

STORMWATER MANAGEMENT REPORT
130 EASTERN PROMENADE
PORTLAND, MAINE
May 17, 2011
Revised June 21, 2011

Introduction

130 Eastern Promenade is located on the southeast corner of the intersection of Eastern Promenade and Wilson Street in Portland, Maine overlooking the Eastern Promenade Park and Casco Bay. Existing Stormwater runoff from this project is surface flow and ultimately discharges to the curb and gutter systems of Wilson Street and the Eastern Promenade, which drain into the catch basin at the intersection of Eastern Promenade and Cutter Street.

The applicant plans to renovate the Building and Site, which includes complete renovation of the main 3-story structure and removal of the one-story additions along the side and rear of the building. Building additions include a small addition on the east side of the building and construction of an open carport area in the southeast corner of the structure. Site improvements include new driveway and off-street parking, sidewalks, and a small terrace/ garden along the east side of the property.

This report discusses the Site's hydrological conditions and quantifies the stormwater runoff generated in the existing and proposed conditions.

Data Collection and Assumptions

Site Data was gathered from field observations, drawings and AutoCAD files from Carroll, Associate, Landscape Architects. This data was used to create a HydroCAD stormwater model, which is based on the United States Department of Agriculture's (USDA) Technical Release 20 (TR-20) and Technical Release 55 (TR-55) hydraulic programs.

Curve numbers (CNs) assigned to differing land cover and soil types were taken from tables within the HydroCAD software, which are from the SCS TR-55 manual, revised 1986. 24-hour rainfall depths were taken from the Stormwater Management for Maine, Volume III BMPs Technical Design Manual, Dated January 2006 by the Maine

Department of Environmental Protection . Time of concentrations were entered via direct entry and were assumed to be 5 minutes.

The limits of the property line were used as the existing and proposed watershed subcatchments. This area is shown on attached Drawing D1 entitled "Existing Conditions Drainage Map". Proposed conditions are shown on the Drawing L-3.0 entitled "Site Grading Plan, 130 Eastern Promenade, Portland Maine", dated May 21, 2011 by Carroll Associates. Modeling assumptions made for both conditions are summarized in the attached HydroCAD output.

Existing Site Conditions

The 0.18± acre Site currently hosts a multi-unit residential building and attached garage. Walkways and decks connect to these structures. The remainder of the property is mostly grassed. The Site currently has 5,639 square feet of impervious area, which includes roof, driveway, and walkways.

The Site generally slopes from east to west toward the Eastern Promenade. Slopes are generally mild. According to the United States Department of Agriculture and Soil Conservation Service Issued August 1974, on-Site soils include Hinckley Gravelly Sandy Loam, which have an "A" Hydrological Soil Grouping (HSG) classification.

Proposed Site Conditions

The renovations will include removing the existing one-story apartments and garage structure. The main structure will be renovated and slightly expanded to the southeast as shown on the plan. The building entrance is proposed to be relocated to the rear adjacent to the driveway and parking area.

Land cover changes are minimal. The bulk of the new pavement areas are located within the footprints of the existing buildings that are being removed. A landscaped garden area that includes a small paved terrace and walkway to the Eastern Promenade sidewalk is proposed along the east side of the building. The proposed Site will have 6,151 square feet of impervious area at completion, an increase of approximately 512 square feet over existing conditions.

Based on direction from the Assistant City Engineer, stormwater runoff from the Site has been designed to maintain surface flows across the Site and onto the Wilson Street and Eastern Promenade right-of-ways. The driveway, parking area, and gutter downspouts flow onto Wilson Street, and the eastern garden area flows onto the Eastern Promenade. No underground piping or discharge into the combined sewer system is proposed as part of this project.

To mitigate increased impervious area, a rain garden will be constructed as shown on the Drawing L3.0. This rain garden will be a minimum of 50 square feet, holding 6 inches of stormwater at the surface. The HydroCAD model assumes that stormwater that collects in the rain garden will infiltrate at a rate of 4 inches per hour into the subsurface soils. Rain garden sizing calculations are attached to this report.

Water Quantity

The table below compares peak flows leaving the Site for the 2, 10, and 25 year storm events.

**Table Comparing Peak Flows
130 Eastern Promenade – June 21, 2011**

Storm Event	Existing Conditions Peak Flow (cfs)	Proposed Condition Peak Flow (cfs), Total
2-year	0.29	0.31
10-year	0.60	0.66
25-year	0.76	0.82

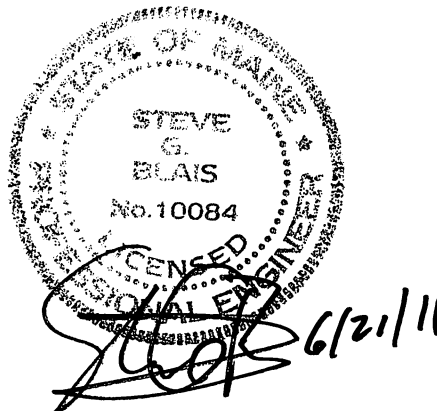
The proposed renovations to the Site will cause a slight increase in overall stormwater runoff. This increase is 0.06 cfs in the 25 year storm and is relatively insignificant and will not cause unreasonable negative impacts to downstream properties.

Conclusions

As requested by the Assistant City Engineer, all runoff from the Site will leave the property via surface flows. This project does not propose any direct stormwater connections to the City's combined sewer system. A rain garden will be constructed to mitigate stormwater impacts from this project. This project will not cause a significant increase in stormwater runoff as a result of the renovations described in this report and shown on the aforementioned Site Grading Plan.

BLAIS CIVIL ENGINEERS

Steve G. Blais, PE
Enclosures



NOTES

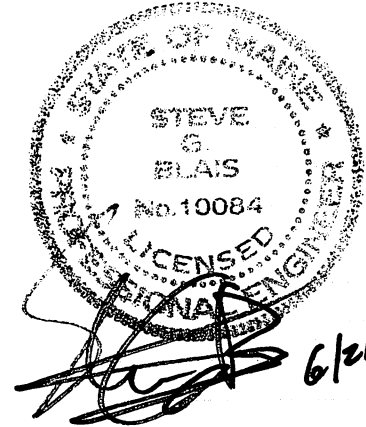
Date/Time: 6/21/11

BCE File: 11109

Re: RAIN GARDEN SIZING

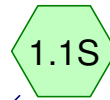
Notes By: SB

-
- IMPERVIOUS AREA TO BE TREATED : 600 SF
 - $600 \text{ SF} \times 1" = 50 \text{ FT}^3 \leftarrow \text{WATER QUALITY VOLUME.}$
 - $50 \text{ FT}^3 / 1 \text{ FT (TREATMENT DEPTH CAPACITY OF RAIN GARDEN)} = 50 \text{ FT}^2$
 - RAIN GARDEN MUST BE $50 \text{ FT}^2 \times 6" \text{ DEEP AT SURFACE}$
 - 6" STORAGE WILL BE PROVIDED IN SOIL MEDIA PER MDEP BMP STANDARDS





Existing Conditions



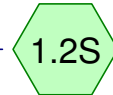
Proposed Conditions



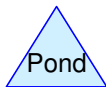
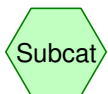
POA



Rain Garden



Proposed Conditions -
to Rain Garden



Drainage Diagram for 07126-130 Eastern Promenade
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07126-130 Eastern Promenade

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Type III 24-hr 2-Yr Rainfall=3.00"

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Summary for Subcatchment 1.1S: Proposed Conditions

Runoff = 0.31 cfs @ 12.08 hrs, Volume= 0.021 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.00"

Area (sf)	CN	Description
1,754	39	>75% Grass cover, Good, HSG A
* 5,551	98	Paved parking & roofs & deck
7,305	84	Weighted Average
1,754		Pervious Area
5,551		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	32		0.11		Direct Entry,

Summary for Subcatchment 1.2S: Proposed Conditions - to Rain Garden

Runoff = 0.04 cfs @ 12.07 hrs, Volume= 0.003 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.00"

Area (sf)	CN	Description
* 600	98	Paved parking & roofs & deck
600		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	32		0.11		Direct Entry,

Summary for Subcatchment 1S: Existing Conditions

Runoff = 0.29 cfs @ 12.08 hrs, Volume= 0.020 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.00"

Area (sf)	CN	Description
2,266	39	>75% Grass cover, Good, HSG A
* 5,639	98	Paved parking & roofs & deck
7,905	81	Weighted Average
2,266		Pervious Area
5,639		Impervious Area

07126-130 Eastern Promenade

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Type III 24-hr 2-Yr Rainfall=3.00"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	53		0.18		Direct Entry,

Summary for Pond 1.2P: Rain Garden

Inflow Area = 0.014 ac, 100.00% Impervious, Inflow Depth = 2.77" for 2-Yr event
 Inflow = 0.04 cfs @ 12.07 hrs, Volume= 0.003 af
 Outflow = 0.03 cfs @ 12.16 hrs, Volume= 0.003 af, Atten= 36%, Lag= 5.2 min
 Discarded = 0.01 cfs @ 12.16 hrs, Volume= 0.003 af
 Primary = 0.02 cfs @ 12.16 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 100.52' @ 12.16 hrs Surf.Area= 60 sf Storage= 28 cf

Plug-Flow detention time= 26.6 min calculated for 0.003 af (100% of inflow)
 Center-of-Mass det. time= 26.6 min (783.4 - 756.8)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	60 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	50	0	0
100.50	60	28	28
101.00	70	33	60

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	4.000 in/hr Exfiltration over Surface area
#2	Primary	100.50'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.01 cfs @ 12.16 hrs HW=100.52' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.02 cfs @ 12.16 hrs HW=100.52' (Free Discharge)
 ↳2=Broad-Crested Rectangular Weir (Weir Controls 0.02 cfs @ 0.32 fps)

Summary for Link 1.0L: POA

Inflow Area = 0.181 ac, 77.81% Impervious, Inflow Depth = 1.41" for 2-Yr event
 Inflow = 0.31 cfs @ 12.08 hrs, Volume= 0.021 af
 Primary = 0.31 cfs @ 12.08 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min

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

07126-130 Eastern Promenade

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Type III 24-hr 10-Yr Rainfall=4.70"

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Summary for Subcatchment 1.1S: Proposed Conditions

Runoff = 0.60 cfs @ 12.07 hrs, Volume= 0.042 af, Depth= 2.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.70"

Area (sf)	CN	Description
1,754	39	>75% Grass cover, Good, HSG A
* 5,551	98	Paved parking & roofs & deck
7,305	84	Weighted Average
1,754		Pervious Area
5,551		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	32		0.11		Direct Entry,

Summary for Subcatchment 1.2S: Proposed Conditions - to Rain Garden

Runoff = 0.07 cfs @ 12.07 hrs, Volume= 0.005 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.70"

Area (sf)	CN	Description
* 600	98	Paved parking & roofs & deck
600		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	32		0.11		Direct Entry,

Summary for Subcatchment 1S: Existing Conditions

Runoff = 0.60 cfs @ 12.07 hrs, Volume= 0.041 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.70"

Area (sf)	CN	Description
2,266	39	>75% Grass cover, Good, HSG A
* 5,639	98	Paved parking & roofs & deck
7,905	81	Weighted Average
2,266		Pervious Area
5,639		Impervious Area

07126-130 Eastern Promenade

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Type III 24-hr 10-Yr Rainfall=4.70"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	53		0.18		Direct Entry,

Summary for Pond 1.2P: Rain Garden

Inflow Area = 0.014 ac, 100.00% Impervious, Inflow Depth = 4.46" for 10-Yr event
 Inflow = 0.07 cfs @ 12.07 hrs, Volume= 0.005 af
 Outflow = 0.07 cfs @ 12.08 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.4 min
 Discarded = 0.01 cfs @ 12.08 hrs, Volume= 0.004 af
 Primary = 0.06 cfs @ 12.08 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 100.53' @ 12.08 hrs Surf.Area= 61 sf Storage= 29 cf

Plug-Flow detention time= 24.0 min calculated for 0.005 af (100% of inflow)
 Center-of-Mass det. time= 24.0 min (772.1 - 748.1)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	60 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	50	0	0
100.50	60	28	28
101.00	70	33	60

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	4.000 in/hr Exfiltration over Surface area
#2	Primary	100.50'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.01 cfs @ 12.08 hrs HW=100.53' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.06 cfs @ 12.08 hrs HW=100.53' (Free Discharge)
 ↳2=Broad-Crested Rectangular Weir (Weir Controls 0.06 cfs @ 0.46 fps)

Summary for Link 1.0L: POA

Inflow Area = 0.181 ac, 77.81% Impervious, Inflow Depth = 2.83" for 10-Yr event
 Inflow = 0.66 cfs @ 12.07 hrs, Volume= 0.043 af
 Primary = 0.66 cfs @ 12.07 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min

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

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Type III 24-hr 25-Yr Rainfall=5.50"

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Summary for Subcatchment 1.1S: Proposed Conditions

Runoff = 0.75 cfs @ 12.07 hrs, Volume= 0.052 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=5.50"

Area (sf)	CN	Description
1,754	39	>75% Grass cover, Good, HSG A
* 5,551	98	Paved parking & roofs & deck
7,305	84	Weighted Average
1,754		Pervious Area
5,551		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	32		0.11		Direct Entry,

Summary for Subcatchment 1.2S: Proposed Conditions - to Rain Garden

Runoff = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=5.50"

Area (sf)	CN	Description
* 600	98	Paved parking & roofs & deck
600		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	32		0.11		Direct Entry,

Summary for Subcatchment 1S: Existing Conditions

Runoff = 0.76 cfs @ 12.07 hrs, Volume= 0.052 af, Depth= 3.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=5.50"

Area (sf)	CN	Description
2,266	39	>75% Grass cover, Good, HSG A
* 5,639	98	Paved parking & roofs & deck
7,905	81	Weighted Average
2,266		Pervious Area
5,639		Impervious Area

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Type III 24-hr 25-Yr Rainfall=5.50"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	53		0.18		Direct Entry,

Summary for Pond 1.2P: Rain Garden

Inflow Area = 0.014 ac, 100.00% Impervious, Inflow Depth = 5.26" for 25-Yr event
 Inflow = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af
 Outflow = 0.08 cfs @ 12.08 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.4 min
 Discarded = 0.01 cfs @ 12.08 hrs, Volume= 0.004 af
 Primary = 0.07 cfs @ 12.08 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 100.54' @ 12.08 hrs Surf.Area= 61 sf Storage= 30 cf

Plug-Flow detention time= 23.6 min calculated for 0.006 af (100% of inflow)
 Center-of-Mass det. time= 23.6 min (769.1 - 745.5)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	60 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	50	0	0
100.50	60	28	28
101.00	70	33	60

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	4.000 in/hr Exfiltration over Surface area
#2	Primary	100.50'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.01 cfs @ 12.08 hrs HW=100.54' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.07 cfs @ 12.08 hrs HW=100.54' (Free Discharge)
 ↳2=Broad-Crested Rectangular Weir (Weir Controls 0.07 cfs @ 0.48 fps)

Summary for Link 1.0L: POA

Inflow Area = 0.181 ac, 77.81% Impervious, Inflow Depth = 3.54" for 25-Yr event
 Inflow = 0.82 cfs @ 12.07 hrs, Volume= 0.054 af
 Primary = 0.82 cfs @ 12.07 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

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