NOTES:

1. "The development is required to comply with the City/MaineDEP water quality treatment standards. These standards will be met by the incorporation of the following, as was evidenced in the approved Master Plan documents:

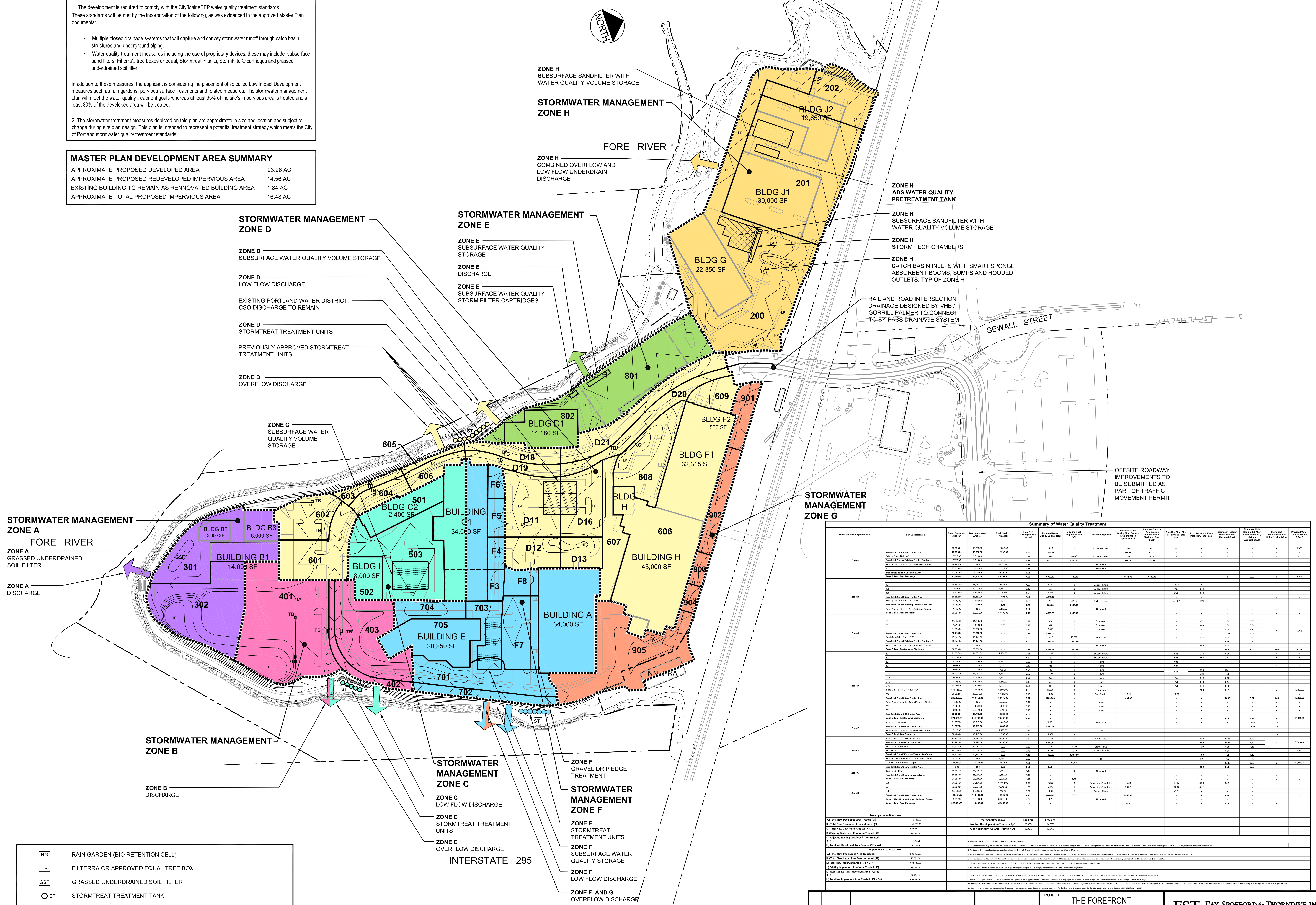
- Multiple closed drainage systems that will capture and convey stormwater runoff through catch basin structures and underground piping.
- Water quality treatment measures including the use of proprietary devices; these may include subsurface sand filters, Filterra® tree boxes or equal, Stormtreat™ units, StormFilter® cartridges and grassed underdrained soil filter.

In addition to these measures, the applicant is considering the placement of so called Low Impact Development measures such as rain gardens, pervious surface treatments and related measures. The stormwater management plan will meet the water quality treatment goals whereas at least 95% of the site's impervious area is treated and at least 80% of the developed area will be treated.

2. The stormwater treatment measures depicted on this plan are approximate in size and location and subject to change during site plan design. This plan is intended to represent a potential treatment strategy which meets the City of Portland stormwater quality treatment standards.

MASTER PLAN DEVELOPMENT AREA SUMMARY

APPROXIMATE PROPOSED DEVELOPED AREA	23.26 AC
APPROXIMATE PROPOSED REDEVELOPED IMPERVIOUS AREA	14.56 AC
EXISTING BUILDING TO REMAIN AS RENNOVATED BUILDING AREA	1.84 AC
APPROXIMATE TOTAL PROPOSED IMPERVIOUS AREA	16.48 AC



NORTH
FORE RIVER
STORMWATER MANAGEMENT ZONE A
ZONE A GRASSED UNDERDRAINED SOIL FILTER
ZONE A DISCHARGE
STORMWATER MANAGEMENT ZONE B
ZONE B DISCHARGE
STORMWATER MANAGEMENT ZONE C
ZONE C SUBSURFACE WATER QUALITY VOLUME STORAGE
ZONE C LOW FLOW DISCHARGE
ZONE C STORMTREAT TREATMENT UNITS
ZONE C OVERFLOW DISCHARGE
STORMWATER MANAGEMENT ZONE D
ZONE D SUBSURFACE WATER QUALITY VOLUME STORAGE
ZONE D LOW FLOW DISCHARGE
EXISTING PORTLAND WATER DISTRICT CSO DISCHARGE TO REMAIN
ZONE D STORMTREAT TREATMENT UNITS
PREVIOUSLY APPROVED STORMTREAT TREATMENT UNITS
ZONE D OVERFLOW DISCHARGE
STORMWATER MANAGEMENT ZONE E
ZONE E SUBSURFACE WATER QUALITY STORAGE
ZONE E DISCHARGE
ZONE E SUBSURFACE WATER QUALITY STORM FILTER CARTRIDGES
STORMWATER MANAGEMENT ZONE F
ZONE F GRAVEL DRIP EDGE TREATMENT
ZONE F STORMTREAT TREATMENT UNITS
ZONE F SUBSURFACE WATER QUALITY STORAGE
ZONE F LOW FLOW DISCHARGE
ZONE F AND G OVERFLOW DISCHARGE
STORMWATER MANAGEMENT ZONE G
STORMWATER MANAGEMENT ZONE H
ZONE H SUBSURFACE SANDFILTER WITH WATER QUALITY VOLUME STORAGE
ZONE H COMBINED OVERFLOW AND LOW FLOW UNDERDRAIN DISCHARGE
ZONE H ADS WATER QUALITY PRETREATMENT TANK
ZONE H SUBSURFACE SANDFILTER WITH WATER QUALITY VOLUME STORAGE
ZONE H STORM TECH CHAMBERS
ZONE H CATCH BASIN INLETS WITH SMART SPONGE ABSORBENT BOOMS, SUMPS AND HOODED OUTLETS, TYP OF ZONE H
RAIL AND ROAD INTERSECTION DRAINAGE DESIGNED BY VHB / GORRILL PALMER TO CONNECT TO BY-PASS DRAINAGE SYSTEM
SEWALL STREET
OFFSITE ROADWAY IMPROVEMENTS TO BE SUBMITTED AS PART OF TRAFFIC MOVEMENT PERMIT
INTERSTATE 295
BLDG B2 3,600 SF
BLDG B3 6,000 SF
BUILDING B1 14,000 SF
BLDG C2 12,400 SF
BUILDING C1 34,600 SF
BLDG I 8,000 SF
BUILDING E 20,250 SF
BUILDING A 34,000 SF
BLDG D1 14,180 SF
BLDG F1 32,315 SF
BLDG F2 1,530 SF
BLDG H
BUILDING H 45,000 SF
BLDG G 22,350 SF
BLDG J1 30,000 SF
BLDG J2 19,650 SF
RG RAIN GARDEN (BIO RETENTION CELL)
TB FILTERRA OR APPROVED EQUAL TREE BOX
GSF GRASSED UNDERDRAINED SOIL FILTER
ST STORMTREAT TREATMENT TANK
ST STORMTREAT TREATMENT TANK PREVIOUSLY APPROVED
SUBSURFACE WATER QUALITY VOLUME STORAGE
SUBSURFACE WATER QUALITY VOLUME STORAGE PREVIOUSLY APPROVED
SUBSURFACE SAND FILTER WITH WATER QUALITY VOLUME STORAGE
(IN FEET)
1 inch = 80 ft.

Summary of Water Quality Treatment

Storm Water Management Zone	Inlet Subcatchment	Total Developed Area (sf)	Total Impervious Area (sf)	Total Pervious Area (sf)	Total New Developed Area (Acres)	Required Water Quality Volume (cf)2	Existing Roof Mitigation Credit (sf)9	Treatment Approach	Required Water Quality Filter Surface Area (sf) (When applicable)10	Required Surface Area Volume controlled by Maximum Pond Depth	Tree Box Filter Size or Provided Filter Size	1 Yr 24-hr Storm Event Peak Flow Rate (cfs)3	Stormtech Isolator Row Chambers Required (EA)4	Stormtreat Units Required (EA) or StormFilters (EA) (Where Applicable)5,11	Stormtreat Units/Storm Filter Units Provided (EA)	Provided Water Quality Volume (cf)4, 7
Zone A	301	23,093.00	10,798.00	12,295.00	0.53	1,310	0	UD Grass Filter	786	873	900	-	-	-	-	1,350
	Sub-Total Zone A New Treated Area	23,093.00	10,798.00	12,295.00	0.53	1309.67	0.00	-	785.80	873.11	-	-	-	-	-	-
	Existing Depot Building*	7,720.00	7,720.00	0.00	0.18	643	4,632	UD Grass Filter	386	429	700	-	-	-	-	900
	Sub-Total Zone A Existing Treated Roof Area	7,720.00	7,720.00	0.00	0.18	643.33	4632.00	-	386.00	428.89	-	-	-	-	-	-
	Zone A New Untreated Area-Perimeter Grades	14,729.00	0.00	14,729.00	0.34	-	-	Untreated	-	-	-	-	-	-	-	-
	302	27,818.00	5,591.00	22,227.00	0.64	-	-	Untreated	-	-	-	-	-	-	-	-
	Sub-Totals Zone A Untreated Area	42,547.00	5,591.00	36,956.00	0.98	-	-	-	-	-	-	-	-	-	-	-
	Zone A Total Area Discharge	73,360.00	24,109.00	49,251.00	1.68	1953.00	4632.00	-	1171.80	1302.00	-	-	0	0.00	0	2,250
Zone B	401	46,664.00	17,081.00	29,583.00	1.07	2,410	0	Boxless Filtera	-	-	13'x7'	1.17	-	-	-	-
	402	7,588.00	6,241.00	1,347.00	0.17	565	0	Boxless Filtera	-	-	4'x6'	0.42	-	-	-	-
	403	26,630.00	9,865.00	16,765.00	0.61	1,381	0	Boxless Filtera	-	-	6'x8	0.73	-	-	-	-
	Sub-Total Zone B New Treated Area	80,882.00	33,187.00	47,695.00	1.86	4355.42		-	-	-	-	-	-	-	-	-
	Existing Depot Building* (trib to 401)	3,400.00	3,400.00	0.00	0.08	283	2,040	Boxless Filterra	-	-	see 401	0.21	-	-	-	-
	Sub-Total Zone B Existing Treated Roof Area	3,400.00	3,400.00	0.00	0.08	283.33	2040.00	-	-	-	-	-	-	-		
	Zone B New Untreated Area-Perimeter Grades	9,443.00	0.00	9,443.00	0.22	-		Untreated	-	-	-	-	-	-	-	-
	Zone B Total Area Discharge	93,725.00	36,587.00	57,138.00	2.15	4638.75	2040.00		-	-	-	-	-	-	-	-
Zone C	501	11,805.00	11,805.00	0.00	0.27	984	0	Stormtreat	-	-	-	0.72	3.60	0.85	5	5,738
	502	7,523.00	7,523.00	0.00	0.17	627	0	Stormtreat	-	-	-	0.46	2.30	0.54		
	503	31,390.00	31,390.00	0.00	0.72	2,616	0	Stormtreat	-	-	-	1.92	9.58	2.26		
	Sub-Total Zone C New Treated Area	50,718.00	50,718.00	0.00	1.16	4226.50		-	-	-	-	-	15.49	3.66		
	South Side Brick South (C1)*	18,141.00	18,141.00	0.00	0.42	1,512	10,885	Storm Treat	-	-	-	1.11	5.54	1.31		
	Sub-Total Zone C Existing Treated Roof Area*	18,141.00	18,141.00	0.00	0.42	1511.75	10884.60	-	-	-	-	-	5.54	1.31		
	Zone C New Untreated Area-Perimeter Grades	0.00	0.00	0.00	0.00	0		Untreated	-	-	-	0.00	0.00	0.00		
	Zone C Total Treated Area Discharge	68,859.00	68,859.00	0.00	1.58	5738.25	10884.60		-	-	-	-	21.02	4.97	5.00	5738
Zone D	601	21,057.00	11,803.00	9,254.00	0.48	1,292	0	Boxless Filtera	-	-	6'x8'	0.81	4.04	-	-	-
	602	13,308.00	7,527.00	5,781.00	0.31	820	0	Boxless Filtera	-	-	4'x6'	0.55	2.73	-	-	-
	603	3,244.00	1,359.00	1,885.00	0.07	176	0	Filterra	-	-	4'x6'	-	-	-	-	-
	604	5,691.00	3,131.00	2,560.00	0.13	346	0	Filterra	-	-	4'x'6	-	-	-	-	-
	D-21	9,052.00	8,280.00	772.00	0.21	716	0	Filterra	-	-	6'x8'	0.52	2.61	-	-	-
	D-20	16,178.00	12,517.00	3,661.00	0.37	1,165	0	Filterra	-	-		0.81	4.05	-	-	-
	D-18	9,604.00	5,763.00	3,841.00	0.22	608	0	Filterra	-	-	4'x6'	0.43	2.16	-	-	-
	D-19	8,103.00	6,430.00	1,673.00	0.19	592	0	Filterra	-	-	4'x'6	0.43	2.17	-	-	-
	D-12	11,149.00	4,926.00	6,223.00	0.26	618	0	Filterra	-	-	4'x'6	0.41	0.00	-	-	-
	Inlets D-11 , D-16, D-13, 606, 607	131,145.00	118,553.00	12,592.00	3.01	10,299	0	StormTreat	-	-	-	7.26	36.29	8.92	9	10,300.00
	608	20,692.00	10,264.00	10,428.00	0.48	1,203	0	Rain Garden	1,031	-	1,500	-	-	-	-	-
	Sub-Total Zone D New Treated Area	249,223.00	190,553.00	58,670.00	5.72	17835.08	-	-	1031.32	-	-	-	54.06	8.92	9.00	10,300.00
	Zone D New Unterated Area - Perimeter Grades	7,580.00	0.00	7,580.00	0.17	-	-	None	-	-	-	-	-	-	-	-
	605	7,186.00	4,988.00	2,198.00	0.16	-	-	None	-	-	-	-	-	-	-	-
	609	8,000.00	5,752.00	2,248.00	0.18	-	-	None	-	-	-	-	-	-	-	-
	Sub-Total; Zone D Untreated Area	22,766.00	10,740.00	12,026.00	0.52	-	-									
	Zone D Total Treated Area Discharge	271,989.00	201,293.00	70,696.00	6.24	-	0.00	-	-	-	-	-	54.06	8.92	9	10,300.00
Zone E	INLETS 801 thru 802	61,357.00	46,717.00	14,640.00	1.41	4,381	0	Storm Filter	-	-	-	-	-	14.09	15	
	Sub-Total Zone E New Treated Area	61,357.00	46,717.00	14,640.00	1.41	4381.08	-	-	-	-	-	-	-	14.09	15	
	Zone E New Untreated Area-Perimeter Grades	7,123.00	0.00	7,123.00	0.16	-	-	None	-	-	-	-	-	-		
	Zone E Total Area Discharge	68,480.00	46,717.00	21,763.00	1.57	4,381	0	-	-	-	-	-	-	-	15	
Zone F	INLETS 701, 702, CB's F-3 thru F-8	92,981.00	62,795.00	30,186.00	2.13	6,239	0	Storm Treat	-	-	-	4.89	24.45	5.40	7	7,600.00
	Sub-Total Zone F New Treated Area	92,981.00	62,795.00	30,186.00		6239.12		-	-	-	-	4.89	24.45	5.40		
	Brick South North Side*	16,323.00	16,323.00	0.00	0.37	1,360	9,794	Storm Treats	-	-	-	1.00	4.98	1.18		
	Brick North *	34,000.00	34,000.00	0.00	0.78	2,833	20,400	Gravel Drip Strip	-	-	-	-	0.00	-		2,920
	Sub-Total Zone F Existing Treated Roof Area	50,323.00	50,323.00	0.00	1.16	4193.58	30193.80	-	-	-	-	1.00	4.98	1.18		
	Zone F New Untreated Area - Perimeter Grades	8,725.00	0.00	8,725.00	0.20			None	-	-	-	NA	NA	NA		
	Zone F Total Area Discharge	152,029.00	113,118.00	38,911.00	1.36	-	30,194	-	-	-	-		29.43	6.58	7	10,520.00
Zone G	Sub-Total Zone G New Treated Area	0.00	0.00	0.00	0.00	0.00					-	0.00	0.00	0.00		
	INLETS 901-905	64,681.00	55,018.00	9,663.00	1.48	-	0	Untreated	-	-	-	-	-	-	-	
	Sub-Total Zone G New Untreated Area	64,681.00	55,018.00	9,663.00	1.48	-		-	-	-	-	-	-	-	-	
	Zone G Total Area Discharge	64,681.00	55,018.00	9,663.00	1.48	-	0.00	-	-	-	-	-	-	-	-	-
Zone H	200	94,355.00	81,191.00	13,164.00	2.17	7,205	0	Subsurface Sand Filter	4,323	-	4,400	4.99	24.9	-	-	-
	201	72,966.00	68,924.00	4,042.00	1.68	5,878	0	Subsurface Sand Filter	3,527	-	3,530	4.22	21.1	-	-	-
	202	16,863.00	16,013.00	850.00	0.39	1,363	0	Boxless Filtera	-	-	4'x8'	-	-	-	-	-
	Sub-Total Zone H New Treated Area	184,184.00	166,128.00	18,056.00	4.23	14445.87	0.00	-	7849.87	-	-	-	46.0	-	-	-
	Zone H New Untreated Area - Perimeter Grades	36,487.00	2,174.00	34,313.00	0.84	1,325		Untreated	-	-	-	-	-	-	-	-
	Zone H Total Area Discharge	220,671.00	168,302.00	52,369.00	5.07	-		-	N/A	-	-	-	46.03	-	-	

Developed Area Breakdown	
A.) Total New Developed Area Treated (SF)	742,438.00
B.) Total New Developed Area untreated (SF)	191,772.00
C.) Total New Developed Area (SF) = A+B	934,210.00
D.) Existing Developed Roof Area Treated (SF)	79,584.00
E.) Adjusted Existing Developed Area Treated (SF)	47,750.4
F.) Total Net Developed Area Treated (SF) = A+E	790,188.40
Impervious Area Breakdown	
G.) Total New Impervious Area Treated (SF)	560,896.00
H.) Total New Impervious Area untreated (SF)	73,523.00
I.) Total New Impervious Area (SF) = G+H	634,419.00
J.) Existing Impervious Roof Area Treated (SF)	79,584.00
K.) Adjusted Existing Impervious Area Treated (SF)	47,750.40
L.) Total Net Impervious Area Treated (SF) = G+K	608,646.40

Treatment Breakdown	Required	Provided
% of Net Developed Area Treated = F/C	80.00%	84.58%
% of Net Impervious Area Treated = L/I	95.00%	95.94%

1. All areas are based on the FST sub division drawings dated September 2014
2. The required water quality volumes have been computed based on Sections 7.4, 7.5 and 7.6 of the Maine DEP Volume III BMP's Technical Design Manual. The volume is computed to be 1" times the subcatchments impervious area and 0.4" times the subcatchments vegetated area. Exisiting buildings to remain are not required to be treated.
3. The 1 year peak flow rates have been computed using the rational method. The rainfall intensities are derived from the Cumberland County IDF curve.
4. Subsurface storage system sizing is based on a Stormtech SC-740 chamber system. All isolator rows have been computed per section 7.3.3 Pretreatment Isolator Row of the Maine DEP Volume III BMP's Technical Manual. One chamber is required for each 0.2 cfs of the computed tributary 1 year peak flow rate.
5. The required number of Stormtreat treatment units have been computed based on Section 7.4 of the Maine DEP Volume III BMP's Technical Design Manual. The number of units is computed to be the water quality volume divided by 1155 cubic feet and always rounded up.
6. The owner reserves the right to use an alternate tree box filter device provided it has been approved by the Maine DEP Chapter 500 delegated review authority of the City of Portland.
7. Provided Water Quality Volume for stormtreat storage system computed using 61.38 CF of storage per chamber based on Storm Tech Chamber Design Manual
8. The Stone Drip Edge was based on section 7.6 of the Maine DEP Volume III BMP's Technical Design Manual. The Width of stone is derived from a required WQV based off 1" of runoff and a desired stone reseviror depth. See sizing computations on separate sheet.
9. According to Chapter 500 Maine DEP stormwater rules; the department allows applicants to take credit for the treatment of existing impervious areas on site. For existing roofs the credit can be calculated by multiplying the total treated area by 0.6.
10. The required surface area for filter treatment system has been sized based on Sections, 7.1, 7.2 and 7.3 of the Maine DEP Volume III BMP's Technical Design Manual. Surface area for Grassed Underdrain Soil Filters and sub-surface sand filters can be computer by taking .05 of the impervious area + .02 of the pervious area, while Bio Retention Cells (Rain Garden can be computer by taking .07 of the impervious area + .03 of the pervious area.
11. The MEDEP will now accept a Filterra tree box filter as a stand alone treatment unit and does not require an Isolator Row for eligible projects. This project meets the eligibility criteria noted in a letter dated June 27th, 2014 from the MEDEP

REV	DATE	DESCRIPTION	
1	10.10.14	FINAL SUBDIVISION APPLICATION SUBMISSION	P.E. BO E. KENNEDY
		REVISIONS	LIC. #11994

PROJECT
THE FOREFRONT AT THOMPSON'S POINT

SHEET TITLE
OVERALL STORMWATER MANAGEMENT PLAN

CLIENT
FOREFRONT PARTNERS I, LP

FST 100 YEARS
FAY, SPOFFORD & THORNDIKE, INC.
ENGINEERS · PLANNERS · SCIENTISTS
778 MAIN ST, SUITE 8, SOUTH PORTLAND, ME 04106

DRAWN:	DED	DATE:	SEPT 2014
DESIGNED:	BEK	SCALE:	1" = 80'
CHECKED:	SRB	JOB NO.	2982.05
FILE NAME:	2982.05-SUB GRADING		
SHEET	C-4.1		