

## **M. STORMWATER**

### **STORMWATER MANAGEMENT REPORT 502 DEERING CENTER PORTLAND, MAINE**

**December 22, 2016**

#### ***Project Description:***

The project is the redevelopment of 502 Stevens Avenue from a single family home to a 4 unit apartment complex and 2,400 square feet of commercial space. The existing home will be removed as well as the existing sidewalk and replaced with a 2,400 square foot building, 4,130 square feet of parking and driveway and 860 square feet of plaza.

#### ***Existing Conditions:***

The 9,562 square foot lot has an existing home of 1,277 square feet and a driveway of 780 square feet. The site is very flat at elevation 119, plus or minus one foot. There are several large trees that provide canopy over the lot. The soils are Windsor sandy loam, a well-drained soil, based on the county soils mapping.

#### ***Developed Conditions:***

The project will have a 2,400 square foot building with a flat roof, parking spaces in the rear with a carport and storage on one side of the lot. It will be redeveloped using a shared driveway with the lot adjacent to this one, #504 Stevens Avenue. This reduces the curb cuts on Stevens Avenue.

There will be defined walkway along the side of the building using pervious pavers. There will be plaza on the side of the building using decking around the large existing ample tree and pervious pavers. This area will provide a small community gathering space.

#### ***Stormwater Treatment and Control:***

The site will have two subsurface stormwater systems. The first will utilize stormwater chambers for storage and use infiltration into the underlying soils for treatment. The second system will treat the parking area. Pretreatment will occur in the 6" deep bowl area.

The second system is under the previous paver plaza area. The system treats the roof water and the plaza area. It stores the stormwater in the stone bedding and infiltrates it. Overflow for the system goes to the adjacent system.

Peak Flows from the systems will be conveyed around the building to the existing catchbasin in Stevens Avenue.

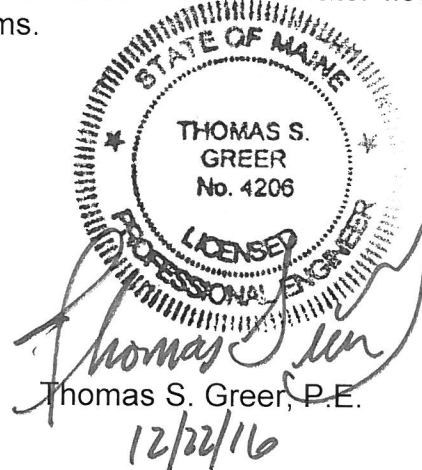
**Results:**

The Drainage Analysis shows that runoff from a 2 ½" rainstorm will infiltrate into the soils. During a 25 year rainstorm some overflow can be expected. This includes water coming up through the pervious pavers and some water overflowing to the pipe connected to the city's stormdrain. In general the flows are very small. Below is a chart showing peak flows.

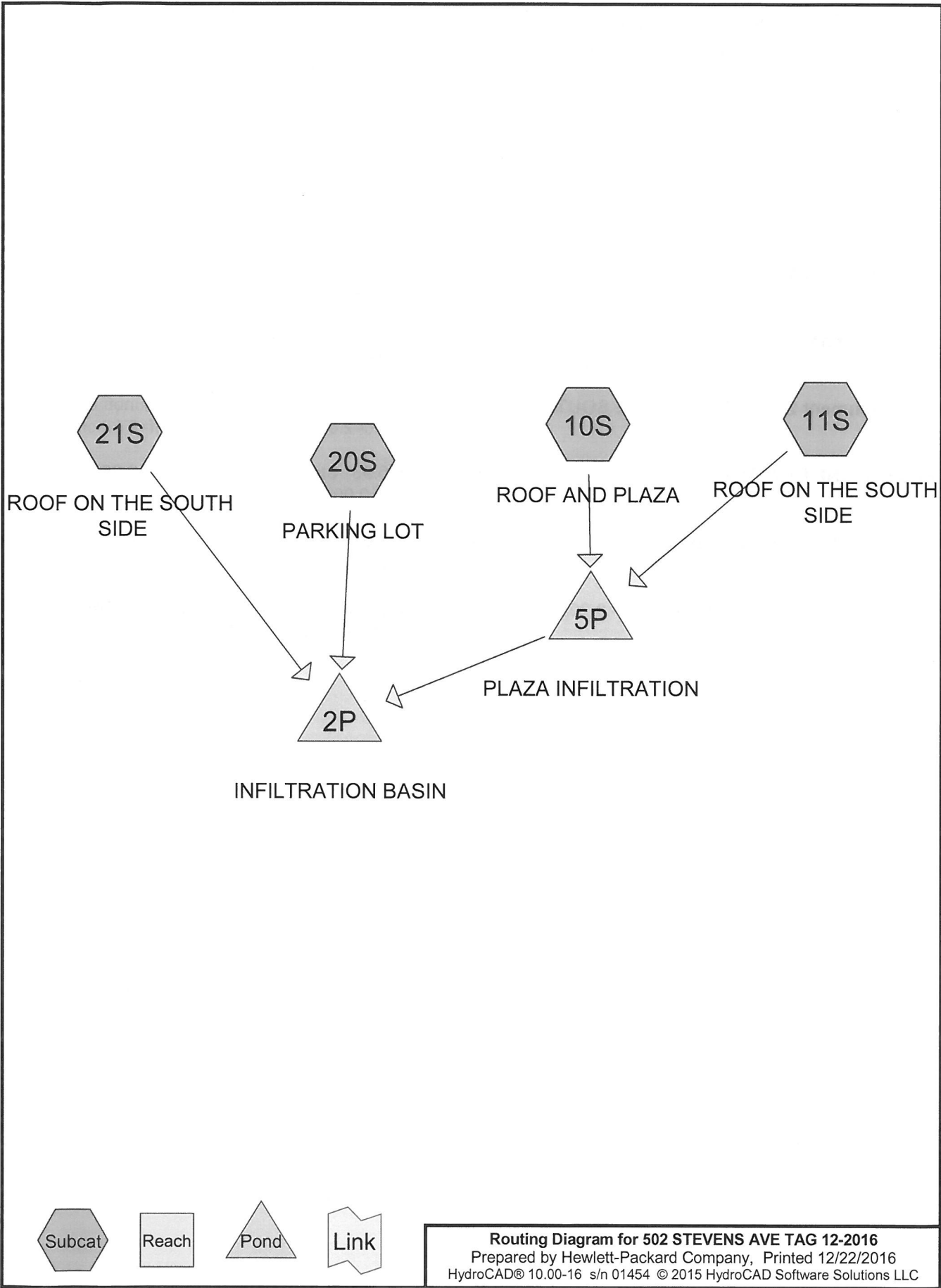
Peak Flows Cubic Feet Per Second (cfs)			
	2 Year	10 Year	25 Year
Developed	0.13	1.61	0.88

**Conclusion:**

The use of infiltration systems on this site will reduce the stormwater flows and have minimal impacts on downstream systems.



Thomas S. Greer, P.E.  
12/22/16



**502 STEVENS AVE TAG 12-2016**

Type III 24-hr 1" RUNOFF Rainfall=2.50"

Prepared by Hewlett-Packard Company

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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, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 10S: ROOF AND PLAZA** Runoff Area=3,435 sf 95.78% Impervious Runoff Depth>2.04"  
Tc=2.0 min CN=97 Runoff=0.20 cfs 0.013 af

**Subcatchment 11S: ROOF ON THE SOUTH** Runoff Area=480 sf 100.00% Impervious Runoff Depth>2.13"  
Tc=2.0 min CN=98 Runoff=0.03 cfs 0.002 af

**Subcatchment 20S: PARKING LOT** Runoff Area=4,536 sf 79.59% Impervious Runoff Depth>1.68"  
Flow Length=75' Slope=0.0050 '/ Tc=1.7 min CN=93 Runoff=0.23 cfs 0.015 af

**Subcatchment 21S: ROOF ON THE SOUTH** Runoff Area=328 sf 100.00% Impervious Runoff Depth>2.13"  
Tc=2.0 min CN=98 Runoff=0.02 cfs 0.001 af

**Pond 2P: INFILTRATION BASIN** Peak Elev=215.93' Storage=329 cf Inflow=0.25 cfs 0.018 af  
Discarded=0.03 cfs 0.017 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.017 af

**Pond 5P: PLAZA INFILTRATION** Peak Elev=217.03' Storage=193 cf Inflow=0.23 cfs 0.015 af  
Discarded=0.02 cfs 0.014 af Primary=0.07 cfs 0.002 af Outflow=0.09 cfs 0.015 af

**Total Runoff Area = 0.202 ac Runoff Volume = 0.031 af Average Runoff Depth = 1.86"**  
**12.20% Pervious = 0.025 ac 87.80% Impervious = 0.177 ac**

**502 STEVENS AVE TAG 12-2016**

Type III 24-hr 10 YEAR Rainfall=4.60"

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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, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 10S: ROOF AND PLAZA** Runoff Area=3,435 sf 95.78% Impervious Runoff Depth>3.98"  
Tc=2.0 min CN=97 Runoff=0.38 cfs 0.026 af

**Subcatchment 11S: ROOF ON THE SOUTH** Runoff Area=480 sf 100.00% Impervious Runoff Depth>4.05"  
Tc=2.0 min CN=98 Runoff=0.05 cfs 0.004 af

**Subcatchment 20S: PARKING LOT** Runoff Area=4,536 sf 79.59% Impervious Runoff Depth>3.60"  
Flow Length=75' Slope=0.0050 '/ Tc=1.7 min CN=93 Runoff=0.48 cfs 0.031 af

**Subcatchment 21S: ROOF ON THE SOUTH** Runoff Area=328 sf 100.00% Impervious Runoff Depth>4.05"  
Tc=2.0 min CN=98 Runoff=0.04 cfs 0.003 af

**Pond 2P: INFILTRATION BASIN** Peak Elev=216.52' Storage=507 cf Inflow=0.81 cfs 0.044 af  
Discarded=0.03 cfs 0.025 af Primary=0.61 cfs 0.018 af Outflow=0.64 cfs 0.043 af

**Pond 5P: PLAZA INFILTRATION** Peak Elev=217.61' Storage=246 cf Inflow=0.44 cfs 0.030 af  
Discarded=0.03 cfs 0.020 af Primary=0.32 cfs 0.010 af Outflow=0.35 cfs 0.030 af

**Total Runoff Area = 0.202 ac Runoff Volume = 0.064 af Average Runoff Depth = 3.79"**  
**12.20% Pervious = 0.025 ac 87.80% Impervious = 0.177 ac**

**502 STEVENS AVE TAG 12-2016**

Prepared by Hewlett-Packard Company

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Type III 24-hr 2 YEAR Rainfall=3.10"

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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, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 10S: ROOF AND PLAZA** Runoff Area=3,435 sf 95.78% Impervious Runoff Depth>2.60"  
Tc=2.0 min CN=97 Runoff=0.25 cfs 0.017 af

**Subcatchment 11S: ROOF ON THE SOUTH** Runoff Area=480 sf 100.00% Impervious Runoff Depth>2.68"  
Tc=2.0 min CN=98 Runoff=0.04 cfs 0.002 af

**Subcatchment 20S: PARKING LOT** Runoff Area=4,536 sf 79.59% Impervious Runoff Depth>2.22"  
Flow Length=75' Slope=0.0050 '/' Tc=1.7 min CN=93 Runoff=0.30 cfs 0.019 af

**Subcatchment 21S: ROOF ON THE SOUTH** Runoff Area=328 sf 100.00% Impervious Runoff Depth>2.68"  
Tc=2.0 min CN=98 Runoff=0.02 cfs 0.002 af

**Pond 2P: INFILTRATION BASIN** Peak Elev=216.21' Storage=414 cf Inflow=0.40 cfs 0.025 af  
Discarded=0.03 cfs 0.021 af Primary=0.13 cfs 0.004 af Outflow=0.16 cfs 0.025 af

**Pond 5P: PLAZA INFILTRATION** Peak Elev=217.21' Storage=209 cf Inflow=0.29 cfs 0.020 af  
Discarded=0.03 cfs 0.016 af Primary=0.19 cfs 0.004 af Outflow=0.21 cfs 0.019 af

**Total Runoff Area = 0.202 ac Runoff Volume = 0.040 af Average Runoff Depth = 2.41"**  
**12.20% Pervious = 0.025 ac 87.80% Impervious = 0.177 ac**

**502 STEVENS AVE TAG 12-2016**

Type III 24-hr 25 YEAR Rainfall=5.80"

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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, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 10S: ROOF AND PLAZA** Runoff Area=3,435 sf 95.78% Impervious Runoff Depth>5.07"  
Tc=2.0 min CN=97 Runoff=0.48 cfs 0.033 af

**Subcatchment 11S: ROOF ON THE SOUTH** Runoff Area=480 sf 100.00% Impervious Runoff Depth>5.15"  
Tc=2.0 min CN=98 Runoff=0.07 cfs 0.005 af

**Subcatchment 20S: PARKING LOT** Runoff Area=4,536 sf 79.59% Impervious Runoff Depth>4.71"  
Flow Length=75' Slope=0.0050 '/' Tc=1.7 min CN=93 Runoff=0.61 cfs 0.041 af

**Subcatchment 21S: ROOF ON THE SOUTH** Runoff Area=328 sf 100.00% Impervious Runoff Depth>5.15"  
Tc=2.0 min CN=98 Runoff=0.05 cfs 0.003 af

**Pond 2P: INFILTRATION BASIN** Peak Elev=216.67' Storage=552 cf Inflow=1.03 cfs 0.060 af  
Discarded=0.03 cfs 0.027 af Primary=0.88 cfs 0.030 af Outflow=0.91 cfs 0.057 af

**Pond 5P: PLAZA INFILTRATION** Peak Elev=217.93' Storage=274 cf Inflow=0.55 cfs 0.038 af  
Discarded=0.03 cfs 0.022 af Primary=0.40 cfs 0.016 af Outflow=0.43 cfs 0.038 af

**Total Runoff Area = 0.202 ac Runoff Volume = 0.082 af Average Runoff Depth = 4.89"**  
**12.20% Pervious = 0.025 ac 87.80% Impervious = 0.177 ac**