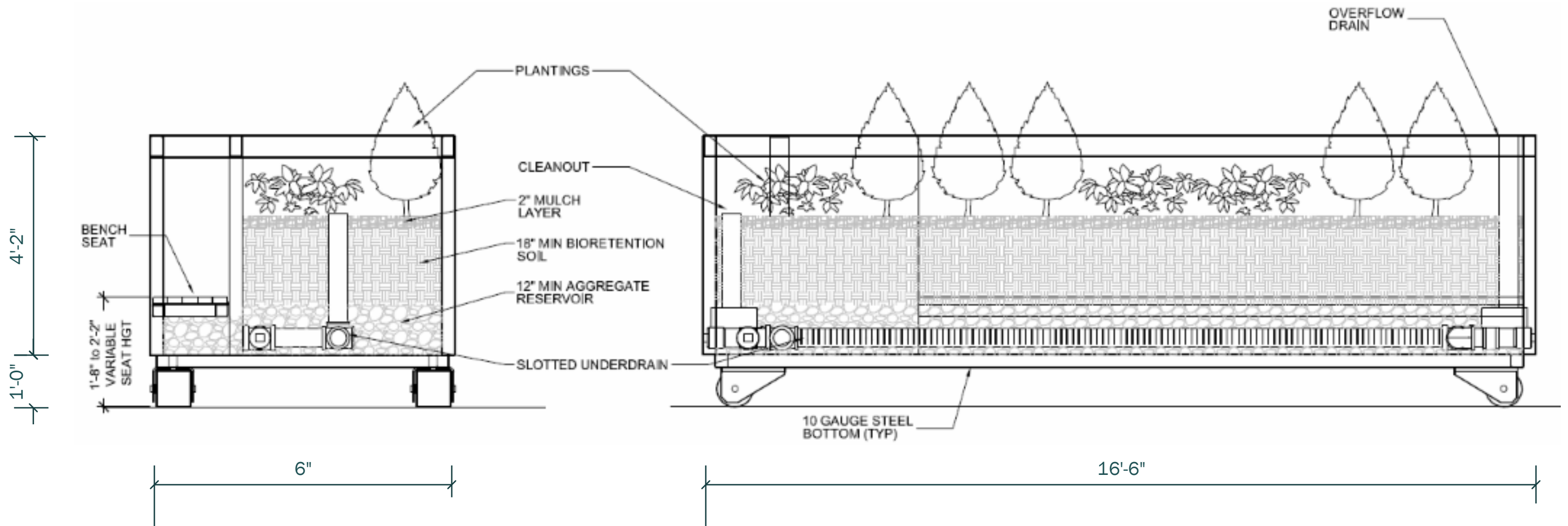


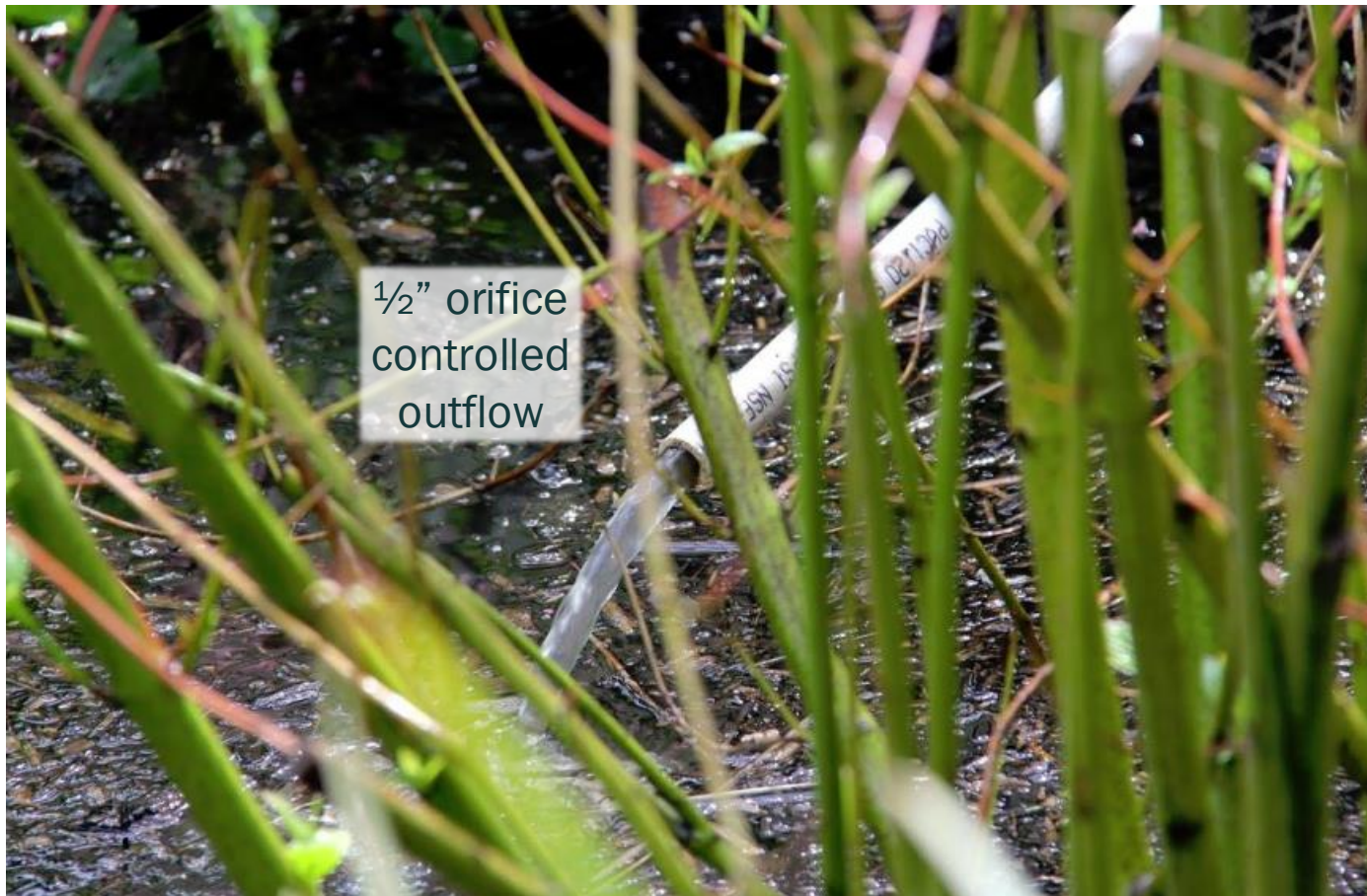


- Vertical-walled bioretention facility best management practice
- What: Metal constructed, mobile stormwater treatment system BMP
- Profile: aggregate, bioretention soil, native vegetation, live storage
- Flow control: underdrain, reducing orifice, live storage
- Filtration: bioretention soil media
- Scalable: connect in series for large sites
- WA Ecology approved equivalent to bioretention facility, BMP T7.30



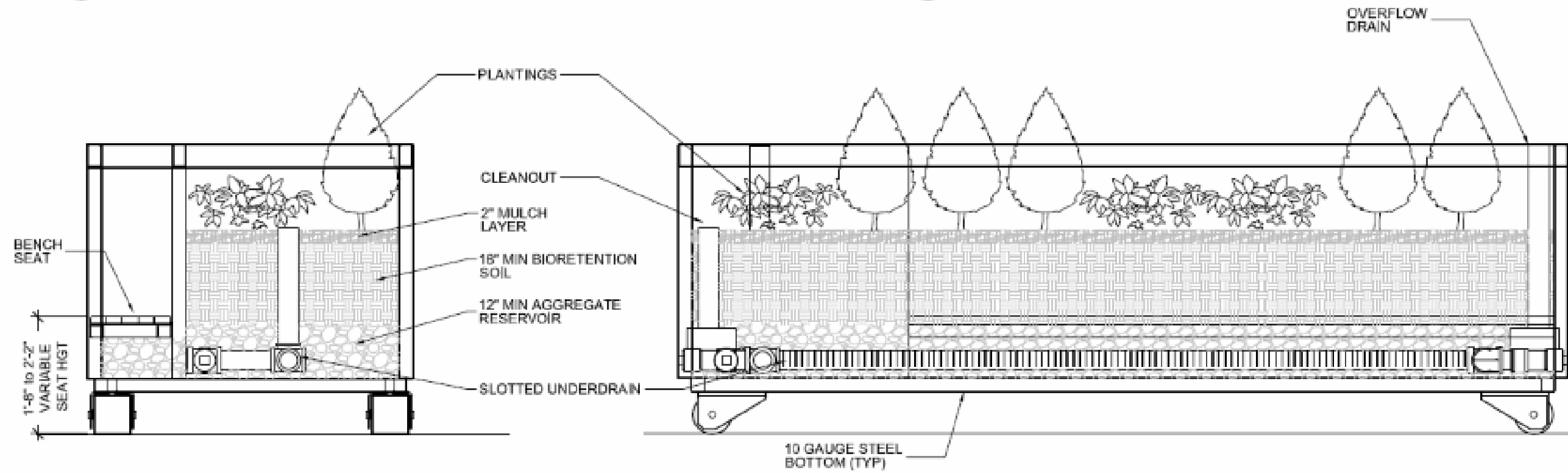
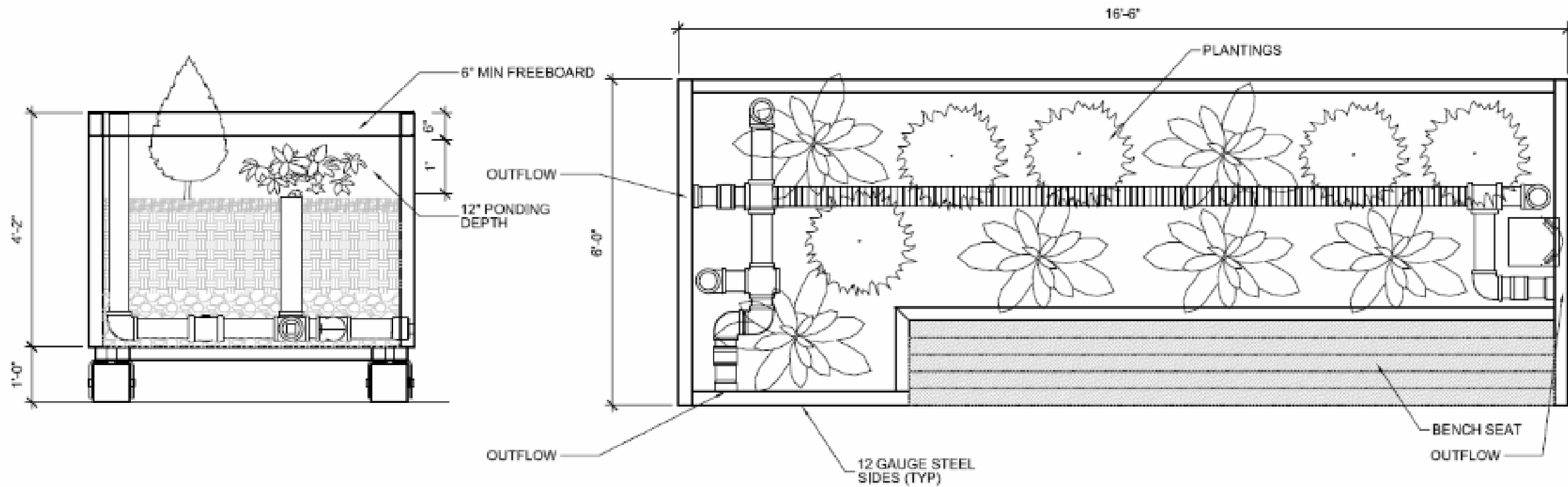


Gravity Feed from Roof Downspouts and Pumping from Oil/Water Separator






SPLASH BOXX™



PROJECT NO.	
CITY/TOWN	
DATE	
SCALE	
DESIGNER	
CHECKER	
DATE	
PROJECT	
LOCATION	
CLIENT	
DATE	

THE INFORMATION CONTAINED HEREIN IS THE PROPERTY OF SPLASH BOXX. IT IS TO BE USED ONLY FOR THE PROJECT AND LOCATION SPECIFICALLY IDENTIFIED HEREIN. ANY REUSE OR MODIFICATION OF THIS INFORMATION WITHOUT THE WRITTEN PERMISSION OF SPLASH BOXX IS STRICTLY PROHIBITED.

SHEET NO.	PLAN & ELEV.
SHEET NAME	EX-1

Splash Boxx							
Volume & Weight Calculations							
						ESTIMATOR:	<i>Adam Braun</i>
						Updated:	12/27/2012
MATERIAL	LENGTH (FEET)	WIDTH (FEET)	AREA (SF)	DEPTH (FEET)	VOLUME (CY)	DENSITY (LB/CY)	WEIGHT (TON)
2" WASHED ROCK	16.00	4.33	69.33	0.83	2.14	2800	3.00
RAIN GARDEN SOIL MIX	16.00	4.33	69.33	1.50	3.85	2400	4.62
MULCH	16.00	4.33	69.33	0.17	0.43	800	0.17
STANDING WATER	16.00	4.33	69.33	0.17	0.43	1685	0.36
PLASTIC PIPING + SEATING	-	-	-	-	-	-	0.04
SPLASH BOXX	-	-	-	-	-	-	1.95
TOTAL WEIGHT, SPLASH BOXX WITH SEATING							10.14
2" WASHED ROCK	16.00	5.50	88.00	0.83	2.72	2800	3.80
RAIN GARDEN SOIL MIX	16.00	5.50	88.00	1.50	4.89	2400	5.87
MULCH	16.00	5.50	88.00	0.17	0.54	800	0.22
STANDING WATER	16.00	5.50	88.00	0.17	0.54	1685	0.46
PLASTIC PIPING	-	-	-	-	-	-	0.02
SPLASH BOXX	-	-	-	-	-	-	1.95
TOTAL WEIGHT, SPLASH BOXX WITHOUT SEATING							12.32

Modeling Guidance


WWHM 2012 Screen Shot

Equivalent to Bioretention Facility


SPLASH BOXX

DEMONSTRATING COMPLIANCE WITH ECOLOGY'S MINIMUM REQUIREMENTS AND USING THE WESTERN WASHINGTON HYDROLOGY MODEL (WWHM 2012) TO SIZE AND EVALUATE WATER QUALITY AND FLOW CONTROL PERFORMANCE OF SPLASH BOXX

Prepared for
Splash Boxx, LLC



Prepared by
Herrera Environmental Consultants, Inc.



September 11, 2013

Bioretention 1 Mitigated

Facility Name: Splash Boxx

Outlet 1: 0, Outlet 2: 0, Outlet 3: 0

4 - Define facility: on

Facility Type: Use simple Bioretention, Underdrain Used

Bioretention Bottom Elevation: 0

Bioretention Dimensions:

Bioretention Length (ft)	16,000
Bioretention Bottom Width (ft)	5,500
Freeboard (ft)	0.500
Over-road Flooding (ft)	0.500
Effective Total Depth (ft)	4
Bottom slope of bioretention (ft/ft)	0.000
Top and Bottom side slope (ft/ft)	0.000
Left Side Slope (H/V)	0.000
Right Side Slope (H/V)	0.000

Material Layers for:

	Layer 1	Layer 2	Layer 3
Depth (ft)	1.667	0.833	0.000
Soil Layer 1	SMMwW		
Soil Layer 2	GRAVEL		
Soil Layer 3	GRAVEL		

5 - Define underdrain:

Underdrain Diameter (ft)	0.33	Offset (in)	
Orifice Diameter (in)	0.5		
Flow Through Underdrain (ac-ft)	0		
Total Outflow (ac-ft)	0		
Percent Through Underdrain	0		

6 - Define outlet:

Riser Outlet Structure: [dropdown]

Outlet Structure Data:

Riser Height Above bioretention	1
Riser Diameter (in)	4
Riser Type	Flat

7 - Define Splash Boxx:


Orifice Number	Diameter (in)	Height (ft)
1	0	0
2	0	0
3	0	0

8 - Define Splash Boxx material:

Native Infiltration: NO

Show Bioretention: Close Table

Bioretention Volume at Riser Head (ac-ft): .003



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

November 5, 2013

Mr. David Hymel
Rain Dog Designs
PO Box 231
Eatonville, WA 98328

RE: Splash Boxx for Stormwater Runoff Filtration

Dear Mr. Hymel:


The Washington State Department of Ecology (Ecology) finds the Splash Boxx treatment system functionally equivalent to a Bioretention Facility when using approved Bioretention Soil Media. The media specifications for Splash Boxx must adhere to the guidelines for Bioretention areas, found in BMP T7.30 of the Stormwater Management Manual for Western Washington (2012) or its latest version. The sizing procedure must also adhere to the procedure outlined in the Bioretention area of the manual mentioned above or the procedure Splash Boxx submitted to Ecology, dated September 11, 2013, for design of the Splash Boxx using WWHM.

Ecology does not endorse this product or its manufacturer.

Contractors may use the Splash Boxx BMP at project sites without seeking additional Ecology approval. Installers must follow manufacturer installation recommendations.

For more information, please contact me at douglas.howie@ecy.wa.gov, or (360) 407-6444.

Sincerely,



Douglas C. Howie, P.E.
Stormwater Engineer
Water Quality Program

cc: Kurt Marx, Washington Stormwater Center

WA Ecology Equivalency Guidance for Site Development
This guidance document includes methods for sizing Splash Boxx best management practices (BMPs) to fully comply with Ecology minimum requirements for water quality treatment (Minimum Requirement #6) and for evaluating the performance (i.e., partial or full compliance) of Splash Boxx BMPs relative to Ecology flow control (Minimum Requirement #7) and On-site Stormwater requirements (Minimum Requirement #5).

<http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html>

Splash Boxx Flow Control Performance					
Number of Splash Boxxes ^a	Drainage Area (square feet) ^b	1-year Reduction (%) ^{c,d}	2-year Reduction (%) ^{c,e}	25-year Reduction (%) ^{c,e}	Percent Runoff Treated (%) ^f
1	1,000	45%	45%	70%	100%
1	2,000	64%	68%	73%	100%
1	3,000	76%	79%	41%	99.6%
1	4,000	60%	45%	28%	98.4%
1	5,000	34%	25%	16%	96.5%
2	1,000	51%	52%	66%	100%
2	2,000	62%	62%	75%	100%
2	3,000	66%	68%	81%	100%
2	4,000	69%	72%	55%	100%
2	5,000	74%	76%	45%	99.8%
2	7,000	66%	52%	36%	98.7%
2	10,000	29%	23%	21%	95.6%

a. When more than one Boxx was modeled, the Boxxes were modeled in series, assuming that the Boxxes are connected at the underdrain elevation and the bioretention soil surface elevation (i.e., even in small events, both Boxxes receive runoff). Underdrain flows from both Boxxes were assumed to be controlled by a single 0.5 inch diameter orifice.

b. The drainage area for the predeveloped scenario is assumed to be 100% impervious and does not include the Splash Boxx footprint. This assumption results in slightly conservative estimates of peak flow control performance.

c. The “x-year Reduction” represents the reduction in x-year peak flow from a 100% impervious area.

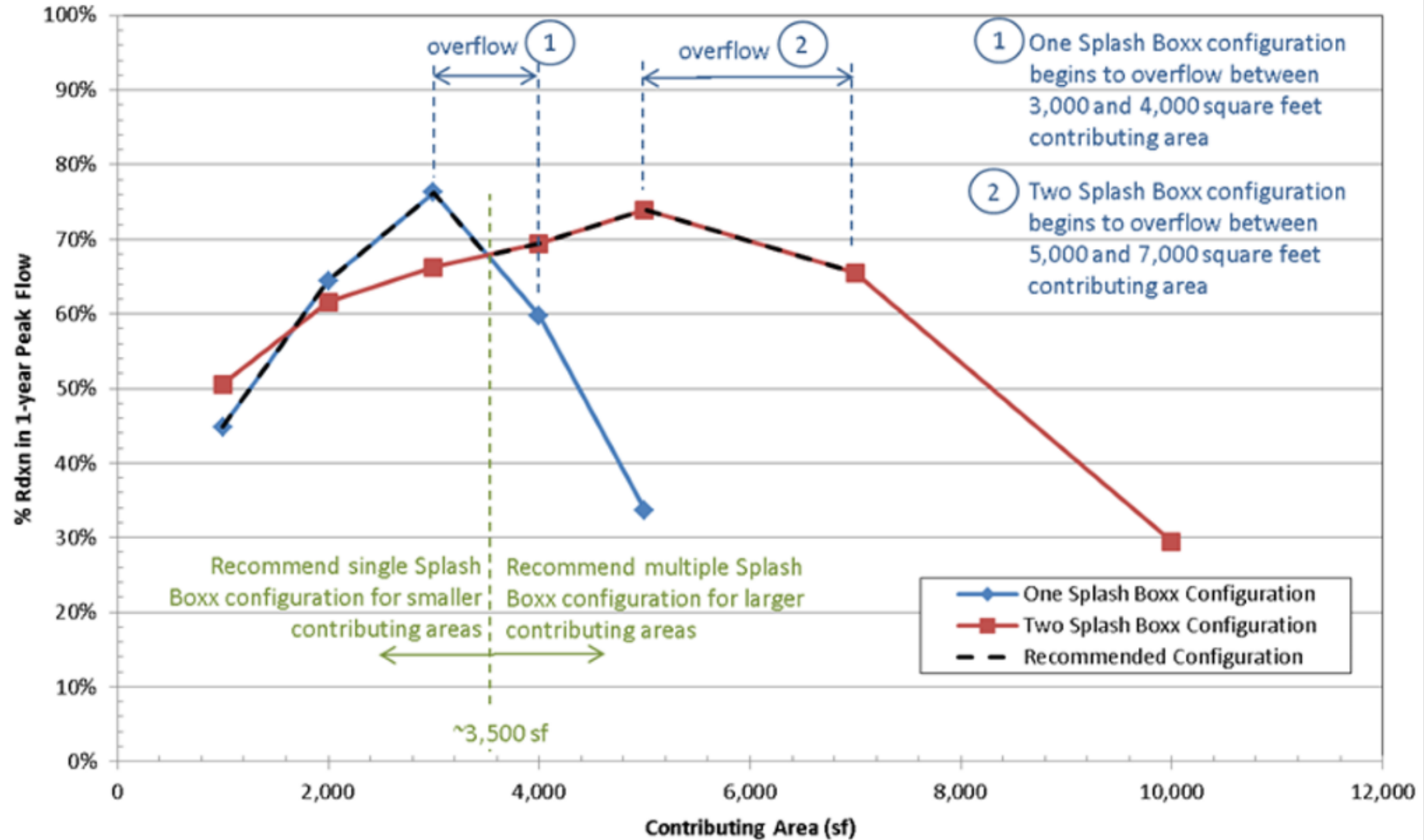
d. 1-year recurrence interval flow calculated based on partial duration statistics (converted from MGSFlood annual duration statistics).

e. 2- and 25-year recurrence interval flows calculated based on annual duration statistics.

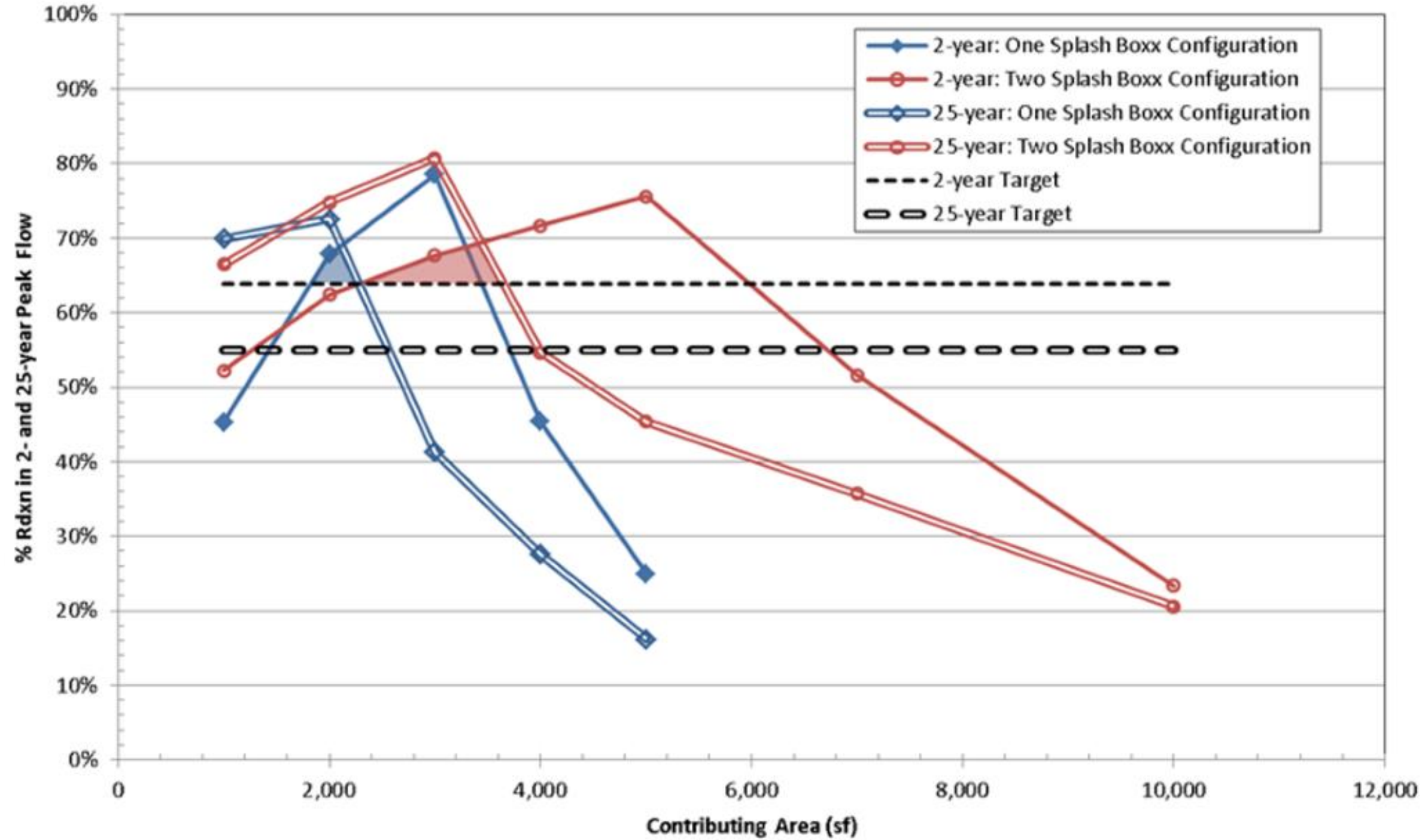
f. “Percent Treated” represents the fraction of runoff that passes through the bioretention soil media and exits the facility via the orifice. Any water that leaves the Splash Boxx via the overflow structure does not receive treatment.

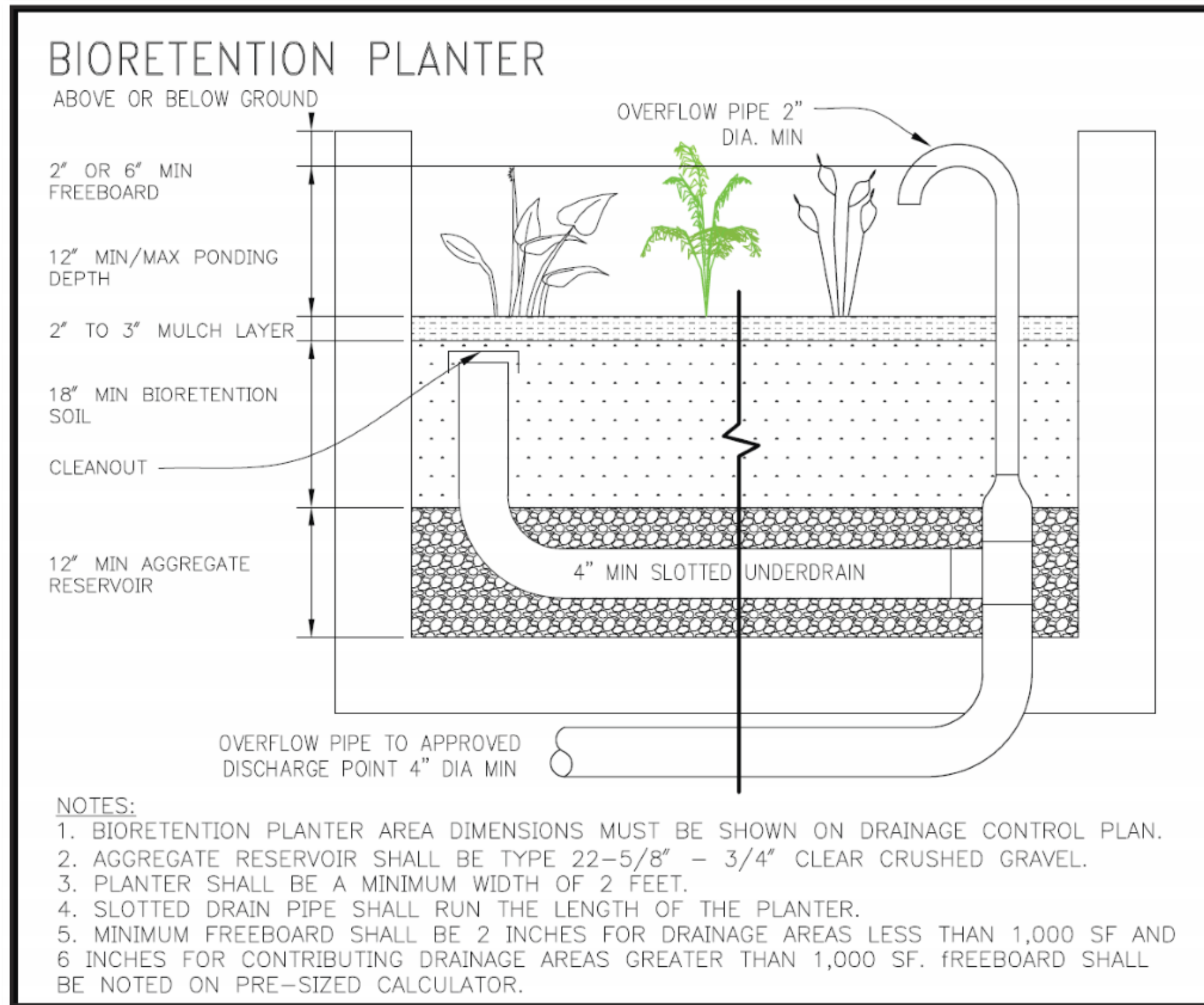


Splash Boxx, No Seat Configuration 1-year reduction in peak flow



Splash Boxx, No Seat Configuration 2- and 25-year reduction in peak flow





Department of Planning and Development
dpd Development

Client Assistance Memo
CAM 536

Seattle Permits
— part of a multi-departmental City of Seattle series on getting a permit

Green Stormwater Infrastructure (GSI) on Private Property Bioretention Planters

January 7, 2010

Splash Boxx is designed in accordance with the City of Seattle bioretention planter box. Details are in Client Assistance Memo 536.

