



May 6, 2019

New Bedford Conservation Commission
New Bedford City Hall
133 Williams Street
New Bedford, MA 02740

**RE: Rain Garden As-Built Report
100 Duchaine Boulevard – New Bedford, MA**

Dear Commission Members:

On behalf of the property owner and applicant, Parallel Products of New England, please find an As-Built Plan and HydroCAD© calculations enclosed with this letter detailing the storage capacity of the rain garden. The following table is a representation of the proposed conditions vs. existing conditions, specifically the storage volume and elevations of the rain garden provided on site at the above referenced project.

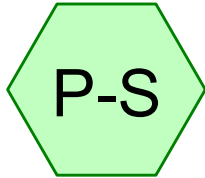
Table 1 - Comparison of Proposed Vs. As-Built Conditions of The Rain Garden			
~ VOLUME (C.F.) ~			
<u>PROPOSED</u>		770	
<u>EXISTING</u>		785	
~ ELEVATION (FT) ~			
<u>PROPOSED</u>		<u>EXISTING</u>	
Top Berm	78.0	Top Berm	78.5
Bottom	77.5	Bottom	78.0

We trust the attachments noted above and included herewith will provide the necessary documentation to address the special conditions within the Order of Conditions issued on November 14, 2017. If you should have any questions, please feel free to contact us.

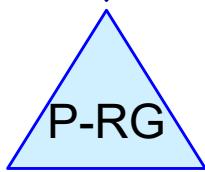
Very truly yours,

FARLAND CORP., INC.

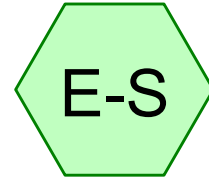

Matthew J. White, E.I.T.
Project Manager



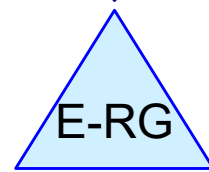
Tributary to Rain
Garden



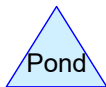
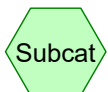
RG - Proposed



Tributary to Rain
Garden



RG - Existing



15500.2 Pre v Post RG

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.138	98	Paved parking & roofs (E-S, P-S)

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Type III 24-hr 2-yr Rainfall=3.40"

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Summary for Subcatchment E-S: Tributary to Rain Garden

Runoff = 0.23 cfs @ 12.08 hrs, Volume= 0.018 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

Area (sf)	CN	Description
3,008	98	Paved parking & roofs
3,008		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Summary for Subcatchment P-S: Tributary to Rain Garden

Runoff = 0.23 cfs @ 12.08 hrs, Volume= 0.018 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

Area (sf)	CN	Description
3,008	98	Paved parking & roofs
3,008		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Summary for Pond E-RG: RG - Existing

Inflow Area = 0.069 ac, 100.00% Impervious, Inflow Depth = 3.17" for 2-yr event
 Inflow = 0.23 cfs @ 12.08 hrs, Volume= 0.018 af
 Outflow = 0.01 cfs @ 14.69 hrs, Volume= 0.018 af, Atten= 96%, Lag= 156.4 min
 Discarded = 0.01 cfs @ 14.69 hrs, Volume= 0.018 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 78.27' @ 14.69 hrs Surf.Area= 1,589 sf Storage= 395 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 335.5 min (1,090.6 - 755.1)

Volume	Invert	Avail.Storage	Storage Description
#1	78.00'	785 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

15500.2 Pre v Post RG

Type III 24-hr 2-yr Rainfall=3.40"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
78.00	1,330	0	0
78.50	1,808	785	785

Device	Routing	Invert	Outlet Devices
#1	Discarded	78.00'	0.270 in/hr Exfiltration over Surface area
#2	Primary	78.50'	7.0' long x 5.0' 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 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.01 cfs @ 14.69 hrs HW=78.27' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=78.00' (Free Discharge)
 ↳2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P-RG: RG - Proposed

Inflow Area = 0.069 ac, 100.00% Impervious, Inflow Depth = 3.17" for 2-yr event
 Inflow = 0.23 cfs @ 12.08 hrs, Volume= 0.018 af
 Outflow = 0.01 cfs @ 14.74 hrs, Volume= 0.018 af, Atten= 96%, Lag= 159.5 min
 Discarded = 0.01 cfs @ 14.74 hrs, Volume= 0.018 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 77.78' @ 14.74 hrs Surf.Area= 1,566 sf Storage= 398 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 334.7 min (1,089.8 - 755.1)

Volume	Invert	Avail.Storage	Storage Description
#1	77.50'	770 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.50	1,300	0	0
78.00	1,779	770	770

Device	Routing	Invert	Outlet Devices
#1	Discarded	77.50'	0.270 in/hr Exfiltration over Surface area
#2	Primary	78.00'	7.0' long x 5.0' 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 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

15500.2 Pre v Post RG

Type III 24-hr 2-yr Rainfall=3.40"

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Discarded OutFlow Max=0.01 cfs @ 14.74 hrs HW=77.78' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=77.50' (Free Discharge)

↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

15500.2 Pre v Post RG

Type III 24-hr 10-yr Rainfall=4.80"

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Summary for Subcatchment E-S: Tributary to Rain Garden

Runoff = 0.32 cfs @ 12.08 hrs, Volume= 0.026 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"

Area (sf)	CN	Description
3,008	98	Paved parking & roofs
3,008		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Summary for Subcatchment P-S: Tributary to Rain Garden

Runoff = 0.32 cfs @ 12.08 hrs, Volume= 0.026 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"

Area (sf)	CN	Description
3,008	98	Paved parking & roofs
3,008		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Summary for Pond E-RG: RG - Existing

Inflow Area = 0.069 ac, 100.00% Impervious, Inflow Depth = 4.56" for 10-yr event

Inflow = 0.32 cfs @ 12.08 hrs, Volume= 0.026 af

Outflow = 0.01 cfs @ 15.53 hrs, Volume= 0.020 af, Atten= 97%, Lag= 207.0 min

Discarded = 0.01 cfs @ 15.53 hrs, Volume= 0.020 af

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 78.42' @ 15.53 hrs Surf.Area= 1,731 sf Storage= 642 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 319.8 min (1,068.5 - 748.7)

Volume	Invert	Avail.Storage	Storage Description
#1	78.00'	785 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

15500.2 Pre v Post RG

Type III 24-hr 10-yr Rainfall=4.80"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
78.00	1,330	0	0
78.50	1,808	785	785

Device	Routing	Invert	Outlet Devices
#1	Discarded	78.00'	0.270 in/hr Exfiltration over Surface area
#2	Primary	78.50'	7.0' long x 5.0' 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 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.01 cfs @ 15.53 hrs HW=78.42' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=78.00' (Free Discharge)
 ↳2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P-RG: RG - Proposed

Inflow Area = 0.069 ac, 100.00% Impervious, Inflow Depth = 4.56" for 10-yr event
 Inflow = 0.32 cfs @ 12.08 hrs, Volume= 0.026 af
 Outflow = 0.01 cfs @ 15.56 hrs, Volume= 0.020 af, Atten= 97%, Lag= 208.9 min
 Discarded = 0.01 cfs @ 15.56 hrs, Volume= 0.020 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 77.93' @ 15.56 hrs Surf.Area= 1,711 sf Storage= 646 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 319.4 min (1,068.1 - 748.7)

Volume	Invert	Avail.Storage	Storage Description
#1	77.50'	770 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.50	1,300	0	0
78.00	1,779	770	770

Device	Routing	Invert	Outlet Devices
#1	Discarded	77.50'	0.270 in/hr Exfiltration over Surface area
#2	Primary	78.00'	7.0' long x 5.0' 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 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

15500.2 Pre v Post RG

Type III 24-hr 10-yr Rainfall=4.80"

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Discarded OutFlow Max=0.01 cfs @ 15.56 hrs HW=77.93' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=77.50' (Free Discharge)

↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

15500.2 Pre v Post RG

Type III 24-hr 100-yr Rainfall=7.00"

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Summary for Subcatchment E-S: Tributary to Rain Garden

Runoff = 0.47 cfs @ 12.08 hrs, Volume= 0.039 af, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.00"

Area (sf)	CN	Description
3,008	98	Paved parking & roofs
3,008		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Summary for Subcatchment P-S: Tributary to Rain Garden

Runoff = 0.47 cfs @ 12.08 hrs, Volume= 0.039 af, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.00"

Area (sf)	CN	Description
3,008	98	Paved parking & roofs
3,008		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Summary for Pond E-RG: RG - Existing

Inflow Area = 0.069 ac, 100.00% Impervious, Inflow Depth = 6.76" for 100-yr event

Inflow = 0.47 cfs @ 12.08 hrs, Volume= 0.039 af

Outflow = 0.19 cfs @ 12.33 hrs, Volume= 0.029 af, Atten= 59%, Lag= 15.0 min

Discarded = 0.01 cfs @ 12.33 hrs, Volume= 0.022 af

Primary = 0.18 cfs @ 12.33 hrs, Volume= 0.007 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 78.55' @ 12.33 hrs Surf.Area= 1,808 sf Storage= 785 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 238.3 min (981.2 - 743.0)

Volume	Invert	Avail.Storage	Storage Description
#1	78.00'	785 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

15500.2 Pre v Post RG

Type III 24-hr 100-yr Rainfall=7.00"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
78.00	1,330	0	0
78.50	1,808	785	785

Device	Routing	Invert	Outlet Devices
#1	Discarded	78.00'	0.270 in/hr Exfiltration over Surface area
#2	Primary	78.50'	7.0' long x 5.0' 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 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.01 cfs @ 12.33 hrs HW=78.55' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.16 cfs @ 12.33 hrs HW=78.55' (Free Discharge)
 ↳2=Broad-Crested Rectangular Weir (Weir Controls 0.16 cfs @ 0.50 fps)

Summary for Pond P-RG: RG - Proposed

Inflow Area = 0.069 ac, 100.00% Impervious, Inflow Depth = 6.76" for 100-yr event
 Inflow = 0.47 cfs @ 12.08 hrs, Volume= 0.039 af
 Outflow = 0.21 cfs @ 12.30 hrs, Volume= 0.029 af, Atten= 56%, Lag= 13.3 min
 Discarded = 0.01 cfs @ 12.30 hrs, Volume= 0.022 af
 Primary = 0.20 cfs @ 12.30 hrs, Volume= 0.007 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 78.05' @ 12.30 hrs Surf.Area= 1,779 sf Storage= 770 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 233.2 min (976.1 - 743.0)

Volume	Invert	Avail.Storage	Storage Description
#1	77.50'	770 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.50	1,300	0	0
78.00	1,779	770	770

Device	Routing	Invert	Outlet Devices
#1	Discarded	77.50'	0.270 in/hr Exfiltration over Surface area
#2	Primary	78.00'	7.0' long x 5.0' 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 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

15500.2 Pre v Post RG

Type III 24-hr 100-yr Rainfall=7.00"

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Discarded OutFlow Max=0.01 cfs @ 12.30 hrs HW=78.05' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.17 cfs @ 12.30 hrs HW=78.05' (Free Discharge)

↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.17 cfs @ 0.51 fps)