

Detailed Stormceptor Sizing Report – 43 Blackmer Street

Project Information & Location			
Project Name	43 Blackmer Street	Project Number	15109
City	New Bedford	State/ Province	Massachusetts
Country	United States of America	Date	3/31/2016
Designer Information		EOR Information (optional)	
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Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	43 Blackmer Street
Recommended Stormceptor Model	STC 900
Target TSS Removal (%)	77.0
TSS Removal (%) Provided	79
PSD	Fine Distribution
Rainfall Station	BLUE HILL

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	% TSS Removal Provided
STC 450i	72
STC 900	79
STC 1200	79
STC 1800	78
STC 2400	82
STC 3600	82
STC 4800	84
STC 6000	84
STC 7200	86
STC 11000	89
STC 13000	89
STC 16000	91
Stormceptor MAX	Custom

Stormceptor

The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for each rainfall event, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.

Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Design Methodology

Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:

- Site parameters
- Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
- Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
- TSS load
- Detention time of the system

Hydrology Analysis

PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour). Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station

State/Province	Massachusetts	Total Number of Rainfall Events	10784
Rainfall Station Name	BLUE HILL	Total Rainfall (in)	2849.7
Station ID #	0736	Average Annual Rainfall (in)	49.1
Coordinates	42°12'44"N, 71°6'53"W	Total Evaporation (in)	256.6
Elevation (ft)	630	Total Infiltration (in)	0.0
Years of Rainfall Data	58	Total Rainfall that is Runoff	2593.1

Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
- For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

Drainage Area		Up Stream Storage	
Total Area (acres)	1.0	Storage (ac-ft)	Discharge (cfs)
Imperviousness %	100.0	0.000	0.000
Water Quality Objective		Up Stream Flow Diversion	
TSS Removal (%)	77.0	Max. Flow to Stormceptor (cfs)	
Runoff Volume Capture (%)		Design Details	
Oil Spill Capture Volume (Gal)		Stormceptor Inlet Invert Elev (ft)	0.70
Peak Conveyed Flow Rate (CFS)	7.00	Stormceptor Outlet Invert Elev (ft)	0.40
Water Quality Flow Rate (CFS)	0.40	Stormceptor Rim Elev (ft)	6.80
		Normal Water Level Elevation (ft)	0.00
		Pipe Diameter (in)	12
		Pipe Material	RCP - concrete
		Multiple Inlets (Y/N)	No
		Grate Inlet (Y/N)	No

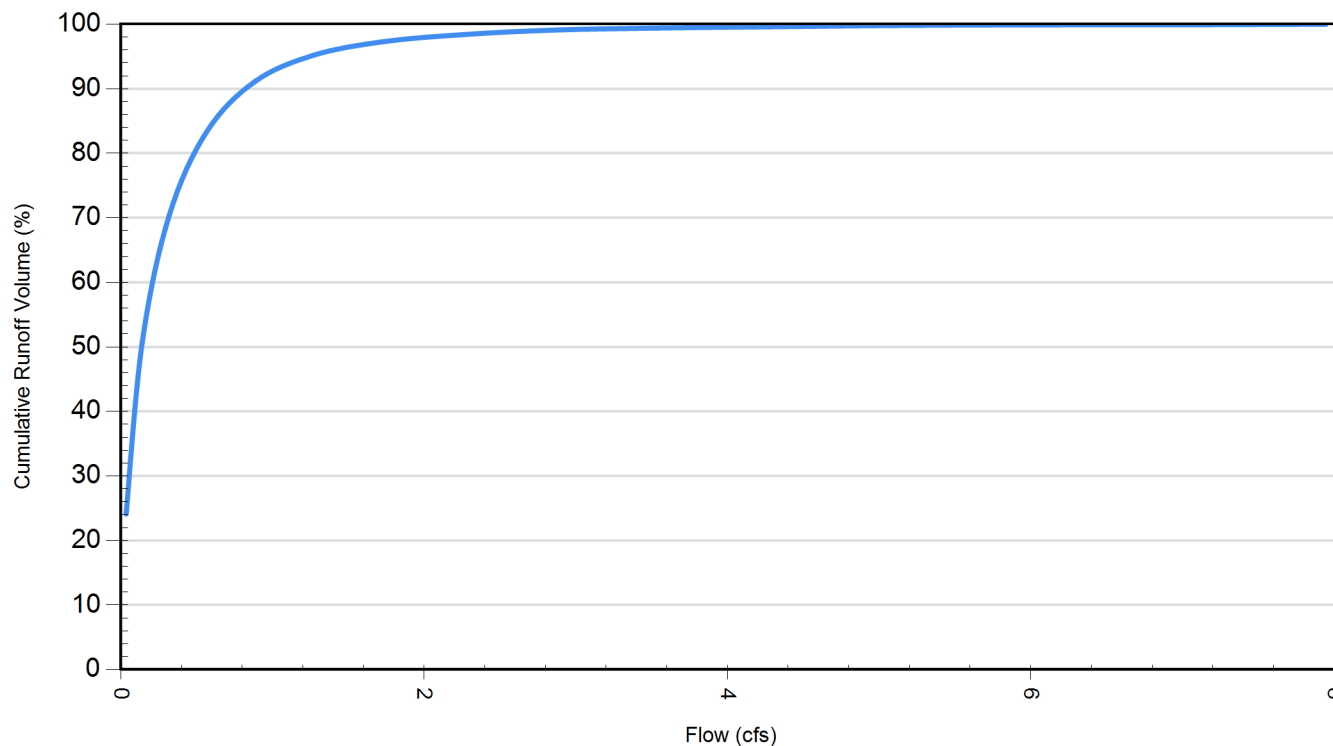
Particle Size Distribution (PSD)		
Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.		
Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Site Name		43 Blackmer Street	
Site Details			
Drainage Area		Infiltration Parameters	
Total Area (acres)	1.0	Horton's equation is used to estimate infiltration	
Imperviousness %	100.0	Max. Infiltration Rate (in/hr)	2.44
Surface Characteristics		Min. Infiltration Rate (in/hr)	0.4
Width (ft)	417.00	Decay Rate (1/sec)	0.00055
Slope %	2	Regeneration Rate (1/sec)	0.01
Impervious Depression Storage (in)	0.02	Evaporation	
Pervious Depression Storage (in)	0.2	Daily Evaporation Rate (in/day)	0.1
Impervious Manning's n	0.015	Dry Weather Flow	
Pervious Manning's n	0.25	Dry Weather Flow (cfs)	0
Maintenance Frequency		Winter Months	
Maintenance Frequency (months) >	12	Winter Infiltration	0
TSS Loading Parameters			
TSS Loading Function			
Buildup/Wash-off Parameters		TSS Availability Parameters	
Target Event Mean Conc. (EMC) mg/L		Availability Constant A	
Exponential Buildup Power		Availability Factor B	
Exponential Washoff Exponent		Availability Exponent C	
		Min. Particle Size Affected by Availability (micron)	

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (cfs)	Runoff Volume (ft³)	Volume Over (ft³)	Cumulative Runoff Volume (%)
0.035	2336.526	7382.217	24.1
0.141	4921.445	4795.315	50.7
0.318	6830.504	2885.875	70.3
0.565	8094.471	1619.357	83.3
0.883	8845.556	868.422	91.1
1.271	9245.395	467.963	95.2
1.730	9451.202	262.206	97.3
2.260	9560.75	152.587	98.4
2.860	9621.955	91.399	99.1
3.531	9657.255	56.096	99.4
4.273	9678.458	34.916	99.6
5.085	9693.023	20.364	99.8
5.968	9701.093	12.297	99.9
6.922	9706.131	7.259	99.9
7.946	9709.353	4.032	100.0

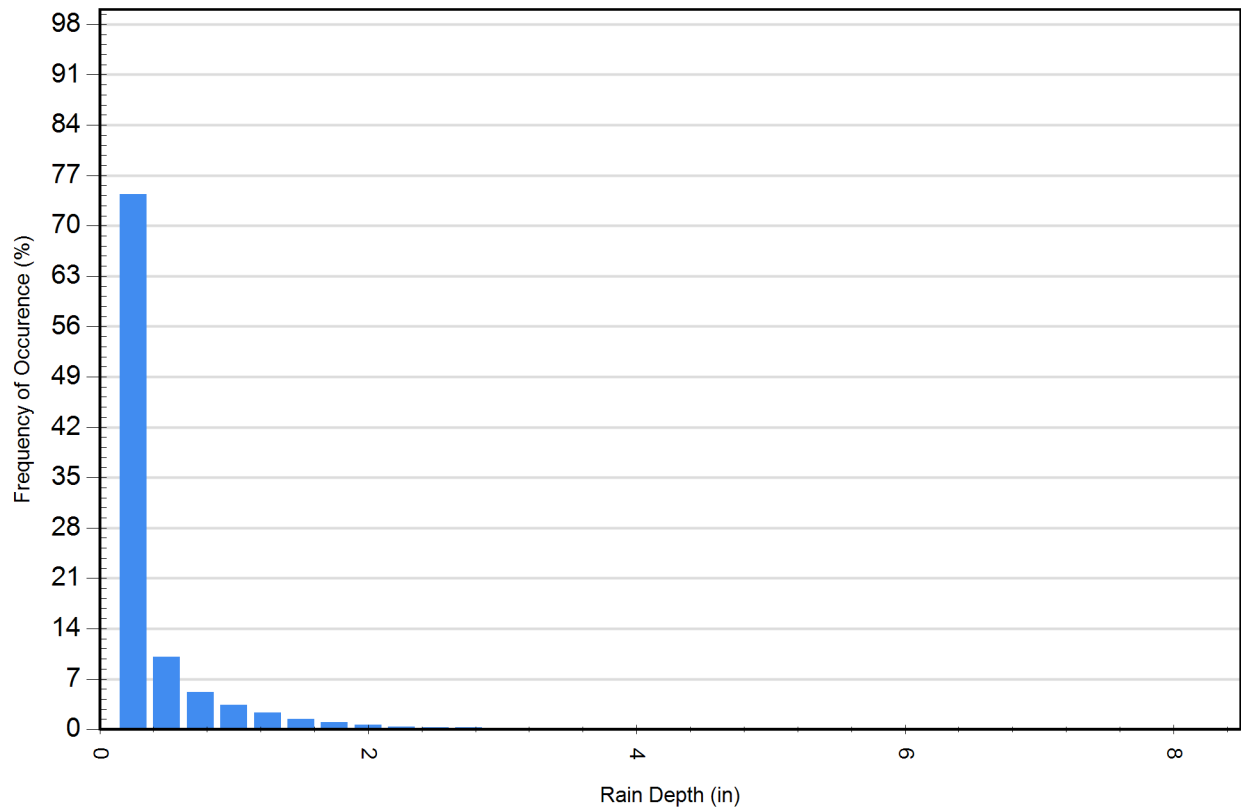
Cumulative Runoff Volume by Runoff Rate

For area: 1.0(ac), imperviousness: 100.0%, rainfall station: BLUE HILL



Rainfall Event Analysis				
Rainfall Depth (in)	No. of Events	Percentage of Total Events (%)	Total Volume (in)	Percentage of Annual Volume (%)
0.25	8022	74.4	470	16.5
0.50	1094	10.1	398	14.0
0.75	557	5.2	345	12.1
1.00	368	3.4	318	11.1
1.25	243	2.3	272	9.5
1.50	148	1.4	202	7.1
1.75	107	1.0	174	6.1
2.00	66	0.6	123	4.3
2.25	42	0.4	89	3.1
2.50	33	0.3	79	2.8
2.75	28	0.3	74	2.6
3.00	21	0.2	60	2.1
3.25	12	0.1	37	1.3
3.50	10	0.1	34	1.2
3.75	5	0.0	18	0.6
4.00	2	0.0	8	0.3
4.25	1	0.0	4	0.1
4.50	4	0.0	18	0.6
4.75	3	0.0	14	0.5
5.00	0	0.0	0	0.0
5.25	1	0.0	5	0.2
5.50	3	0.0	16	0.6
5.75	2	0.0	11	0.4
6.00	5	0.0	29	1.0
6.25	0	0.0	0	0.0
6.50	1	0.0	6	0.2
6.75	0	0.0	0	0.0
7.00	1	0.0	7	0.2
7.25	1	0.0	7	0.2
7.50	0	0.0	0	0.0
7.75	2	0.0	15	0.5
8.00	0	0.0	0	0.0
8.25	0	0.0	0	0.0
8.25	2	0.0	17	0.6

Frequency of Occurrence by Rainfall Depths



For Stormceptor Specifications and Drawings Please Visit:
<http://www.imbriumsystems.com/technical-specifications>