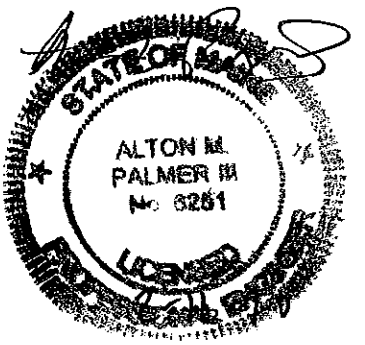
Stormwater



STORMWATER MANAGEMENT

I. Overview

Pursuant to SECTION V PORTLAND STORMWATER MANAGEMENT STANDARDS, of the Technical Standards, Paragraph II Applicability, Subparagraph C,

"The following development proposals shall be required to submit a Stormwater Management Plan pursuant to the regulations of Maine DEP Chapter 500 Stormwater Management rules, including Basic, General, and Flooding Standards.

b. Major site plans as defined in the Land Use Code – Section 14-522."

This report addresses the General, Flooding, and Urban Impaired Stream Standards. To meet the general standards, a project's stormwater management system must include treatment measures that will mitigate for the increased frequency and duration of channel erosive flows due to runoff from smaller storms, provide effective treatment for pollutants in stormwater, and mitigate potential temperature impacts. It is not anticipated that the project will be required to meet the Flooding or Urban Impaired Stream Standards, as outlined in the City of Portland Stormwater Management Standards.

II. Introduction

Bangor Savings Bank has retained Gorrill-Palmer Consulting Engineers, Inc. to prepare development plans and permit applications for a proposed bank with drive-up service. The proposed bank will be located at 320 Allen Avenue, southwest of the intersection of Washington Avenue and Allen Avenue in Portland.

The developer is currently seeking Major Site Plan Approval from the City of Portland for the proposed bank development.

This narrative contains the general stormwater management measures, which are appropriate for the infrastructure and lot construction required to develop this site.

III. Development Description

The development site includes portions of Lot E40, E41, and E50 of Portland Assessor's Map 344, totaling approximately 0.86 acres (the property lines were reconfigured for the development of the abutting Walgreens Pharmacy). The parcel is currently developed with a restaurant, Espo's.

Figure 1 is a map showing the project location.

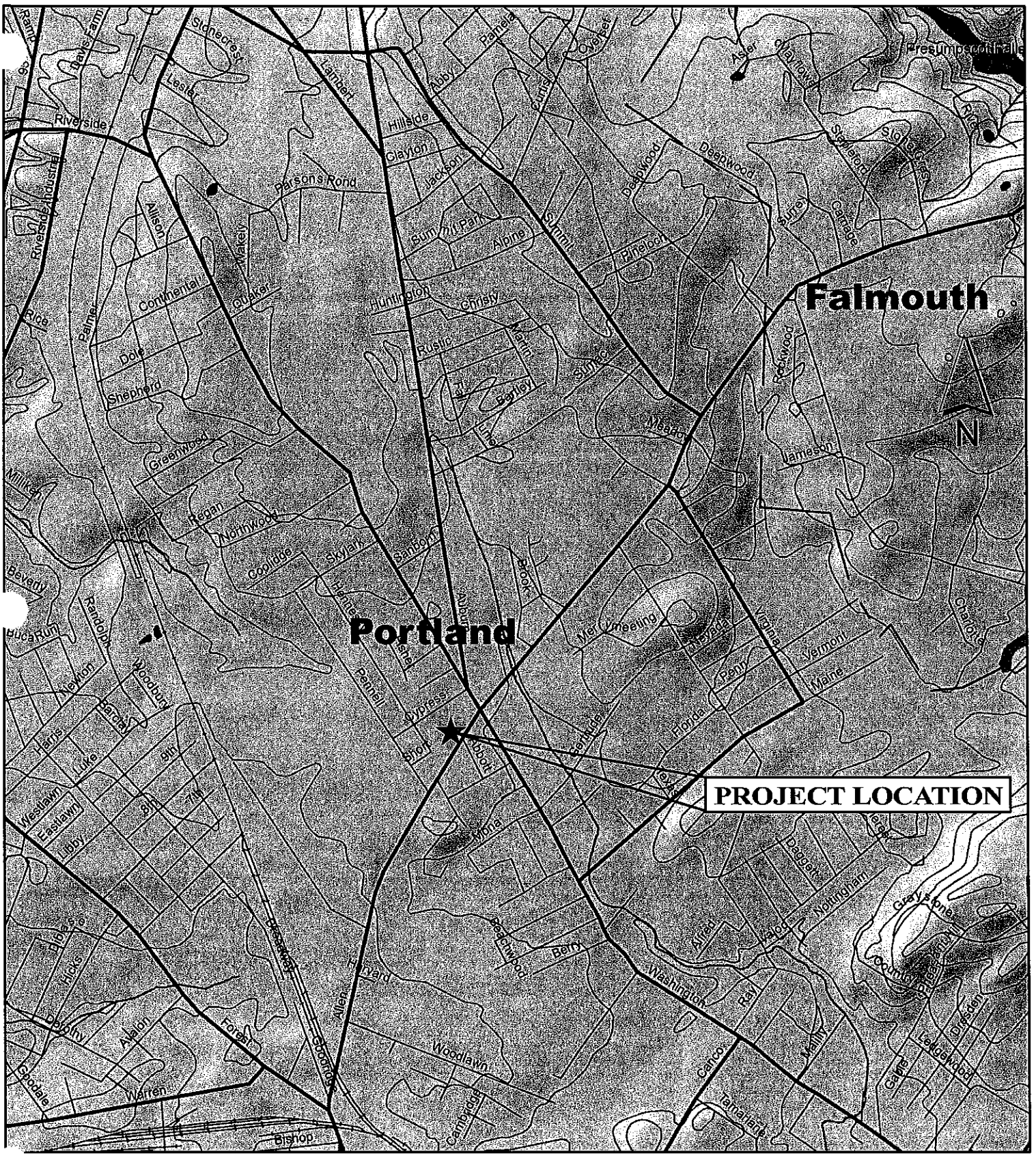
Abutting land uses include:

- North – Residential
- West – Residential
- South – Allen Avenue/Commercial
- East – Commercial

It is Gorrill-Palmer's understanding that the client intends to demolish the existing building and construct a 3,320 +/- square-foot bank with a drive-thru facility on site. The existing parking field is proposed to

Location Map

Figure No. 1



PROPOSED BANK, PORTLAND, MAINE

FEET
1,000 0 1,000 2,000

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Traffic and Civil Engineering Services
PO Box 1237
15 Shaker Road
Gray, ME 04039
207-657-6910
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JN: 2287
DATE: DEC 2009
FILE:2287_LOCMAP.MXD
SOURCE: MAINE GIS WEBSITE

be reconstructed to accommodate approximately 22 parking spaces. The site is proposed to be accessed through a primary curb cut on Allen Avenue and two curb cuts located on Allen Avenue and Washington Avenue which are shared with the abutting Walgreens Pharmacy. The proposed bank development has been designed to maintain cross access with the existing Walgreens Pharmacy.

IV. Surface Water

There are no lakes located on, adjacent to or downstream of the project site.

V. General Topography

The site is relatively flat, with slopes ranging from 1% - 8% across the main portion of the site. The majority of the site slopes in a southerly direction. Elevations on-site range from 83' at the southwestern corner of the lot to 81' along the northern portion of the lot, based on an assumed datum.

VI. Floodplain

Based on the FEMA Firm Map the site is located outside the 100 year flood Boundary Zone A2. The panel indicates a 100 year flood elevation of 79 on the easterly side of the intersection of Washington Avenue and Allen Avenue.

VII. Natural Drainage Ways

The project as currently proposed does not include alteration of any natural drainage ways.

VIII. Alterations to Land Cover

Overall changes in land cover will include the removal of impervious areas and the addition of vegetated areas.

IX. Basic Standards

The Basic Standard will be met as presented in the Erosion and Sedimentation Control Report for this project, which is included as part of the Application Package to the City.

X. General Standards

The City of Portland Stormwater Management Standards concentrate on four stormwater management objectives:

- Effective Pollutant Removal
- Cooling
- Channel Protection
- Flood Control

These objectives may be met either directly by providing BMP's that manage and treat the runoff after it has been created, or indirectly by incorporating low impact development site planning concepts to minimize production and contamination of runoff by maximizing infiltration and evapotranspiration.

X.1 Current Treatment Methods

Under the General Standard, the project is required to meet the BMP Standards as the development site is not tributary to a lake watershed. The BMP Standard requires that runoff from no less than 95% of the impervious area and no less than 80% of the developed area associated with a project be controlled. The four treatment measures listed in Chapter 500 and described in Volume III of the Stormwater BMP Manual are:

- Wetpond with detention above the permanent pool
- Filters
- Infiltration
- Buffers

Below is a brief description of each treatment method.

Wetpond with detention above the permanent pool:

Wet ponds are stormwater detention impoundments that have a permanent pool of water and have the capacity to temporarily store storm water runoff while it is released at a controlled rate. They can be designed to provide flood control as well as water quality treatment. Properly sized and maintained, wet ponds can achieve high rates of removal for a number of urban pollutants, including sediment and the pollutants associated with sediment, such as trace metals, hydrocarbons, BOD, nutrients, and pesticides. The addition of an underdrained gravel trench in the bench area around the permanent pool allows for slow, extended release of stormwater without risk of blockage and effective cooling to avoid thermal impacts. This BMP treatment method is generally used to treat runoff from large drainage areas.

Filters

Filtration BMPs, particularly organic soil filter medias, have shown to be very effective at removing a wide range of pollutants from stormwater runoff. They can be constructed in combination with infiltration practices, or with an underdrain filter, where infiltration is not feasible. Soil filters can be designed and constructed using common materials. Underdrained soil filters control stormwater quality by capturing and retaining runoff and passing it through a filter bed comprised of a specific soil media. Various filter medias may be used, the most common including sand filters and organic filters. Once through the soil media, the runoff is collected in a perforated underdrain pipe and discharged to the receiving water. The filter and underdrain provides for slow release of smaller storm events, minimizing stream channel erosion, as well as cooling the discharge.

A bioretention cell is a type of underdrained filter designed to collect, infiltrate/filter, and treat moderate amounts of stormwater runoff using conditioned planting soil beds, gravel beds and vegetation within shallow depressions. The major difference between an underdrained soil filter and bioretention cell is the vegetation. A typical underdrained soil filter may be planted with grass, whereas a bioretention cell is planted with a variety of shrubs and perennials whose roots assist with the passing of water and uptake of pollutants. Studies have shown that bioretention cells are capable of reducing sediment, nutrients, oil and grease, and trace metals. Bioretention cells are usually located in close proximity to the origin of the stormwater runoff and it is anticipated that these facilities would most often be scattered throughout a residential area, along the downhill edge of parking areas, or below the down spouts of roof drains. Bioretention cells

can be designed to infiltrate water into the groundwater below, or to filter the water through the bioretention soil media and collect it in an underdrain located beneath the soil media.

Infiltration

Infiltration measures control stormwater quantity and quality, by retaining all or part of runoff on-site and discharging it into the ground. Infiltration is designed to occur at the surface (as in infiltration basins and to a degree vegetated swales and buffers), or in subsurface systems (e.g., infiltration trenches and infiltrators). The basic function of an infiltration system is to remove a portion of runoff from the total runoff volume of the site and treatment comes about through absorption, straining, microbial decomposition in the soil and trapping of particulate matter within pretreatment areas. Pretreatment to remove sediments, grease and oils is required prior to discharge to the infiltration measure. Possible pretreatment measures include filter strips, swales with check dams, sand filters, sediment traps, grease and oil traps, and sediment basins.

Buffers

Buffer strips are natural, undisturbed strips of natural vegetation or planted strips of close growing vegetation adjacent to and downslope of developed areas. As stormwater runoff travels over the buffer area, vegetation slows the runoff and traps particulate pollutants. They are also effective for phosphorus removal when designed in accordance with the volume III BMP technical design manual. The effectiveness of buffers for pollutant removal depends on the flow path length and slope, the buffer berm length, the soil permeability, the size of drainage area, and the type and density of vegetation. Buffers are used to treat runoff from relatively small amounts of impervious area, as typically found in residential developments and small commercial and industrial sites. This type of BMP requires minimal maintenance and provides an aesthetically pleasing area.

X.2 Approach and Analysis for Quality

The proposed development will be required to meet the Basic Standard and the BMP Standard under the General Standard of the City of Portland Stormwater Regulations. Based upon review of the four recommended and approved methods for mitigating the increased frequency and duration of channel erosive flows, as required by the BMP Standards, the developer is proposing to use two bioretention ponds. The filtration methodology was selected due the availability of area within the project site.

X.3 Stormwater Treatment

Attachment A contains the water quality map for this project.

Subcatchment 1 is tributary to the proposed Bioretention Cell #1. The tributary area consists of pavement area, landscaped area, roof area of the proposed bank, as well as the pond itself. Due to previous test pits from the abutting Walgreens development, it is not anticipated that the groundwater elevation is high in this area. As a result, the bioretention cell will not be lined with an impermeable liner.

Subcatchment 2 is tributary to the proposed Bioretention Cell #2. The tributary area consists of pavement area, landscaped area, roof area of the proposed bank, as well as the pond itself. A portion of the Walgreens development is also tributary to the biocell. Due to previous test pits from the abutting Walgreens development, it is not anticipated that the groundwater elevation is high in this area. As a result, the bioretention cell will not be lined with an impermeable liner.

Bioretention Cells are defined in Volume III, Section 7 of the Stormwater Management Best Management Practices Manual published by the Maine Department of Environmental Protection. The development will be required to provide the treatment volume for 1.0 inch times the subcatchment's impervious area plus 0.4 inch times the subcatchment's landscaped developed area, for areas associated with bioretention cells. The surface area of the filter is required to be no less than the sum of 5% of the impervious area and 2% of the landscaped area draining to the filter. The available treatment volume includes 6" of storage above the soil media and one third of the soil filter volume. Larger storms will overflow the Bioretention Cell and spill into a catch basin, which discharges to the municipal system within Allen Avenue. A valve will be placed on the bioretention cell underdrain to regulate the outflow through the soil media. The valve will be field adjusted to maintain the outflow time between 24 and 48 hours. Yearly maintenance of the bioretention cell will include monitoring the cell outflow after a rainfall event to ensure the outflow time is within the required parameters.

The following tables present the bioretention cell information:

Table 1		
Proposed Bioretention Cell #1		
	Required	**Provided**
Impervious Area		14,965 sq. ft.
Developed Area (non-impervious)		3,700 sq. ft.
Treatment Volume	1,370 cu. ft.	1,495 cu. ft.
Filter Surface Area 5%(imp. Area) +2%(landscaped Area)	822.25 sq. ft.	1,840 sq. ft.
Cell Base Elevation		80.90 ft.
Overflow Elevation		81.40 ft.

Table 2		
Proposed Bioretention Cell #2		
	Required	**Provided**
Impervious Area		9,025 sq. ft.
Developed Area (non-impervious)		4,655 sq. ft.
Treatment Volume	907 cu. ft.	914 cu. ft.
Filter Surface Area 5%(imp. Area) +2%(landscaped Area)	544.35 sq. ft.	844 sq. ft.
Cell Base Elevation		79.75 ft.
Overflow Elevation		80.25 ft.

X.4 Conclusion – Overall Treatment

The proposed bank development will utilize Bioretention Cells to mitigate the development as required by the BMP Standards. The development is required to control runoff from no less than 95% of the impervious area and no less than 80% of the developed area. As proposed, the

development is controlling approximately 95% of the impervious area and approximately 88% of the developed area, which meets or exceeds the required control. It should be noted that as currently designed, the project is treating previously untreated off-site area from the abutting Walgreens development. This off-site area was not included in the calculation of total area, but was included in the calculations for total treated area. In addition, of the approximately 6,843 sq. ft. of untreated developed area by the proposed bank biocells, approximately 2,425 sq. ft. is being directed to the Walgreens stormwater system. The Walgreens stormwater system includes an *"Environment 21 Unistorm Model 6R Water Treatment System"*, which is not a Maine DEP approved treatment system, but is similar in design as a Downstream Defender® Advanced Vortex Separator. A small portion of the proposed entrance and vegetated side slopes throughout the site are not being treated due to the existing and proposed topography of the site.

X.5 Construction BMPs

Additional water quality treatment will be provided during construction by best management practices (BMP). Standard BMPs to be employed include siltation fencing around the downslope construction perimeter and erosion control fabrics applied to slopes prior to revegetation.

XI. Flooding Standard

The Flooding Standard, as outlined by the City of Portland Stormwater Management Standards, indicates that, if required, the project must detain, retain, or result in the infiltration of stormwater from 24-hour storms of the 2-year, 10-year, and 25-year frequencies such that the peak flows of stormwater from the project site do not exceed the peak flows of stormwater prior to undertaking the project. As the project is a redevelopment of an existing site, which results in a reduction of the overall impervious surface of the project site, it is anticipated that the proposed development will not result in an increase, or will result in an insignificant increase, in peak flow rates for the project site. The following table illustrates the reduction in impervious area from the existing site to the proposed development:

Table 3
Existing vs. Proposed Impervious Surface

	Existing	Proposed	Net Change
Total Area	37,559 sq. ft.	37,559 sq. ft.	0
Impervious Area	28,733 sq. ft.	24,296 sq. ft.	-4,391 sq. ft.

As can be seen in the above table, the impervious area from existing to proposed development decreases approximately 4,400 sq. ft. In addition, the proposed project will result in the construction of two Bioretention cells, which will attenuate and treat the runoff from a 1" storm, which is larger than a significant portion of the rain events for the year. This attenuation within the biocells will reduce the peak flows from the site, as well.

XII. Urban Impaired Stream Standard

The project site is tributary to the storm drain system that eventually discharges to Fall Brook, which is identified as an Urban Impaired Stream. Based on the City of Portland Stormwater Management Standards, the project will not be required to comply with the Urban Impaired Stream Standard as the project is a redevelopment of an existing impervious area. Per the City of Portland Stormwater Management Standards:

"Exception for a project including redevelopment. Redevelopment of an existing impervious area is not required to meet the urban impaired stream standard provided the department determines that the new use of the existing impervious area is not likely to increase stormwater impacts in the proposed project's stormwater runoff beyond the levels already present in the runoff from the existing impervious area."

As the project results in a reduction of the overall impervious surface of the project site, it is our opinion that the new use is not likely to increase stormwater impacts in the proposed project's stormwater runoff beyond the levels already present in the runoff from the existing impervious area.

XIII. Maintenance of Facilities

The stormwater facilities will be maintained by the Applicant, Bangor Savings Bank or their assigned heirs. The contract documents will require the contractor to designate a person responsible for maintenance of the sedimentation control features during construction as required by the Erosion Control Report. Long-term operation/maintenance recommended for the stormwater facilities is presented below. A standard maintenance log, to be used for each facility, is provided in Attachment B.

The responsible party may contract with such professionals, as may be necessary in order to comply with this provision and may rely on the advice of such professionals in carrying out its duty hereunder, provided, that the following operation and maintenance procedures are hereby established as a minimum for compliance with this section.

Inspection and Maintenance Frequency and Corrective Measures:
The following areas, facilities, and measures will be inspected and the identified deficiencies will be corrected. Clean-out must include the removal and legal disposal of any accumulated sediments and debris.

Catch Basins:
Inspect catch basins 2 times per year (preferably in Spring and Fall) to ensure that the catch basins are working in their intended fashion and that they are free of debris. Clean structures when sediment depths reach 12" from invert of outlet. If the basin outlet is designed with a hood to trap floatable materials (i.e. Snout), check to ensure watertight seal is working. At a minimum, remove floating debris and hydrocarbons at the time of the inspection. Hydrocarbon Socks installed within catch basins shall be properly disposed of by an approved contractor within 14 days after the first 1" rainfall event after final pavement. Hydrocarbon Socks shall be maintained within all catch basins during the first year of operation. All socks should be removed and disposed of one year after the initial replacement. New Hydrocarbon Socks shall be installed within areas that receive new pavement in the future

Soil Filter – Bio-Filtration:
Inspect all upstream pre-treatment measures 2 times per year (preferably in Spring and Fall) for sediment and floatables accumulation. Remove and dispose of any sediments or debris.

Surface (Underdrain Pond, Swale or Bio-Filter):
The soil filter will be inspected within the first three months after construction; thereafter the filter will be inspected 2 times per year (preferably in Spring and Fall) to ensure that the filter is draining within 24 to 48 hours of a rain event equivalent to 1" or more. Adjustments will be made to the outlet valve to ensure that the Bioretention Cell drains within 24 to 48 hours. Failure to drain in 72 hours will require part or all of the soil filter media to be removed and replaced with new material meeting the soil filter gradation. The facilities will be inspected after major storms and any identified deficiencies will be corrected. Harvesting and weeding of excessive

growth shall be performed as needed. Inspect for unwanted or invasive plants and remove as necessary. Add new mulch as needed to maintain a 3 inch thickness.

Vegetated Areas:
Inspect slopes and embankments early in the growing season 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. The facilities will be inspected after major storms and any identified deficiencies will be corrected.

Roadways and Parking Surfaces: Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring. Accumulations on pavement may be removed by pavement sweeping. 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. Repair potholes and other roadway obstructions and hazards. Plowing and sanding of paved areas shall be performed as necessary to maintain vehicular traffic safety.

XII. Conclusion

The Applicant has provided Stormwater treatment measures as well as specifying a maintenance plan for all stormwater measures. As noted above, the project will meet the Basic and General Standards contained within the City of Portland Stormwater Management Standards, but will not meet the Flooding and Urban Impaired Stream Standards, as the project is a redevelopment of an existing site and results in a reduction in impervious area.

XIII. Attachments

Attached to this section are the following items:

Attachment A – Stormwater Calculations
Attachment B – Water Quality Maps
Attachment C – Stormwater Maintenance Log

ATTACHMENT A

STORMWATER CALCULATIONS

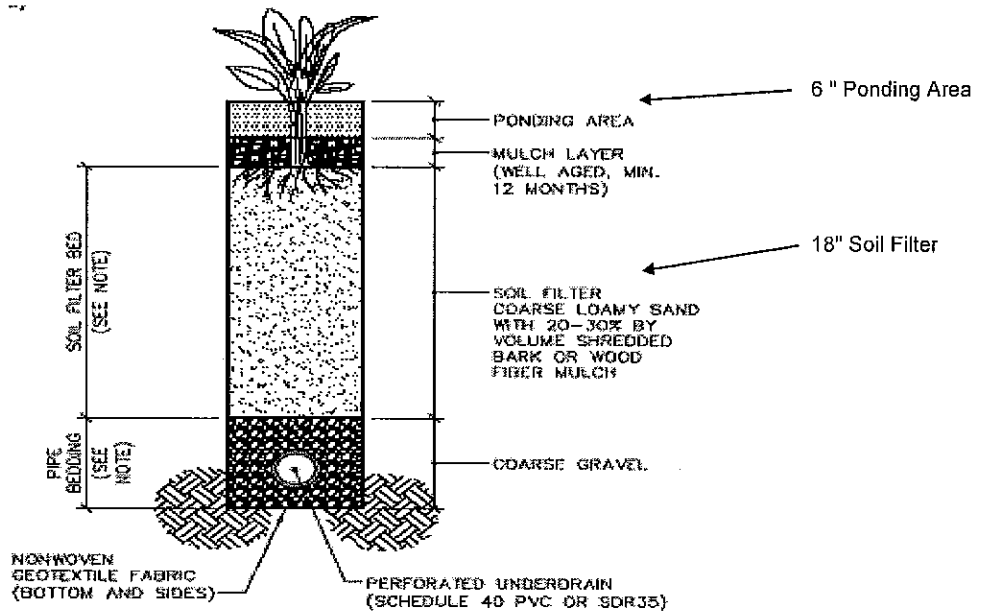
JN 2287
Computed by: JJM
Date: 02/08/10

Bioretention Cell Calculations

Task: Determine the required size of the Bioretention Cell

Reference:
1. Water Quality Map Dated October 2007, revised March 2008
2. MDEP Volume III BMP's Technical Design Manual Dated January 2006
3. Stormwater Management Report Dated February 2010

Bioretention Cell Detail



Given:

1. Total Volume of Water Storage = (6" of Ponding depth + 1/3 The Soil Filter Depth)x filter area
   Total = (6" + (1/3 x 18"))x filter area
   Total Storage = 12"x filter area=1cf storage per square foot of filter area

2. Total Treatment Volume = Impervious Volume + Landscaped Volume
   Impervious Volume = 1" x subcatchment impervious area (s.f.)
   Landscaped Volume = 0.4" x subcatchment landscaped area (s.f.)

Calculations: Total Storage Req. = [(0.4"/12") x Landscaped Area (s.f.)] + [(1"/12") x Impervious Area (s.f.)]

		Impervious Area (AC)	Landscaped Area (Ac)	Storage Required (CF)
Channel Protection Volume	Bioretention Cell #1	14527	3790	1,337
Channel Protection Volume	Bioretention Cell #2	8478	4847	868

Filter Area (Shall be no less than 5% of impervious plus 2% of vegetated)		
	Required	Provided
Bioretention Cell #1	802.15	1,840
Bioretention Cell #2	520.84	844

Results:

	Total Storage Required (CF)	Total Storage Provided (CF)
Bioretention Cell #1	1337	1495
Bioretention Cell #2	868	914

ATTACHMENT B

WATER QUALITY TREATMENT MAPS

ATTACHMENT C

STORMWATER MAINTENANCE LOG

STORMWATER MAINTENANCE LOG

INSPECTION REPORT

PROJECT INFORMATION

Project Name: Bank Development

Address: Allen Avenue
Portland, Maine

CONTRACTOR/SUBCONTRACTOR INFORMATION

Inspector Name: _____

Firm: _____

Title: _____

Qualifications: _____

INSPECTION SUMMARY

Date of Inspection: _____

Major Observations: _____

_____

_____

_____

THE FACILITY IS IN COMPLIANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN WITH THE FOLLOWING EXCEPTIONS:

_____

_____

_____

_____

_____

ACTIONS NECESSARY TO BRING FACILITY INTO COMPLIANCE:

REQUIRED MODIFICATIONS TO STORMWATER POLLUTION PREVENTION PLAN (MUST BE IMPLEMENTED WITHIN 7 DAYS OF INSPECTION):

CERTIFICATION STATEMENT:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the systems, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature

Typed Name

Title

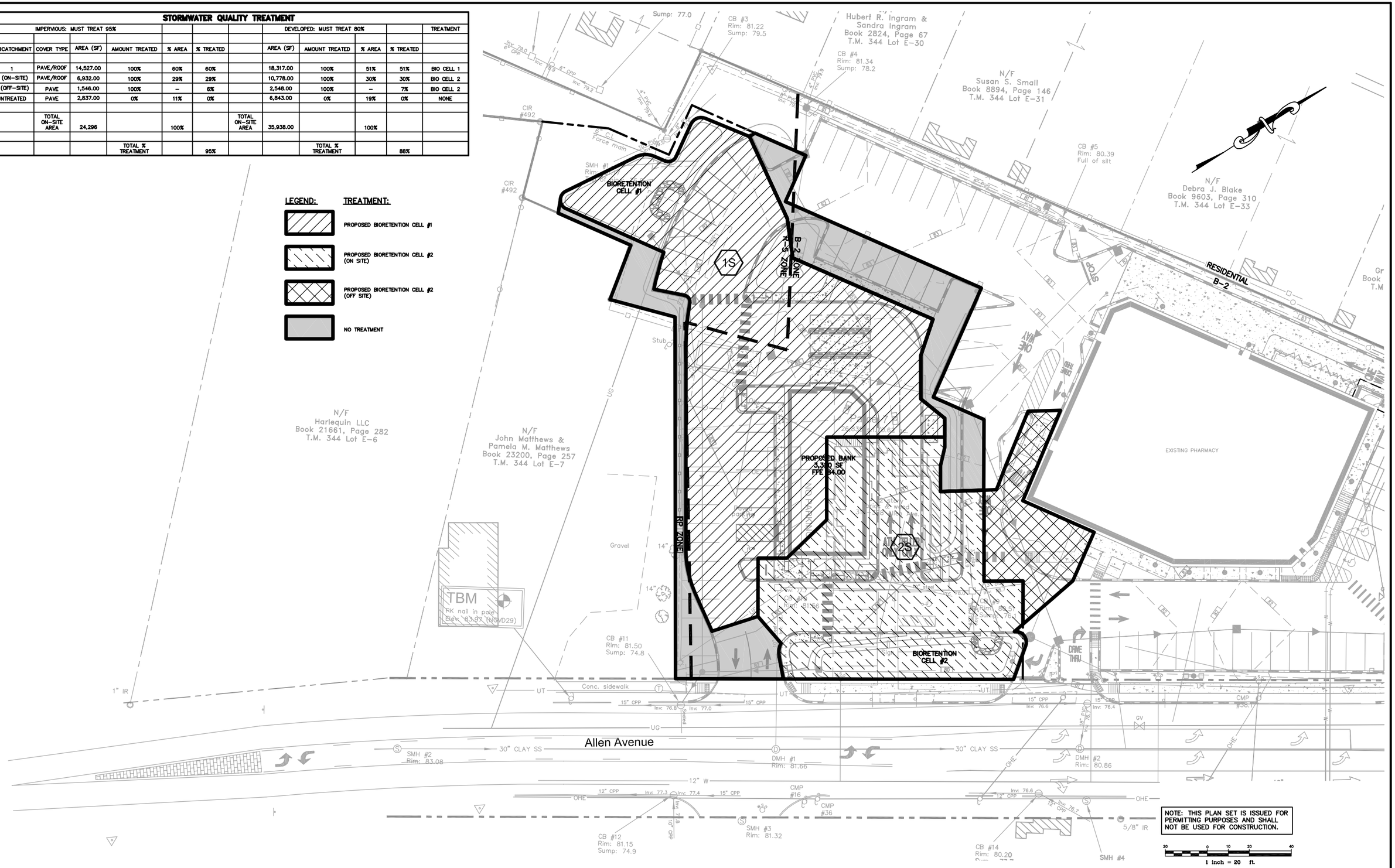
Date

STORMWATER QUALITY TREATMENT

IMPERVIOUS: MUST TREAT 95%							DEVELOPED: MUST TREAT 80%				TREATMENT
SUBCATCHMENT	COVER TYPE	AREA (SF)	AMOUNT TREATED	% AREA	% TREATED		AREA (SF)	AMOUNT TREATED	% AREA	% TREATED	
1	PAVE/ROOF	14,527.00	100%	60%	60%		18,317.00	100%	51%	51%	BIO CELL 1
2 (ON-SITE)	PAVE/ROOF	6,932.00	100%	29%	29%		10,778.00	100%	30%	30%	BIO CELL 2
2 (OFF-SITE)	PAVE	1,546.00	100%	–	6%		2,548.00	100%	–	7%	BIO CELL 2
UNTREATED	PAVE	2,837.00	0%	11%	0%		6,843.00	0%	19%	0%	NONE
	TOTAL ON-SITE AREA	24,296		100%		TOTAL ON-SITE AREA	35,938.00		100%		
			TOTAL % TREATMENT		95%			TOTAL % TREATMENT		88%	

LEGEND: **TREATMENT:**

- PROPOSED BIORETENTION CELL #1
- PROPOSED BIORETENTION CELL #2 (ON SITE)
- PROPOSED BIORETENTION CELL #2 (OFF SITE)
- NO TREATMENT



Rev.	Date	Revision

Issued For	Date	By

Design: JJM	Draft: CG	Date: JAN 2010
Checked: DER	Scale: 1"=20'	Job No.: 2287
File Name: 2287-WTR-QUALITY.dwg		

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Gray, ME 04039
207-657-6910
FAX: 207-657-6912
E-Mail: mailbox@gorrillpalmer.com

Drawing Name: **Water Quality Map**

Project: **Proposed Bank**
314 Allen Avenue, Portland, Maine

Client: **Bangor Savings Bank**
99 Franklin Street, Bangor, Maine 04401

Drawing No. **WQ**

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