STORMWATER MANAGEMENT REPORT
828 RIVERSIDE STREET
PORTLAND, MAINE
November 19, 2014

PINKHAM & GREE
CIVIL ENG
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RESURGAM CITY OF PORTLAND, MAINE
Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 12/31/14

Project Description:

This project is the construction of a 4,534 sq. ft. building and associated parking on a 15,000 sq. ft. lot. The building will be used as a contractor's shop. The existing home on the site will remain.

Existing Conditions:

This existing area is fully developed with a business located to the east, a residential property to the north, and a recreational ball field to the west. The drainage from off site comes from the east. It encompasses the adjacent building and lawn area.

The drainage on site, sheet flows around the existing home to a culvert just off site to the west.

Developed Conditions:

The site will have additional parking and a building added to the land cover. The grading from the parking area is at 1% around the east side of the building to a drip strip filtration system on the north side of the building. The discharge from the site remains in the same location on the west side.

Peak Flow:

The drip strip filter system provides peak flow control. Below are the peak flows leaving the site:

Peak Flow (CFS)

Storm Event	2 Yr	10 Yr	25 Yr
Existing	0.75	1.71	2.13
Developed	0.73	1.34	1.61

Stormwater Treatment:

The drip strip filter system treats the runoff from the parking area and the roof of the building. It stores water in the stone layer and the 6" area above the stone.

Conclusion:

The use of the drip strip filter system provides stormwater treatment and flow control for the site. This project should have no unreasonable adverse impacts from stormwater on downstream properties.

STATE OF MAINE
THOMAS S. GREER
No. 4206
LICENSED PROFESSIONAL ENGINEER

Thomas S. Greer, P.E.
11/19/14

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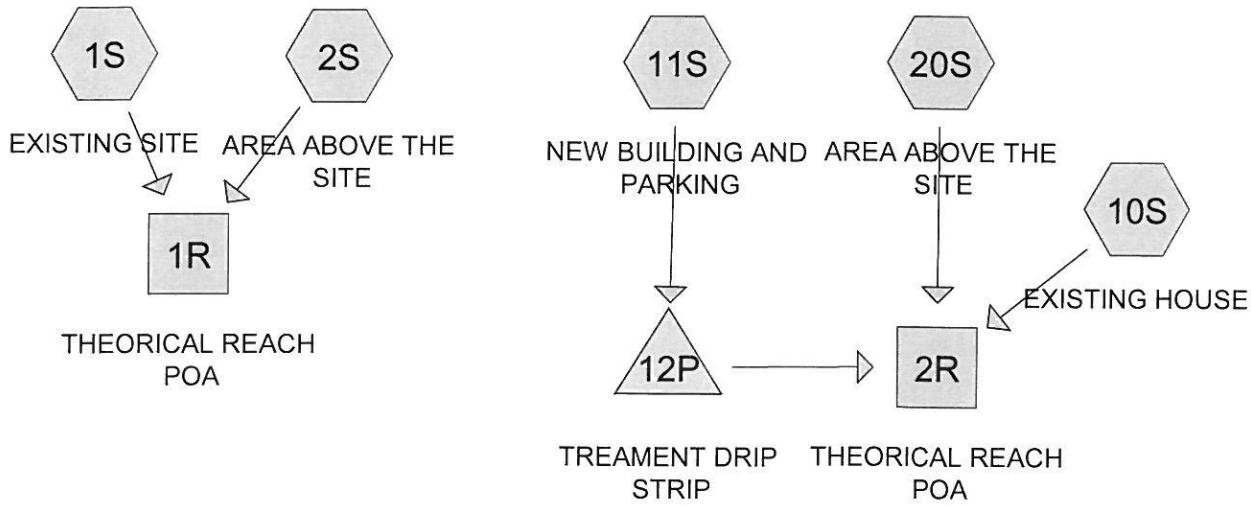

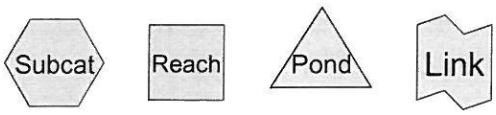

Drainage Diagram for RIVERSIDE 828 TSG
Prepared by Pinkham and Greer, Printed 11/18/2014
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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: EXISTING SITE Runoff Area=15,112 sf 17.81% Impervious Runoff Depth>1.04"
Tc=5.0 min CN=78 Runoff=0.45 cfs 0.030 af

Subcatchment 2S: AREA ABOVE THE SITE Runoff Area=11,500 sf 13.04% Impervious Runoff Depth>0.98"
Tc=5.0 min CN=77 Runoff=0.32 cfs 0.022 af

Subcatchment 10S: EXISTING HOUSE Runoff Area=5,396 sf 42.29% Impervious Runoff Depth>1.41"
Tc=3.0 min CN=84 Runoff=0.24 cfs 0.015 af

Subcatchment 11S: NEW BUILDING AND Runoff Area=9,716 sf 65.34% Impervious Runoff Depth>1.86"
Tc=5.0 min CN=90 Runoff=0.52 cfs 0.035 af

Subcatchment 20S: AREA ABOVE THE Runoff Area=11,500 sf 13.04% Impervious Runoff Depth>0.98"
Tc=5.0 min CN=77 Runoff=0.32 cfs 0.022 af

Reach 1R: THEORICAL REACH POA Avg. Flow Depth=0.29' Max Vel=0.26 fps Inflow=0.77 cfs 0.052 af
n=0.350 L=10.0' S=0.0200 '/' Capacity=19.16 cfs Outflow=0.75 cfs 0.051 af

Reach 2R: THEORICAL REACH POA Avg. Flow Depth=0.29' Max Vel=0.25 fps Inflow=0.75 cfs 0.071 af
n=0.350 L=10.0' S=0.0200 '/' Capacity=19.16 cfs Outflow=0.73 cfs 0.071 af

Pond 12P: TREAMENT DRIP STRIP Peak Elev=99.00' Storage=211 cf Inflow=0.52 cfs 0.035 af
Outflow=0.20 cfs 0.035 af

Total Runoff Area = 1.222 ac Runoff Volume = 0.122 af Average Runoff Depth = 1.20"
73.09% Pervious = 0.893 ac 26.91% Impervious = 0.329 ac

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Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: EXISTING SITE Runoff Area=15,112 sf 17.81% Impervious Runoff Depth>2.29"
Tc=5.0 min CN=78 Runoff=1.00 cfs 0.066 af

Subcatchment 2S: AREA ABOVE THE SITE Runoff Area=11,500 sf 13.04% Impervious Runoff Depth>2.21"
Tc=5.0 min CN=77 Runoff=0.73 cfs 0.049 af

Subcatchment 10S: EXISTING HOUSE Runoff Area=5,396 sf 42.29% Impervious Runoff Depth>2.81"
Tc=3.0 min CN=84 Runoff=0.47 cfs 0.029 af

Subcatchment 11S: NEW BUILDING AND Runoff Area=9,716 sf 65.34% Impervious Runoff Depth>3.39"
Tc=5.0 min CN=90 Runoff=0.91 cfs 0.063 af

Subcatchment 20S: AREA ABOVE THE Runoff Area=11,500 sf 13.04% Impervious Runoff Depth>2.21"
Tc=5.0 min CN=77 Runoff=0.73 cfs 0.049 af

Reach 1R: THEORICAL REACH POA Avg. Flow Depth=0.48' Max Vel=0.35 fps Inflow=1.74 cfs 0.115 af
n=0.350 L=10.0' S=0.0200 '/' Capacity=19.16 cfs Outflow=1.71 cfs 0.115 af

Reach 2R: THEORICAL REACH POA Avg. Flow Depth=0.42' Max Vel=0.32 fps Inflow=1.39 cfs 0.141 af
n=0.350 L=10.0' S=0.0200 '/' Capacity=19.16 cfs Outflow=1.34 cfs 0.140 af

Pond 12P: TREAMENT DRIP STRIP Peak Elev=99.14' Storage=675 cf Inflow=0.91 cfs 0.063 af
Outflow=0.20 cfs 0.063 af

Total Runoff Area = 1.222 ac Runoff Volume = 0.255 af Average Runoff Depth = 2.51"
73.09% Pervious = 0.893 ac 26.91% Impervious = 0.329 ac

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Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: EXISTING SITE Runoff Area=15,112 sf 17.81% Impervious Runoff Depth>2.85"
Tc=5.0 min CN=78 Runoff=1.24 cfs 0.082 af

Subcatchment 2S: AREA ABOVE THE SITE Runoff Area=11,500 sf 13.04% Impervious Runoff Depth>2.76"
Tc=5.0 min CN=77 Runoff=0.92 cfs 0.061 af

Subcatchment 10S: EXISTING HOUSE Runoff Area=5,396 sf 42.29% Impervious Runoff Depth>3.42"
Tc=3.0 min CN=84 Runoff=0.57 cfs 0.035 af

Subcatchment 11S: NEW BUILDING AND Runoff Area=9,716 sf 65.34% Impervious Runoff Depth>4.03"
Tc=5.0 min CN=90 Runoff=1.08 cfs 0.075 af

Subcatchment 20S: AREA ABOVE THE Runoff Area=11,500 sf 13.04% Impervious Runoff Depth>2.76"
Tc=5.0 min CN=77 Runoff=0.92 cfs 0.061 af

Reach 1R: THEORICAL REACH POA Avg. Flow Depth=0.55' Max Vel=0.38 fps Inflow=2.16 cfs 0.143 af
n=0.350 L=10.0' S=0.0200 '/' Capacity=19.16 cfs Outflow=2.13 cfs 0.143 af

Reach 2R: THEORICAL REACH POA Avg. Flow Depth=0.46' Max Vel=0.34 fps Inflow=1.67 cfs 0.171 af
n=0.350 L=10.0' S=0.0200 '/' Capacity=19.16 cfs Outflow=1.61 cfs 0.171 af

Pond 12P: TREAMENT DRIP STRIP Peak Elev=99.19' Storage=895 cf Inflow=1.08 cfs 0.075 af
Outflow=0.20 cfs 0.075 af

Total Runoff Area = 1.222 ac Runoff Volume = 0.314 af Average Runoff Depth = 3.09"
73.09% Pervious = 0.893 ac 26.91% Impervious = 0.329 ac

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Summary for Subcatchment 1S: EXISTING SITE

Runoff = 0.45 cfs @ 12.08 hrs, Volume= 0.030 af, Depth> 1.04"

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

	Area (sf)	CN	Description
*	2,692	98	IMPERVIOUS
*	12,420	74	LANDSCAPED
	15,112	78	Weighted Average
	12,420		82.19% Pervious Area
	2,692		17.81% Impervious Area

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

Summary for Subcatchment 2S: AREA ABOVE THE SITE

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 0.022 af, Depth> 0.98"

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

	Area (sf)	CN	Description
*	1,500	98	EXISTING BUILDINGS
*	10,000	74	LANDSCAPED
	11,500	77	Weighted Average
	10,000		86.96% Pervious Area
	1,500		13.04% Impervious Area

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

Summary for Subcatchment 10S: EXISTING HOUSE

Runoff = 0.24 cfs @ 12.05 hrs, Volume= 0.015 af, Depth> 1.41"

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

	Area (sf)	CN	Description
*	2,282	98	IMPERVIOUS
*	3,114	74	LANDSCAPED
	5,396	84	Weighted Average
	3,114		57.71% Pervious Area
	2,282		42.29% Impervious Area

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

Summary for Subcatchment 11S: NEW BUILDING AND PARKING

Runoff = 0.52 cfs @ 12.07 hrs, Volume= 0.035 af, Depth> 1.86"

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

	Area (sf)	CN	Description
*	6,348	98	PAVED AND BUILDING
*	3,368	74	LANDSCAPED
	9,716	90	Weighted Average
	3,368		34.66% Pervious Area
	6,348		65.34% Impervious Area

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

Summary for Subcatchment 20S: AREA ABOVE THE SITE

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 0.022 af, Depth> 0.98"

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

	Area (sf)	CN	Description
*	1,500	98	EXISTING BUILDINGS
*	10,000	74	LANDSCAPED
	11,500	77	Weighted Average
	10,000		86.96% Pervious Area
	1,500		13.04% Impervious Area

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

Summary for Reach 1R: THEORICAL REACH POA

Inflow Area = 0.611 ac, 15.75% Impervious, Inflow Depth > 1.01" for 2 YEAR event
Inflow = 0.77 cfs @ 12.08 hrs, Volume= 0.052 af
Outflow = 0.75 cfs @ 12.10 hrs, Volume= 0.051 af, Atten= 2%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.26 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 2.0 min

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Peak Storage= 30 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.29'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 19.16 cfs

10.00' x 2.00' deep channel, n= 0.350
Side Slope Z-value= 1.0 '/' Top Width= 14.00'
Length= 10.0' Slope= 0.0200 '/'
Inlet Invert= 0.00', Outlet Invert= -0.20'

Summary for Reach 2R: THEORICAL REACH POA

Inflow Area =	0.611 ac, 38.07% Impervious, Inflow Depth > 1.39" for 2 YEAR event			
Inflow =	0.75 cfs @ 12.07 hrs, Volume=	0.071 af		
Outflow =	0.73 cfs @ 12.09 hrs, Volume=	0.071 af, Atten= 3%, Lag= 1.4 min		

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.25 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 2.1 min

Peak Storage= 29 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.29'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 19.16 cfs

10.00' x 2.00' deep channel, n= 0.350
Side Slope Z-value= 1.0 '/' Top Width= 14.00'
Length= 10.0' Slope= 0.0200 '/'
Inlet Invert= 0.00', Outlet Invert= -0.20'

Summary for Pond 12P: TREAMENT DRIP STRIP

Inflow Area =	0.223 ac, 65.34% Impervious, Inflow Depth > 1.86" for 2 YEAR event			
Inflow =	0.52 cfs @ 12.07 hrs, Volume=	0.035 af		
Outflow =	0.20 cfs @ 11.95 hrs, Volume=	0.035 af, Atten= 61%, Lag= 0.0 min		
Primary =	0.20 cfs @ 11.95 hrs, Volume=	0.035 af		

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

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Peak Elev= 99.00' @ 12.31 hrs Surf.Area= 2,606 sf Storage= 211 cf

Plug-Flow detention time= 6.0 min calculated for 0.035 af (100% of inflow)
Center-of-Mass det. time= 5.7 min (781.6 - 775.9)

Volume	Invert	Avail.Storage	Storage Description
#1	98.90'	6,150 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.90	1,800	0	0
99.40	6,000	1,950	1,950
100.10	6,000	4,200	6,150

Device	Routing	Invert	Outlet Devices
#1	Primary	98.90'	**0.20 cfs Exfiltration at all elevations**
#2	Primary	99.90'	**5.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.20 cfs @ 11.95 hrs HW=98.91' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.20 cfs)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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INSPECTION AND MAINTENANCE OF STORMWATER MANAGEMENT FACILITIES

The owner is Clementina Properties LLC, 1731 Washington Avenue, Portland, Maine 04103. The owner will be responsible for the inspection and maintenance of all stormwater management facilities, the establishment of any contract services required to implement the program, and the keeping of records and maintenance log book as described herein. At a minimum, the appropriate and relevant activities for each of the stormwater management facilities should be performed on the prescribed schedule. Periodic inspection and maintenance of these site features and devices is necessary to prevent erosion and remove pollutants from stormwater runoff.

DRIP STRIP FILTER SYSTEM:

There is a Drip Strip Filter System located on the project site. A Drip Strip Filter is a depression with an underdrained soil bed or soil filter that exfiltrates the stormwater. The depression is designed to temporarily store runoff, which will drain through the soil filter into the underdrains; excess runoff will flow over the downhill lip.

Drip Strip Filter Inspection: The drip strip filter should be inspected after every major storm in the first few months to ensure proper function. Thereafter, the filter should be inspected at least once every six months to ensure that it is draining within 48 hours; and that, after storms that fill the system to overflow, it drains in no less than 24 hours. If the system drains too fast, the orifice on the underdrain outlet may need to be modified.

Drip Strip Filter Replacement: The top several inches of the filter shall be replaced with fresh material when water ponds on the surface of the bed for more than 72 hours. The removed sediments should be disposed in an acceptable manner.

Sediment Removal: Sediment and plant debris should be removed from the pretreatment structure at least annually.

Record all maintenance on forms provided.

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INSPECTION / MAINTENANCE LOG

DRIP STRIP FILTER SYSTEM

I: INSPECTED - C: CLEANED - R: REPAIRED

DATE	INITIALS	ACTION	COMMENT
11/19/14	GHI	I, C	EXAMPLE: Units cleaned by ACME.