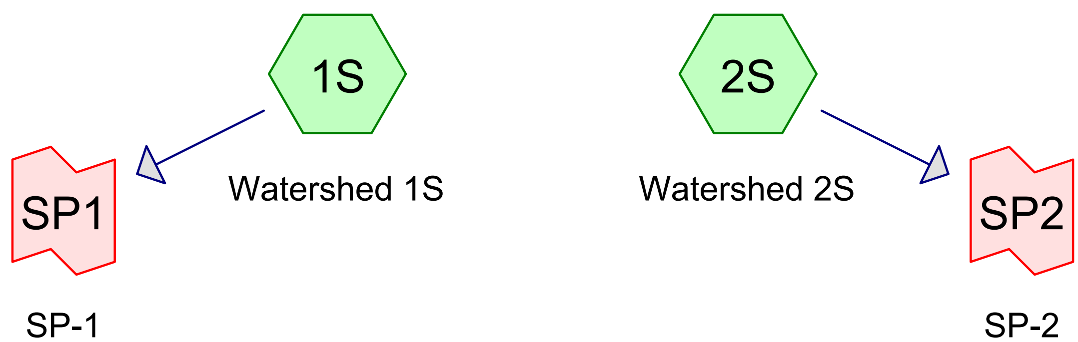
COMMUNITY-PANEL NUMBER
230051 0006 C

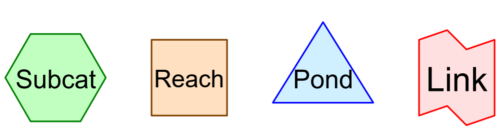
MAP REVISED:
DECEMBER 8, 1998

Federal Emergency Management Agency

Appendix C

Pre-Development Calculations





Routing Diagram for Pre-Develoopment
Prepared by Sebago Technics, Inc, Printed 9/10/2018
HydroCAD® 10.00-18 s/n 01856 © 2016 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
20,032	39	>75% Grass cover, Good, HSG A (1S, 2S)
443	98	Impervious (1S, 2S)
49,918	30	Woods, Good, HSG A (1S, 2S)

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
69,950	HSG A	1S, 2S
0	HSG B	
0	HSG C	
0	HSG D	
443	Other	1S, 2S

Summary for Subcatchment 1S: Watershed 1S

Runoff = 0.02 cfs @ 15.04 hrs, Volume= 462 cf, Depth= 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
	29,205	30	Woods, Good, HSG A
	11,058	39	>75% Grass cover, Good, HSG A
*	147	98	Impervious
	40,410	33	Weighted Average
	40,263		99.64% Pervious Area
	147		0.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	75	0.0230	0.08		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
7.4	222	0.0100	0.50		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
0.5	37	0.0540	1.16		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
24.3	334	Total			

Summary for Subcatchment 2S: Watershed 2S

Runoff = 0.01 cfs @ 15.15 hrs, Volume= 343 cf, Depth= 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
	20,713	30	Woods, Good, HSG A
	8,974	39	>75% Grass cover, Good, HSG A
*	296	98	Impervious
	29,983	33	Weighted Average
	29,687		99.01% Pervious Area
	296		0.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	75	0.0270	0.08		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
18.6	394	0.0050	0.35		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
34.0	469	Total			

Summary for Link SP1: SP-1

Inflow Area = 40,410 sf, 0.36% Impervious, Inflow Depth = 0.14" for 25-year event
Inflow = 0.02 cfs @ 15.04 hrs, Volume= 462 cf
Primary = 0.02 cfs @ 15.04 hrs, Volume= 462 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link SP2: SP-2

Inflow Area = 29,983 sf, 0.99% Impervious, Inflow Depth = 0.14" for 25-year event
Inflow = 0.01 cfs @ 15.15 hrs, Volume= 343 cf
Primary = 0.01 cfs @ 15.15 hrs, Volume= 343 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Watershed1S Runoff Area=40,410 sf 0.36% Impervious Runoff Depth=0.00"
Flow Length=334' Tc=24.3 min CN=33 Runoff=0.00 cfs 0 cf

Subcatchment2S: Watershed2S Runoff Area=29,983 sf 0.99% Impervious Runoff Depth=0.00"
Flow Length=469' Tc=34.0 min CN=33 Runoff=0.00 cfs 0 cf

Link SP1: SP-1 Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link SP2: SP-2 Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 70,393 sf Runoff Volume = 0 cf Average Runoff Depth = 0.00"
99.37% Pervious = 69,950 sf 0.63% Impervious = 443 sf

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Watershed 1S Runoff Area=40,410 sf 0.36% Impervious Runoff Depth=0.01"
Flow Length=334' Tc=24.3 min CN=33 Runoff=0.00 cfs 47 cf

Subcatchment2S: Watershed 2S Runoff Area=29,983 sf 0.99% Impervious Runoff Depth=0.01"
Flow Length=469' Tc=34.0 min CN=33 Runoff=0.00 cfs 35 cf

Link SP1: SP-1 Inflow=0.00 cfs 47 cf
Primary=0.00 cfs 47 cf

Link SP2: SP-2 Inflow=0.00 cfs 35 cf
Primary=0.00 cfs 35 cf

Total Runoff Area = 70,393 sf Runoff Volume = 82 cf Average Runoff Depth = 0.01"
99.37% Pervious = 69,950 sf 0.63% Impervious = 443 sf

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Watershed1S Runoff Area=40,410 sf 0.36% Impervious Runoff Depth=0.14"
Flow Length=334' Tc=24.3 min CN=33 Runoff=0.02 cfs 462 cf

Subcatchment2S: Watershed2S Runoff Area=29,983 sf 0.99% Impervious Runoff Depth=0.14"
Flow Length=469' Tc=34.0 min CN=33 Runoff=0.01 cfs 343 cf

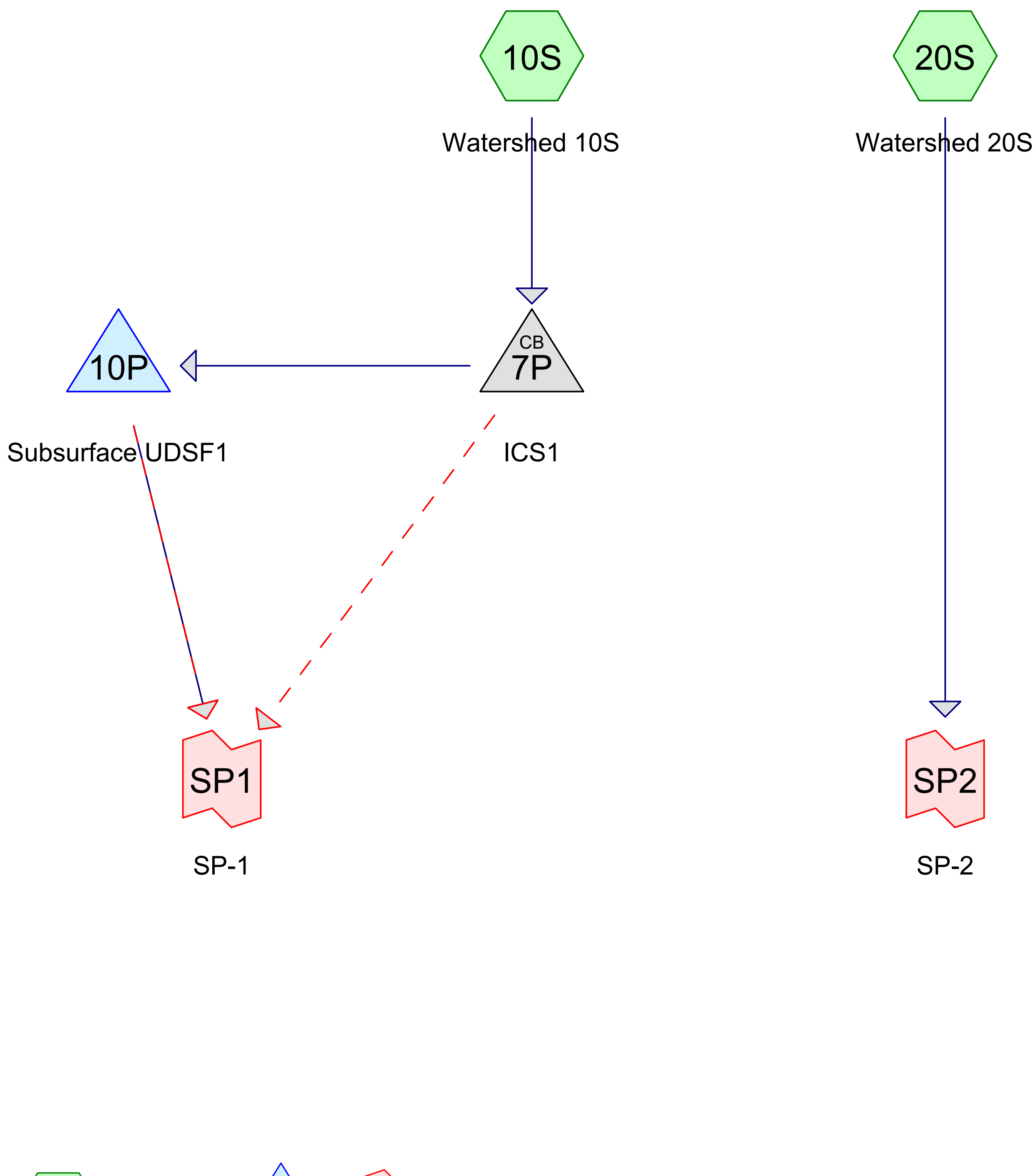
Link SP1: SP-1 Inflow=0.02 cfs 462 cf
Primary=0.02 cfs 462 cf

Link SP2: SP-2 Inflow=0.01 cfs 343 cf
Primary=0.01 cfs 343 cf

Total Runoff Area = 70,393 sf Runoff Volume = 805 cf Average Runoff Depth = 0.14"
99.37% Pervious = 69,950 sf 0.63% Impervious = 443 sf

Appendix D

Post-Development Calculations



Routing Diagram for Post-Develoopment
Prepared by Sebago Technics, Inc, Printed 9/10/2018
HydroCAD® 10.00-18 s/n 01856 © 2016 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
20,628	39	>75% Grass cover, Good, HSG A (10S, 20S)
49,146	98	Impervious (10S, 20S)
2,576	30	Woods, Good, HSG A (10S, 20S)

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
23,204	HSG A	10S, 20S
0	HSG B	
0	HSG C	
0	HSG D	
49,146	Other	10S, 20S

Summary for Subcatchment 10S: Watershed 10S

Runoff = 5.7 cfs @ 12.15 hrs, Volume= 21,030 cf, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
	2,101	30	Woods, Good, HSG A
	15,698	39	>75% Grass cover, Good, HSG A
*	48,550	98	Impervious
	66,349	82	Weighted Average
	17,799		26.83% Pervious Area
	48,550		73.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	55	0.0180	0.10		**Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.10"
1.8	347	0.0050	3.21	2.52	**Pipe Channel, B to C** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
11.2	402	Total			

Summary for Subcatchment 20S: Watershed 20S

Runoff = 0.0 cfs @ 12.27 hrs, Volume= 331 cf, Depth= 0.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
	475	30	Woods, Good, HSG A
	4,930	39	>75% Grass cover, Good, HSG A
*	596	98	Impervious
	6,001	44	Weighted Average
	5,405		90.07% Pervious Area
	596		9.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	75	0.0220	0.11		**Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.10"

Summary for Pond 7P: ICS1

Inflow Area =	66,349 sf, 73.17% Impervious, Inflow Depth = 3.80"	for 25-year event
Inflow =	5.7 cfs @ 12.15 hrs, Volume=	21,030 cf
Outflow =	5.7 cfs @ 12.15 hrs, Volume=	21,030 cf, Atten= 0%, Lag= 0.0 min
Primary =	5.7 cfs @ 12.15 hrs, Volume=	21,030 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 76.15' @ 13.10 hrs
Flood Elev= 83.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	73.68'	**24.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 73.68' / 73.68' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	74.68'	**6.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)
#3	Device 1	71.60'	**12.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 71.60' / 71.50' S= 0.0067 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=5.7 cfs @ 12.15 hrs HW=75.08' TW=74.42' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 5.7 cfs @ 3.39 fps)
  ├─**2=Sharp-Crested Vee/Trap Weir** (Passes < 5.0 cfs potential flow)
  └─**3=Culvert** (Passes < 3.1 cfs potential flow)

Summary for Pond 10P: Subsurface UDSF1

Inflow Area =	66,349 sf, 73.17% Impervious, Inflow Depth = 3.80"	for 25-year event
Inflow =	5.7 cfs @ 12.15 hrs, Volume=	21,030 cf
Outflow =	0.6 cfs @ 13.11 hrs, Volume=	21,036 cf, Atten= 89%, Lag= 57.3 min
Discarded =	0.6 cfs @ 11.74 hrs, Volume=	19,748 cf
Primary =	0.0 cfs @ 13.11 hrs, Volume=	1,288 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 76.15' @ 13.11 hrs Surf.Area= 4,080 sf Storage= 7,930 cf
Flood Elev= 78.24' Surf.Area= 4,080 sf Storage= 8,799 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 105.2 min (920.3 - 815.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	73.18'	3,654 cf	**39.50'W x 103.30'L x 3.50'H Field A** 14,281 cf Overall - 5,145 cf Embedded = 9,135 cf x 40.0% Voids
#2A	73.68'	5,145 cf	**ADS_StormTech SC-740 +Cap** x 112 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 8 Rows of 14 Chambers
		8,799 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	69.80'	**12.0" Round Culvert** L= 61.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 69.80' / 69.20' S= 0.0098 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	70.10'	**0.8" Vert. Orifice/Grate** C= 0.600
#3	Device 1	75.18'	**0.5" Vert. Orifice/Grate** C= 0.600
#4	Device 1	76.65'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#5	Discarded	73.18'	**6.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.6 cfs @ 11.74 hrs HW=73.24' (Free Discharge)
└─**5=Exfiltration** (Exfiltration Controls 0.6 cfs)

Primary OutFlow Max=0.0 cfs @ 13.11 hrs HW=76.15' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.0 cfs of 8.3 cfs potential flow)
 ├─**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 11.81 fps)
 ├─**3=Orifice/Grate** (Orifice Controls 0.0 cfs @ 4.68 fps)
 └─**4=Sharp-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Link SP1: SP-1

Inflow Area = 66,349 sf, 73.17% Impervious, Inflow Depth = 0.23" for 25-year event
Inflow = 0.0 cfs @ 13.11 hrs, Volume= 1,288 cf
Primary = 0.0 cfs @ 13.11 hrs, Volume= 1,288 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link SP2: SP-2

Inflow Area = 6,001 sf, 9.93% Impervious, Inflow Depth = 0.66" for 25-year event
Inflow = 0.0 cfs @ 12.27 hrs, Volume= 331 cf
Primary = 0.0 cfs @ 12.27 hrs, Volume= 331 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10S: Watershed 10S Runoff Area=66,349 sf 73.17% Impervious Runoff Depth=1.46"
Flow Length=402' Tc=11.2 min CN=82 Runoff=2.2 cfs 8,062 cf

Subcatchment 20S: Watershed 20S Runoff Area=6,001 sf 9.93% Impervious Runoff Depth=0.02"
Flow Length=75' Slope=0.0220 '/' Tc=11.1 min CN=44 Runoff=0.0 cfs 12 cf

Pond 7P: ICS1 Peak Elev=74.51' Inflow=2.2 cfs 8,062 cf
Outflow=2.2 cfs 8,062 cf

Pond 10P: Subsurface UDSF1 Peak Elev=73.96' Storage=1,751 cf Inflow=2.2 cfs 8,062 cf
Discarded=0.6 cfs 7,654 cf Primary=0.0 cfs 414 cf Outflow=0.6 cfs 8,068 cf

Link SP1: SP-1 Inflow=0.0 cfs 414 cf
Primary=0.0 cfs 414 cf

Link SP2: SP-2 Inflow=0.0 cfs 12 cf
Primary=0.0 cfs 12 cf

Total Runoff Area = 72,350 sf Runoff Volume = 8,074 cf Average Runoff Depth = 1.34"
32.07% Pervious = 23,204 sf 67.93% Impervious = 49,146 sf

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10S: Watershed 10S Runoff Area=66,349 sf 73.17% Impervious Runoff Depth=2.72"
Flow Length=402' Tc=11.2 min CN=82 Runoff=4.1 cfs 15,061 cf

Subcatchment 20S: Watershed 20S Runoff Area=6,001 sf 9.93% Impervious Runoff Depth=0.29"
Flow Length=75' Slope=0.0220 '/' Tc=11.1 min CN=44 Runoff=0.0 cfs 143 cf

Pond 7P: ICS1 Peak Elev=74.95' Inflow=4.1 cfs 15,061 cf
Outflow=4.1 cfs 15,061 cf

Pond 10P: Subsurface UDSF1 Peak Elev=74.94' Storage=4,937 cf Inflow=4.1 cfs 15,061 cf
Discarded=0.6 cfs 14,239 cf Primary=0.0 cfs 828 cf Outflow=0.6 cfs 15,067 cf

Link SP1: SP-1 Inflow=0.0 cfs 828 cf
Primary=0.0 cfs 828 cf

Link SP2: SP-2 Inflow=0.0 cfs 143 cf
Primary=0.0 cfs 143 cf

Total Runoff Area = 72,350 sf Runoff Volume = 15,204 cf Average Runoff Depth = 2.52"
32.07% Pervious = 23,204 sf 67.93% Impervious = 49,146 sf

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10S: Watershed 10S Runoff Area=66,349 sf 73.17% Impervious Runoff Depth=3.80"
Flow Length=402' Tc=11.2 min CN=82 Runoff=5.7 cfs 21,030 cf

Subcatchment 20S: Watershed 20S Runoff Area=6,001 sf 9.93% Impervious Runoff Depth=0.66"
Flow Length=75' Slope=0.0220 '/' Tc=11.1 min CN=44 Runoff=0.0 cfs 331 cf

Pond 7P: ICS1 Peak Elev=76.15' Inflow=5.7 cfs 21,030 cf
Outflow=5.7 cfs 21,030 cf

Pond 10P: Subsurface UDSF1 Peak Elev=76.15' Storage=7,930 cf Inflow=5.7 cfs 21,030 cf
Discarded=0.6 cfs 19,748 cf Primary=0.0 cfs 1,288 cf Outflow=0.6 cfs 21,036 cf

Link SP1: SP-1 Inflow=0.0 cfs 1,288 cf
Primary=0.0 cfs 1,288 cf

Link SP2: SP-2 Inflow=0.0 cfs 331 cf
Primary=0.0 cfs 331 cf

Total Runoff Area = 72,350 sf Runoff Volume = 21,362 cf Average Runoff Depth = 3.54"
32.07% Pervious = 23,204 sf 67.93% Impervious = 49,146 sf

Appendix E

Inspection, Maintenance and Housekeeping Plan

INSPECTION, MAINTENANCE, AND HOUSEKEEPING PLAN
Pine State Family Mart
1883 Forest Avenue
Portland, Maine 04103

Introduction

The responsible party for maintenance of the stormwater management facility following construction will be the City of Portland.

The Contract Documents will require the contractor to designate of person responsible for maintenance of the sedimentation control features during construction as required by the Erosion & Sedimentation Control Report.

The following plan outlines the anticipated inspection and maintenance procedures for the erosion and sedimentation control measures as well as stormwater management facilities for the project. This plan also outlines several housekeeping requirements that shall be followed during and after construction. These procedures shall be followed in order to ensure the intended function of the designed measures and to prevent unreasonably adverse impacts to the surrounding environment.

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

During Construction

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

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

3. **Documentation:** A log summarizing the inspections and any corrective action taken must be maintained on-site. Correction action shall be performed in general conformance with the Maine Construction General Permit and Maine DEP Chapter 500 Stormwater standards. The log must

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

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

A. Filter Berms:

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

B. Stone Check Dams:

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

C. Riprap Materials:

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

D. Erosion Control Blankets:

- Inspect these reinforced areas semi-annually and after significant rainfall events for slumping, sliding, seepage, and scour. Pay close attention to unreinforced areas adjacent to the erosion control blankets, which may experience accelerated erosion.
- Review all applicable inspection and maintenance procedures recommended by the

specific blanket manufacturer. These tasks shall be included in addition to the requirements of this plan.

E. Stabilized Construction Entrances/Exits:

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

F. Temporary Seed and Mulch:

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

G. Stabilized Temporary Drainage Swales:

- Sediment accumulation in the swale shall be removed once the cross section of the swale is reduced by 25%.
- The swales shall be inspected after rainfall events. Any evidence of sloughing of the side slopes or channel erosion shall be repaired and corrective action should be taken to prevent reoccurrence of the problem.
- In addition to the stabilized lining of the channel (i.e. erosion control blankets), stone check dams may be needed to further reduce channel velocity.

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

A. Spill prevention: Controls must be used to prevent pollutants from being discharged from materials on-site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation. A Spill, Prevention, Control and Countermeasures Plan is created for the project and is to be kept onsite at all times.

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

C. Fugitive sediment and dust: Actions must be taken to 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.

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

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

Post-Construction

1. **Inspection:** After construction, it is the responsibility of the City of Portland to comply with the inspection and maintenance procedures outlined in this section. All measures must be maintained in effective operating condition. A person with knowledge of erosion and stormwater control, including the standards and conditions in all applicable permits, shall conduct the inspections.

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

A. Vegetated Areas:

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

B. Ditches, Swales and Other Open Channels:

- Inspect ditches, swales, level spreaders and other open stormwater channels in the spring, in the late fall, and after heavy rains to remove any obstructions to flow. Remove accumulated sediments and debris, remove woody vegetative growth that could obstruct flow, and repair any erosion of the ditch lining.
- Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity.
- Any woody vegetation growing through riprap linings must also be removed.

Repair any slumping side slopes as soon as practicable.

- If the ditch has a riprap lining, replace riprap in areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones have dislodged.

C. Winter Sanding:

- Clear accumulations of winter sand along access road at least once a year, preferably in the spring.
- Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader or other acceptable method.

D. Culverts:

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

E. Subsurface Sand Filter

- Inspect the site monthly for the first few months after construction. Then inspections can occur on an annual basis, preferably after rain events when clogging will be obvious.
- Make any repairs necessary to ensure the measure is operating properly.
- Regular maintenance is necessary to remove surface sediment, trash, debris, and leaf litter.
- Outlets and chambers need to be cleaned/repaired when drawdown times in the filter exceeds 36 hours.
- In certain cases, layers of sand may need to be replaced every 3 to 5 years.

J. Level Spreader:

- The level spreader pool should be inspected after rainfall events for sediment accumulation and debris that may reduce its capacity. Sediment and debris buildup should be removed once the volume of the pool has been reduced by 25%. The level berm must be constructed so that flows slowly seep across the berm as sheet flow to the receiving downstream drainage way. Repair or reconstruction of the berm is required when flow from the spreader becomes channelized.

3. **Documentation:**

A. The owner or operator of a BMP or a qualified post-construction stormwater inspector hired by that person, shall, on or by June 30 of each year, provide a completed and signed certification to DPS in a form provided by DPS, certifying that the person has inspected the BMP(s) and that they are adequately maintained and functioning as intended by the approved post-construction stormwater management plan, or that they required maintenance or repair, including the record of the deficiency and corrective action(s) taken.

B. A log summarizing the inspections and any corrective action taken must be maintained. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of controls. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to the appropriate regulatory agency upon request. A sample "Stormwater Inspection and Maintenance Form" has been included as Attachment 2 of this Inspection, Maintenance, and Housekeeping Plan.

4. **Maine DEP Recertification:** A certification of the following shall be submitted to the MDEP within three months of the expiration of each five-year interval from the date of issuance of MDEP permits.

   A. Identification and repair of erosion problems. All areas of the project site have been inspected for areas of erosion, and appropriate steps have been taken to permanently stabilize these areas.
   B. Inspection and repair of stormwater control system. All aspects of the stormwater control system have been inspected for damage, wear, and malfunction, and appropriate steps have been taken to repair or replace the system, or portions of the system.
   C. The Inspection, Maintenance, and Housekeeping Plan for the site is being implemented as written, or modifications to the plan have been submitted to and approved by the MDEP, and the maintenance log is being maintained.

5. **Duration of Maintenance:** Perform maintenance as described and required for any associated permits unless and until the system is formally accepted by a municipality or quasi-municipal district or is placed under the jurisdiction of a legally created association that will be responsible for the maintenance of the system. If a municipality or quasi-municipal district chooses to accept a stormwater management system, or a component of a stormwater system, it must provide a letter to the MDEP stating that it assumes responsibility for the system. The letter must specify the components of the system for which the municipality or district will assume responsibility, and that the municipality or district agrees to maintain those components of the system in compliance with MDEP standards. Upon such assumption of responsibility, and approval by the MDEP, the municipality, quasi-municipal district, or association becomes a co-permittee for this purpose only and must comply with all terms and conditions of the permit.

Attachments

Attachment 1 – Stormwater Inspection and Maintenance Log Form

ATTACHMENT 1 – STORMWATER INSPECTION AND MAINTENANCE LOG

Pine State Family Mart
1883 Forest Avenue
Portland, Maine 04103

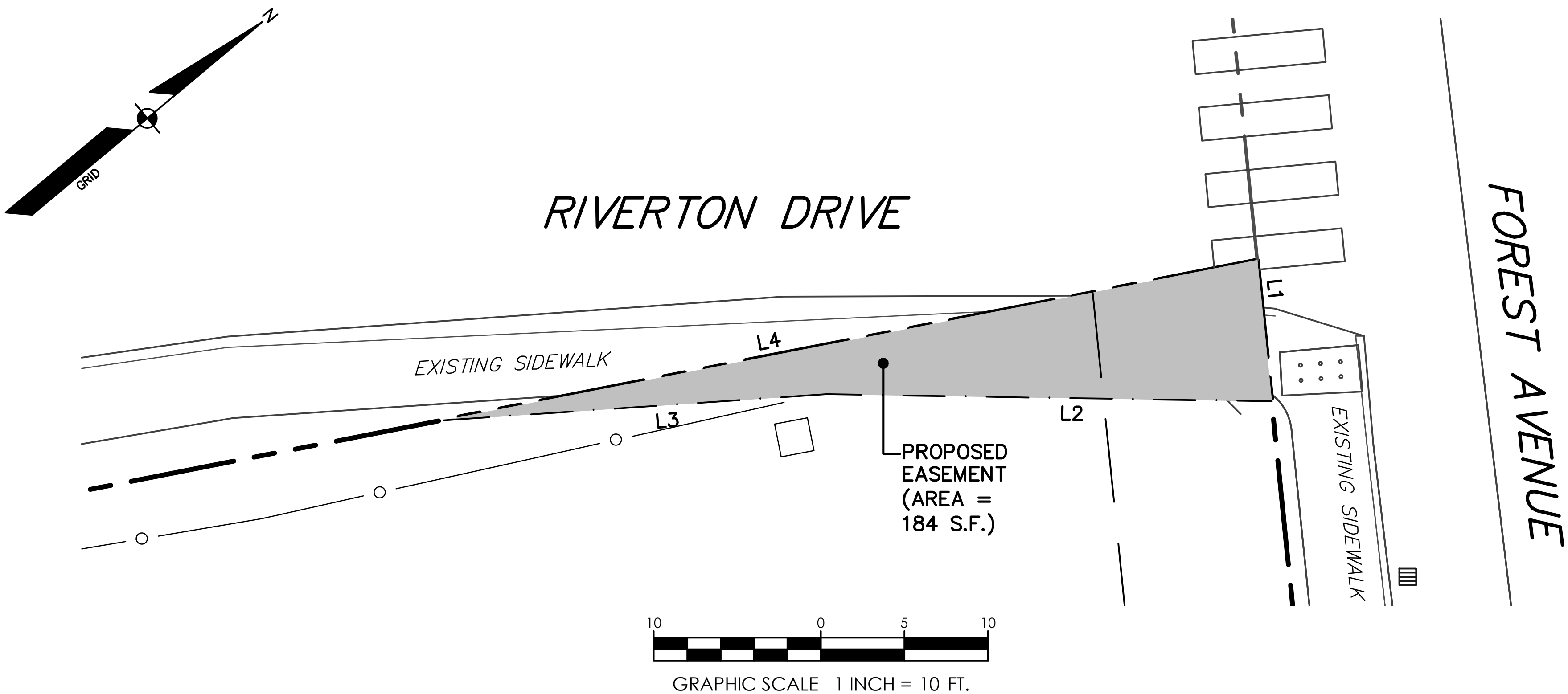
This log is intended to accompany the Inspection, Maintenance and Housekeeping Plan for the proposed Pine State Family Mart in Portland, Maine. The following items shall be checked, cleaned and maintained on a regular basis as specified in the Maintenance Plan and as described in the table below. This log shall be kept on file for a minimum of five (5) years and shall be available for review by the municipality. Qualified personnel familiar with drainage systems and soils shall perform all inspections. Attached is a copy of the construction and post-construction maintenance logs.

	INSPECTOR NAME	DATE PERFORMED	SUGGESTED INTERVAL
Vegetated Areas			
Inspect all slopes and embankments			Annually
Replant bare areas or areas with sparse growth			Annually
Paved Surfaces			
Clear accumulated winter sand			Annually
Remove sediment along edges and in pockets			Annually
Ditches & Swales			
Remove any obstructions and accumulated sediments and debris			Monthly
Repair any erosion of ditch lining			Annually
Mow vegetated ditches			Annually
Remove woody vegetation growing through riprap			Annually
Repair any slumping side slopes			Annually
Replace riprap where stones have dislodged			Annually
Catch Basins			
Remove accumulated sediments and debris in the sump and at grate			Annually
Culverts			
Remove accumulated sediments and debris at the inlet, outlet, within conduit			Annually
Repair any erosion at inlet and outlet			Annually
Sump Depth			Annually

Level Spreader			
Remove sediment			Monthly
Check for evidence of channelized flow over berm			Monthly
Erosion (side slopes, embankment)			Monthly
Mowed			Semi-Annually
Subsurface Sand Filter			
Inspection of subsurface structure following major storm events			Semi-Annually (during first year)
Inspection after major storm to ensure proper function			Bi-Annually
Remove sediment and debris			Annually
Clean/repair outlets and chambers			When drawdown times in filter exceed 36 hrs

Appendix F

Easements/Deed Restrictions



GENERAL NOTES:

1. THE RECORD OWNER OF THE LOCUS PARCEL IS JOHN CHAU AND PHUONG NEANG BY WARRANTY DEED DATED JUNE 20, 2008 AND RECORDED AT THE CUMBERLAND COUNTY REGISTRY OF DEEDS (CCRD) ON JUNE 23, 2008 IN BOOK 26148, PAGE 266.

2. THE PROPERTY IS SHOWN AS LOT 3, BLOCK B, ON THE CITY OF PORTLAND ASSESSORS MAP 327 AND IS LOCATED IN THE B-2 ZONE.

3. REFERENCE IS MADE TO PLANS ENTITLED "EXISTING CONDITIONS AND SITE PLAN OF PINE STATE FAMILY MART, 1884 FOREST AVE., PORTLAND, MAINE FOR JOHN CHAU" DATED SEPTEMBER 10, 2018, BY SEBAGO TECHNICS, INC.

EASEMENT LINE TABLE

LINE	DIRECTION	DISTANCE
L1	S 55°50'32" E	8.50'
L2	S 40°54'47" W	26.63'
L3	S 36°05'00" W	23.00'
L4	N 28°50'58" E	49.65'

SEBAGO TECHNICS
WWW.SEBAGOTECHNICS.COM
75 John Roberts Rd.
Suite 4A
South Portland, ME 04106
Tel. 207-200-2100

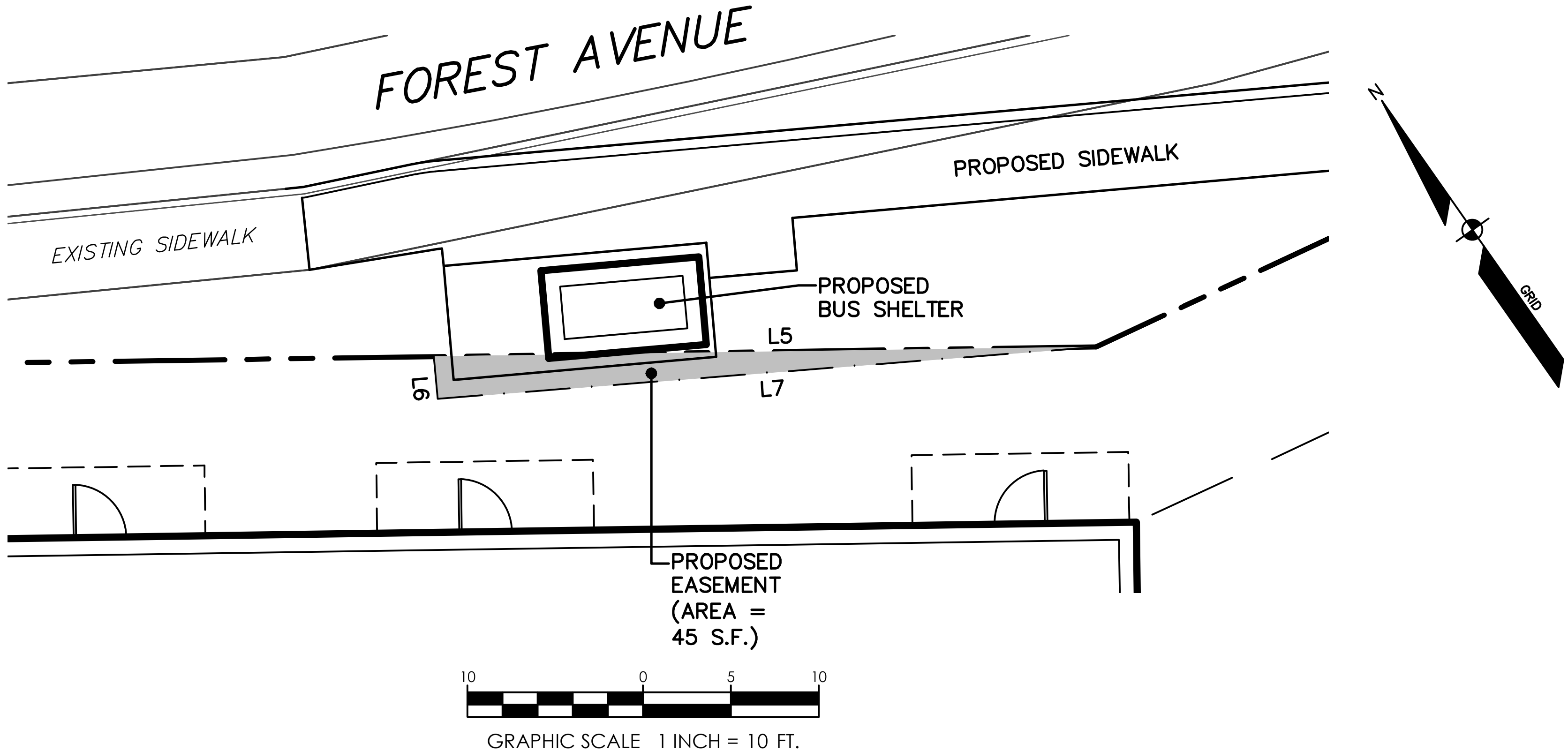
EXHIBIT 'A' SKETCH
OF PROPOSED SIDEWALK EASEMENT

LOCATION:
RIVERTON DRIVE/FOREST AVENUE
PORTLAND, MAINE

FOR:
PINE STATE FAMILY MART
1884 FOREST AVE., PORTLAND, MAINE

SCALE: 1" = 10'
DATE: 09-11-18
SHEET: 1 OF 3

11142S.dwg, TAB: EX1



GENERAL NOTES:

1. THE RECORD OWNER OF THE LOCUS PARCEL IS JOHN CHAU AND PHUONG NEANG BY WARRANTY DEED DATED JUNE 20, 2008 AND RECORDED AT THE CUMBERLAND COUNTY REGISTRY OF DEEDS (CCRD) ON JUNE 23, 2008 IN BOOK 26148, PAGE 266.

2. THE PROPERTY IS SHOWN AS LOT 3, BLOCK B, ON THE CITY OF PORTLAND ASSESSORS MAP 327 AND IS LOCATED IN THE B–2 ZONE.

3. REFERENCE IS MADE TO PLANS ENTITLED "EXISTING CONDITIONS AND SITE PLAN OF PINE STATE FAMILY MART, 1884 FOREST AVE., PORTLAND, MAINE FOR JOHN CHAU" DATED SEPTEMBER 10, 2018, BY SEBAGO TECHNICS, INC.

EASEMENT LINE TABLE

LINE	DIRECTION	DISTANCE
L5	N 55°50'32" W	37.68'
L6	S 30°00'00" W	2.41'
L7	S 59°30'29" E	37.58'

SEBAGO TECHNICS
WWW.SEBAGOTECHNICS.COM
75 John Roberts Rd.
Suite 4A
South Portland, ME 04106
Tel. 207-200-2100

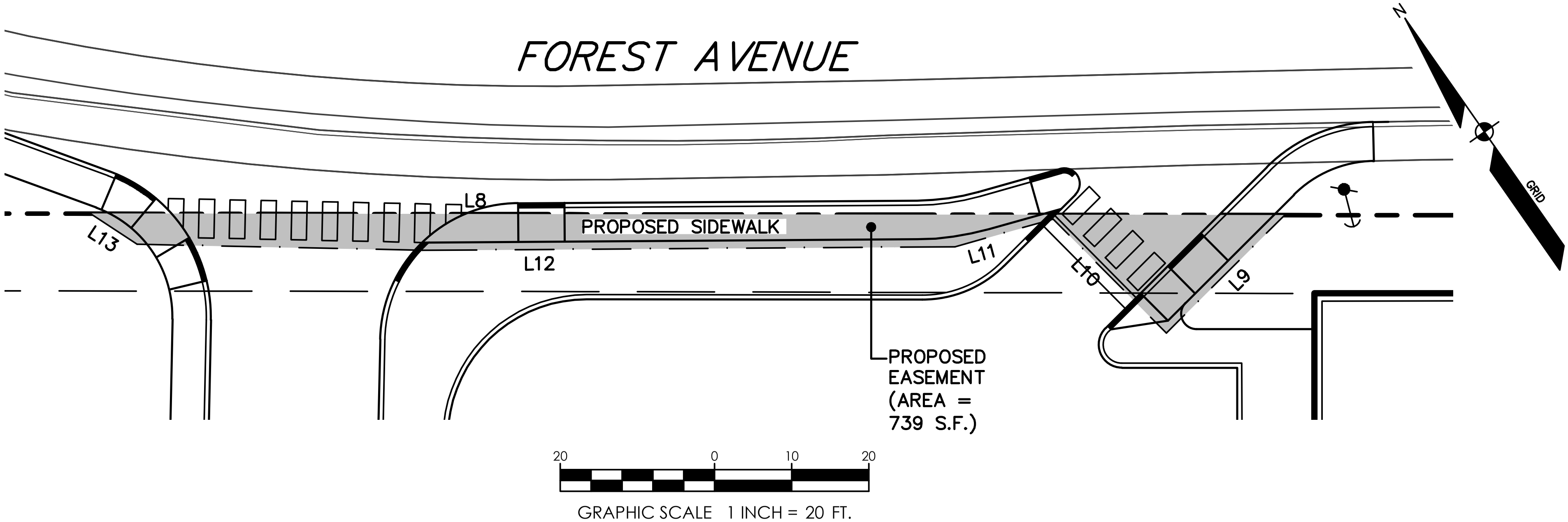
EXHIBIT 'B' SKETCH
OF PROPOSED SIDEWALK EASEMENT

LOCATION:
RIVERTON DRIVE/FOREST AVENUE
PORTLAND, MAINE

FOR:
PINE STATE FAMILY MART
1884 FOREST AVE., PORTLAND, MAINE

SCALE: 1" = 10'
DATE: 09-11-18
SHEET: 2 OF 3

11142S.dwg, TAB: EX2



GENERAL NOTES:

1. THE RECORD OWNER OF THE LOCUS PARCEL IS JOHN CHAU AND PHUONG NEANG BY WARRANTY DEED DATED JUNE 20, 2008 AND RECORDED AT THE CUMBERLAND COUNTY REGISTRY OF DEEDS (CCRD) ON JUNE 23, 2008 IN BOOK 26148, PAGE 266.

2. THE PROPERTY IS SHOWN AS LOT 3, BLOCK B, ON THE CITY OF PORTLAND ASSESSORS MAP 327 AND IS LOCATED IN THE B–2 ZONE.

3. REFERENCE IS MADE TO PLANS ENTITLED "EXISTING CONDITIONS AND SITE PLAN OF PINE STATE FAMILY MART, 1884 FOREST AVE., PORTLAND, MAINE FOR JOHN CHAU" DATED SEPTEMBER 10, 2018, BY SEBAGO TECHNICS, INC.

EASEMENT LINE TABLE

LINE	DIRECTION	DISTANCE
L8	S 79°56'02" E	154.87'
L9	S 55°08'13" W	21.63'
L10	N 34°51'47" W	20.80'
L11	S 84°17'55" W	13.22'
L12	N 80°22'32" W	69.08'
L13	N 46°57'50" W	7.23'

SEBAGO TECHNICS
WWW.SEBAGOTECHNICS.COM
75 John Roberts Rd.
Suite 4A
South Portland, ME 04106
Tel. 207-200-2100

EXHIBIT 'C' SKETCH
OF PROPOSED SIDEWALK EASEMENT

LOCATION:
RIVERTON DRIVE/FOREST AVENUE
PORTLAND, MAINE

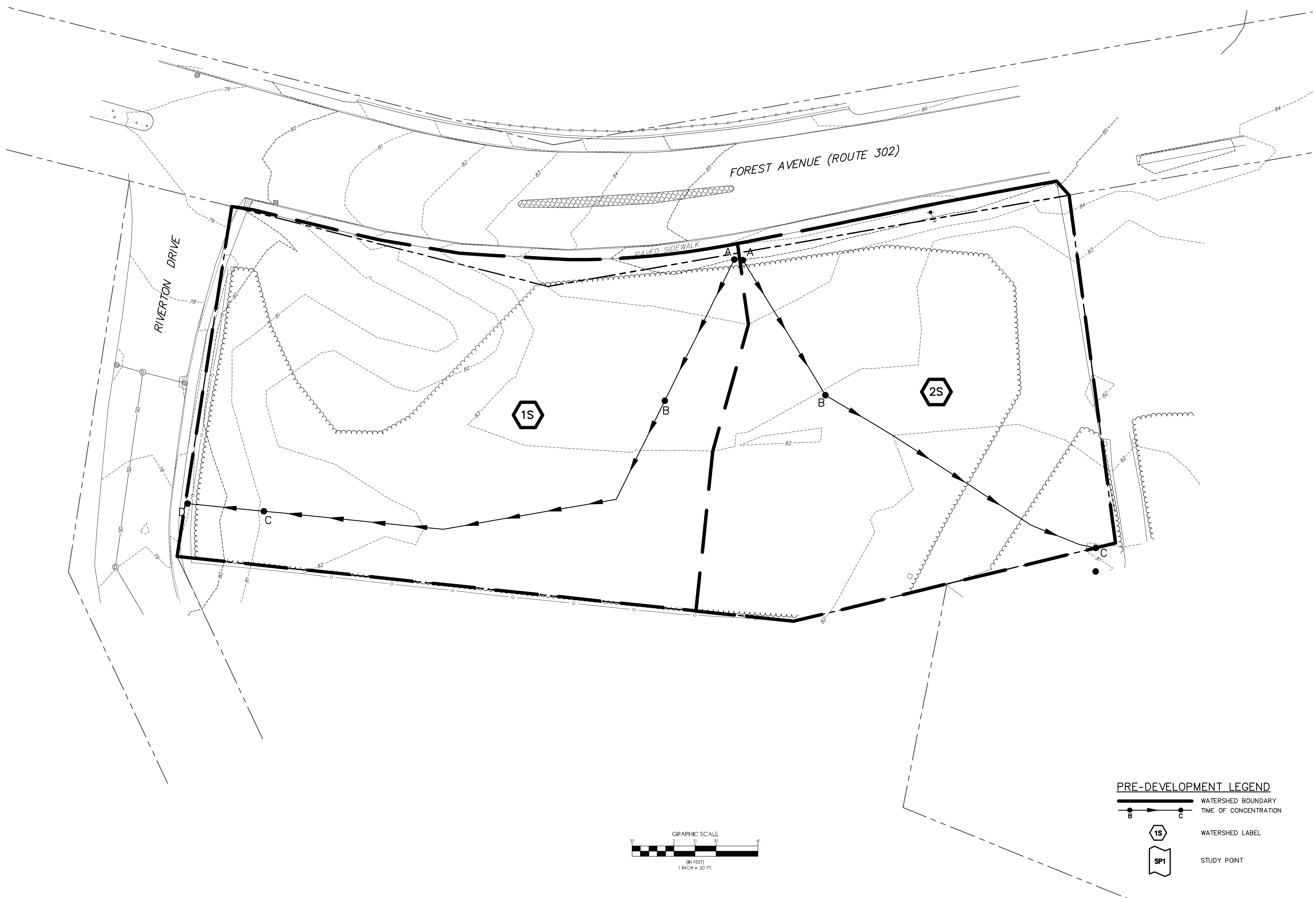
FOR:
PINE STATE FAMILY MART
1884 FOREST AVE., PORTLAND, MAINE

SCALE: 1" = 20'
DATE: 09-11-18
SHEET: 3 OF 3

11142S.dwg, TAB: EX3

Appendix G

Stormwater Management Plans



JAMES R. SEYMOUR, PE 9984

STATE OF MAINE
JAMES R. SEYMOUR
No. 9984
LICENSED
PROFESSIONAL ENGINEER
09-10-18

DESIGNED	CHECKED
SAH	RLM

REV:	BY:	DATE:	STATUS:
A	RLM	9-10-18	SUBMIT TO CITY OF PORTLAND

SEBAGO TECHNICS
WWW.SEBAGOTECHNICS.COM
75 John Roberts Rd.
Suite 4A
South Portland, ME 04106
Tel. 207-200-2100

PRE-DEVELOPMENT WATERSHED PLAN

OF:
PINE STATE FAMILY MART
1884 FOREST AVENUE
PORTLAND, MAINE 04103
FOR:
JOHN CHAU
89 ARCADIA ST.
PORTLAND, MAINE 04103

PROJECT NO.	SCALE
11142	1" =20'

SHEET 1 OF 2

11142SWP.dwg, TAB:PRE

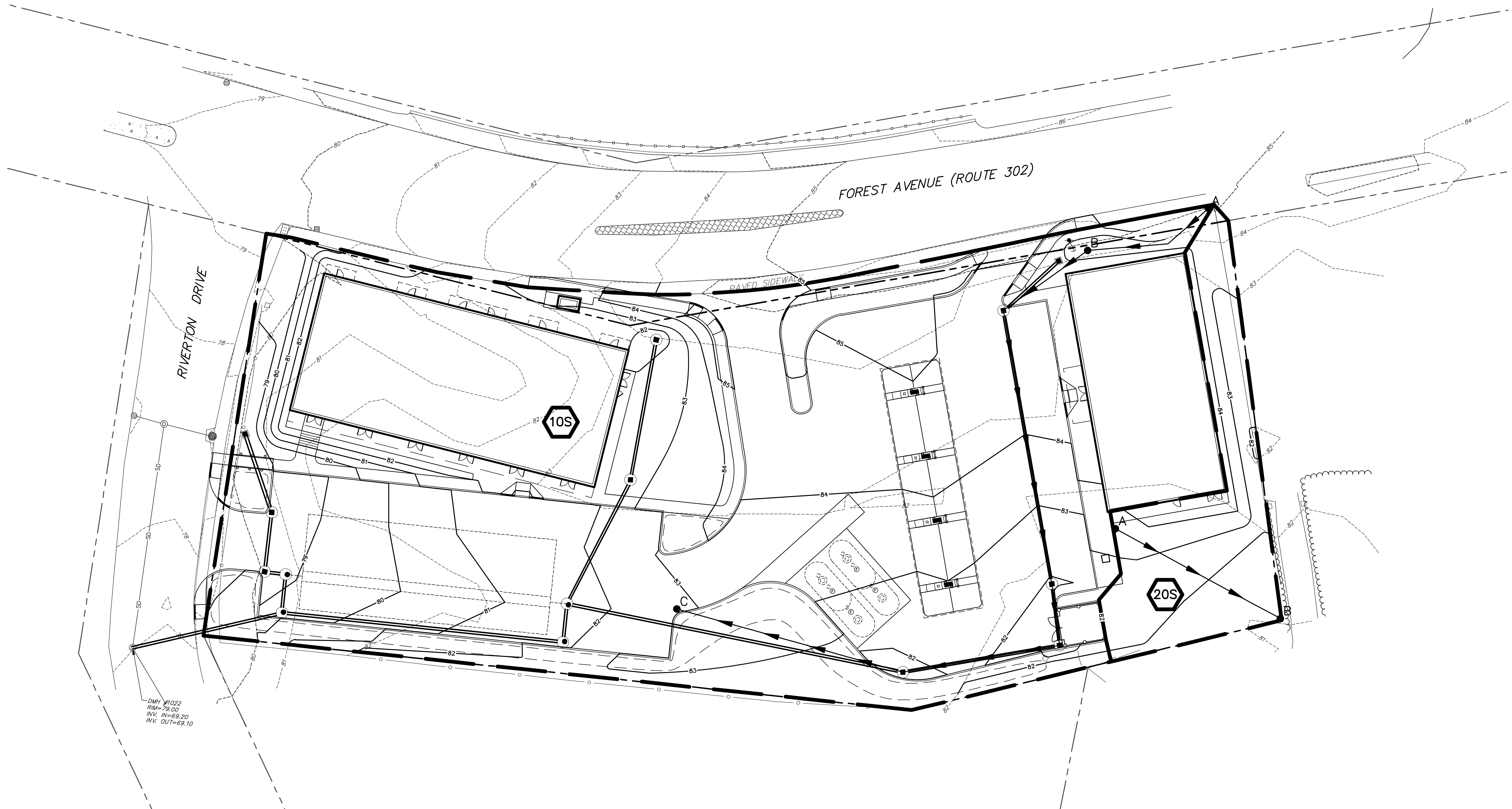


Table 1: MDEP GENERAL STANDARD CALCULATIONS

Job # 11142 Pine State Family Mart

AREA ID	WATERSHED SIZE (S.F.)	EXISTING ONSITE IMPERVIOUS AREA TO REMAIN (S.F.)	NEW ONSITE IMPERVIOUS AREA (S.F.)	EXISTING ONSITE LANDSCAPED AREA TO REMAIN (S.F.)	NEW ONSITE LANDSCAPED AREA (S.F.)	NET NEW DEVELOPED AREA (S.F.)	NET EXISTING DEVELOPED AREAS (S.F.)	TREATMENT PROVIDED?	IMPERVIOUS AREA TREATED (S.F.)	LANDSCAPED AREA TREATED* (S.F.)	DEVELOPED AREA TREATED (S.F.)	TREATMENT BMP
10	66,349	147	48,403	2,101	15,698	64,101		YES	48,550	17,799	66,349	SSSF1
20	7,500	296	300	475	4,930	5,230		NO	0	0	0	
TOTAL (S.F.)	**73,849**	**443**	**48,703**	**2,576**	**20,628**	**69,331**	**0**		**48,550**	**17,799**	**66,349**	

TOTAL NEW IMPERVIOUS AREA (S.F.)	48,703	TOTAL DEVELOPED AREA (S.F.)	69,331
TOTAL IMPERVIOUS AREA RECEIVING TREATMENT (S.F.)	48,550	TOTAL DEV. AREA RECEIVING TREATMENT (S.F.)	66,349
% OF IMPERVIOUS AREA RECEIVING TREATMENT	99.69%	% OF DEV. AREA RECEIVING TREATMENT	95.70%

GRAPHIC SCALE
(IN FEET)
1 INCH = 20 FT.

POST-DEVELOPMENT LEGEND

- WATERSHED BOUNDARY
- B C TIME OF CONCENTRATION
- 10S WATERSHED LABEL
- SP1 STUDY POINT
- 11P STORMWATER TREATMENT/DETENTION POND

JAMES R. SEYMOUR, PE 9984

STATE OF MAINE
JAMES R. SEYMOUR
No. 9984
LICENSED
PROFESSIONAL ENGINEER
09-10-18

DESIGNED	CHECKED
SAH	RLM

REV:	BY:	DATE:	STATUS:
A	RLM	9-10-18	SUBMIT TO CITY OF PORTLAND

SEBAGO TECHNICS
WWW.SEBAGOTECHNICS.COM
75 John Roberts Rd.
Suite 4A
South Portland, ME 04106
Tel. 207-200-2100

PRE-DEVELOPMENT WATERSHED PLAN

OF:
PINE STATE FAMILY MART
1884 FOREST AVENUE
PORTLAND, MAINE 04103
FOR:
JOHN CHAU
89 ARCADIA ST.
PORTLAND, MAINE 04103

PROJECT NO.	SCALE
11142	1" =20'

11142SWP.dwg, TAB:POST