

Data entry date DESIGN DATE | **ENVIRONMENT 21 Sketch Plan, Hydrology Analysis, and Hydraulic Analysis**

Site/Project	SITE/PROJECT
Municipality	CITY
Engineer	NAME OF ENGINEERING FIRM
Owner	NAME OF OWNER
Contractor	NAME OF CONTRACTOR
ENV 21 Affiliate	NAME OF PRECASTER

Trunk Sewer Travel Time	
Longest travel distance, ft	100
Average pipe velocity, ft/sec	4.0
Travel time, minutes	0.4
IDF duration at last inlet, minutes	20.0
IDF duration at first inlet, minutes	5.0

Drainage Area Hydrology / Design Storm IDF Values	
Specified return interval	10 yrs
Specified duration	5.0 minutes
Average intensity	4.8 in/hr
Rainfall depth	0.40 inches

V2B1 Inspection and Pumpout Interval		
Unit pavement pollutant washoff	1000	#/ac/yr
Unit roof pollutant washoff	100	#/ac/yr
Pavement pollutant washoff	600	#/yr
Roof pollutant washoff	48	#/yr
Site pollutant washoff load	648	#/yr
Washoff trapped at curbs and inlets	130	#/yr
Washoff trapped in V2B1	415	#/yr
Design D1 sediment storage depth	0.50	ft
Design D1 sediment storage capacity	6.28	cf
Design D1 sediment storage capacity	660	#
Design D2 sediment storage depth	0.25	ft
Design D2 sediment storage capacity	1.57	cf
Design D2 sediment storage capacity	165	#
Maximum pumpout interval	2.0	yrs+/-
Recommended inspection interval	1.0	yrs+/-
Estimated per cent washoff trapped	88.3	%
V2B1 sump depth	4.5	ft

V2B1 Dimensioning			
Structure #	SC-1		
Model #	2		
MH#	D1	MH#	D2
diam, ft	4	diam, ft	4
Rim	89.50	Rim	89.50
inlet inv	79.20	outlet inv	79.20
floor	74.70	floor	74.70

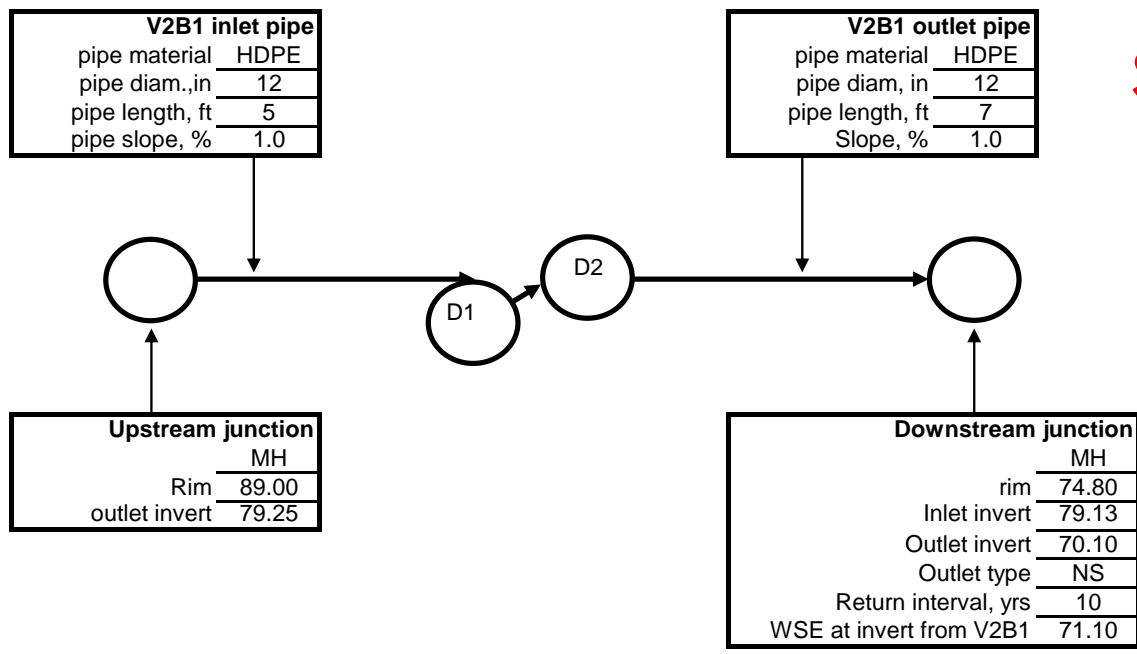
Drainage Area Hydrology for Specified IDF Duration					
Rainfall rate	5.76	cfs	Area, acres	1.2	C
Ponding/bypassing at inlets	0.9	cfs	% paved	50	0.90
Flow entering inlets	4.8	cfs	%roof	40	0.90
Inflow from offsite	0	cfs	% vegetation	10	0.30
Total flow entering inlets	4.84	cfs	CA	1.01	
C = fraction of rainfall depth entering inlets during specified duration					

Water Quality Volume (WQV)					
Drainage area	1.20	acres	Rainfall	1.00	inches
Impervious area	1.08	acres	Runoff	0.86	inches
Impervious area	90	%	WQV	0.09	ac-ft
Water Quality C	0.86		WQV	3746	cf

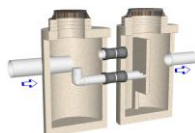
Water Quality Flow Rate (WQFR)					
Average intensity	1.00	in/hr	Runoff coeff.	0.90	
Rainfall duration	NS	minutes	Impervious area	1.08	acres
Annual frequency	NS	events/yr	WQFR	0.97	cfs



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SKETCH PLAN



Environment 21, LLC
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Technical Report

Project: SITE/PROJECT
 Municipality: CITY
 Engineer: NAME OF ENGINEERING FIRM
 Owner: NAME OF OWNER
 Contractor: NAME OF CONTRACTOR
 Environment 21 Affiliate: LINDSAY CONCRETE

Date: DESIGN DATE
 Structure #: SC-1

ENV 21 Product: V2B1®
 Model #: 2

Swirl chamber diameter 4 ft
 Floatable trap diameter 4 ft
 Swirl chamber surface area 12.6 sf

Drainage Area

Drainage area 1.2000 acres
 Paved area 50 %
 Roof area 40 %
 Vegetated area 10 %

Water Quality Volume

Rainfall 0.00 inches
 Site runoff coefficient NS
 Runoff depth 0.90 inches
 Drainage area Quality Flow Ra acres

Design Storm Rainfall IDF Values

Specified return interval 10 years
 Specified duration 5 minutes
 Average intensity 4.8 in/hr
 Rainfall depth 0.40 inches

Water Quality Flow Rate

Runoff coefficient 0.00
 Average Intensity 0.00 0.00
 Impervious area 0.00 acres
 Water Quality Flow Rate 0.00 cfs

Drainage Area Hydrology for Specified IDF Duration

Rainfall rate 5.8 cfs
 Ponding/bypassing at inlets 0.9 cfs
 Flow entering inlets 4.8 cfs
 Inflow from offsite 0 cfs
 Total flow entering inlets 4.8 cfs
 V2B1 inlet velocity 6.16 fps

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Estimated Storm Sewer Flow for Surcharge at Drain Inlets

Outfall pipe flow with inlets surcharged (estimated) 0.9 cfs
 Outfall pipe velocity with inlets surcharged (estimated) 0.1 fps



Sediment Pumpout Interval

Hydraulic model Online treatment without internal bypass

Estimated Composition for Pollutant Washoff Entering V2B1

Annual unit pavement pollutant washoff	1000	#/ac/yr
Annual unit roof pollutant washoff	100	#/ac/yr
TSS as silt + bouyant organics	30	wt%
TSS as fine sand	40	wt%
TSS as medium sand	30	wt%
Pavement pollutant washoff	600	#/yr
Roof pollutant washoff	48	#/yr
Site pollutant washoff load	648	#/yr

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Storage Capacity for Washoff of Oil-Floatables

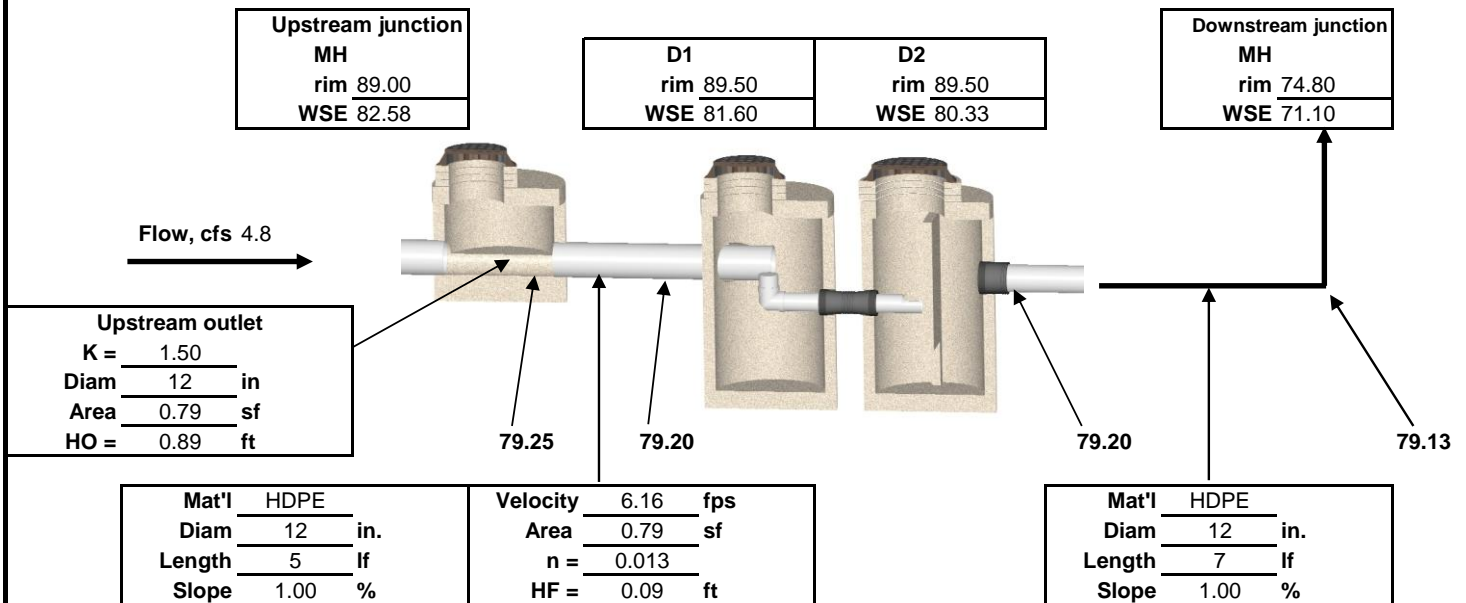
Swirl chamber capacity	18.8	+/- gal	Swirl chamber floatables depth	0.20	ft
Floatables chamber capacity	7.0	+/- gal	Floatables chamber floatables depth	0.15	ft

Estimated V2B1 Pumpout Interval

Washoff trapped at curbs and inlets	130	#/yr	V2B1 sump depth	4.5	ft
Washoff trapped in V2B1	415	#/yr	Design sediment storage capacity	825	#
Estimated per cent washoff trapped	88.3	%	Design sediment storage capacity	7.9	cf
			Design sediment storage depth	0.5	ft
			Maximum pumpout interval	2.0	yrs+/-
			Recommended inspection interval	1.0	yrs+/-

Design Storm Backwater Analysis

- (1) Downstream Water Elevation Estimated by ENV 21 or Provided by Site Engineer
- (2) Outlet pipe hydraulics based on culvert hydraulics



Environment 21, LLC

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Location: CITY

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ENV 21 Affiliate: LINDSAY CONCRETE

Data Entry Date: DESIGN DATE **Dwg:** 1 of 2



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 Global Stormwater Solutions

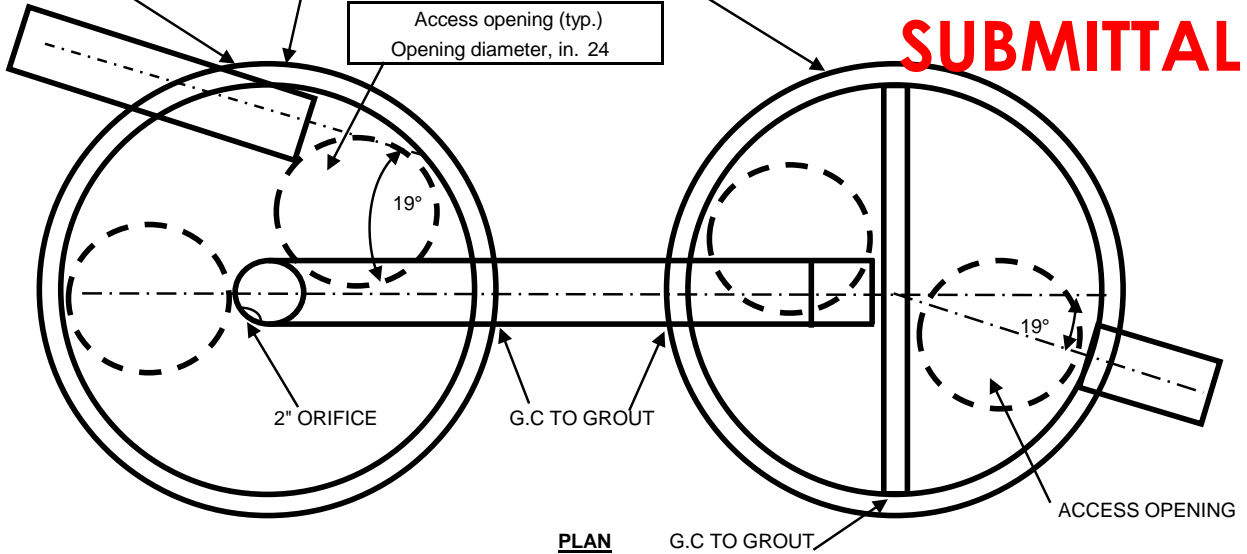
Product Name: V2B1®

STRUCTURE NO.	SC-1	
V2B1 MODEL NO.	2	
	D1	D2
MANHOLE DIAM., FT.	4	4
ACCESS OPENING DIAM., IN.	24	24

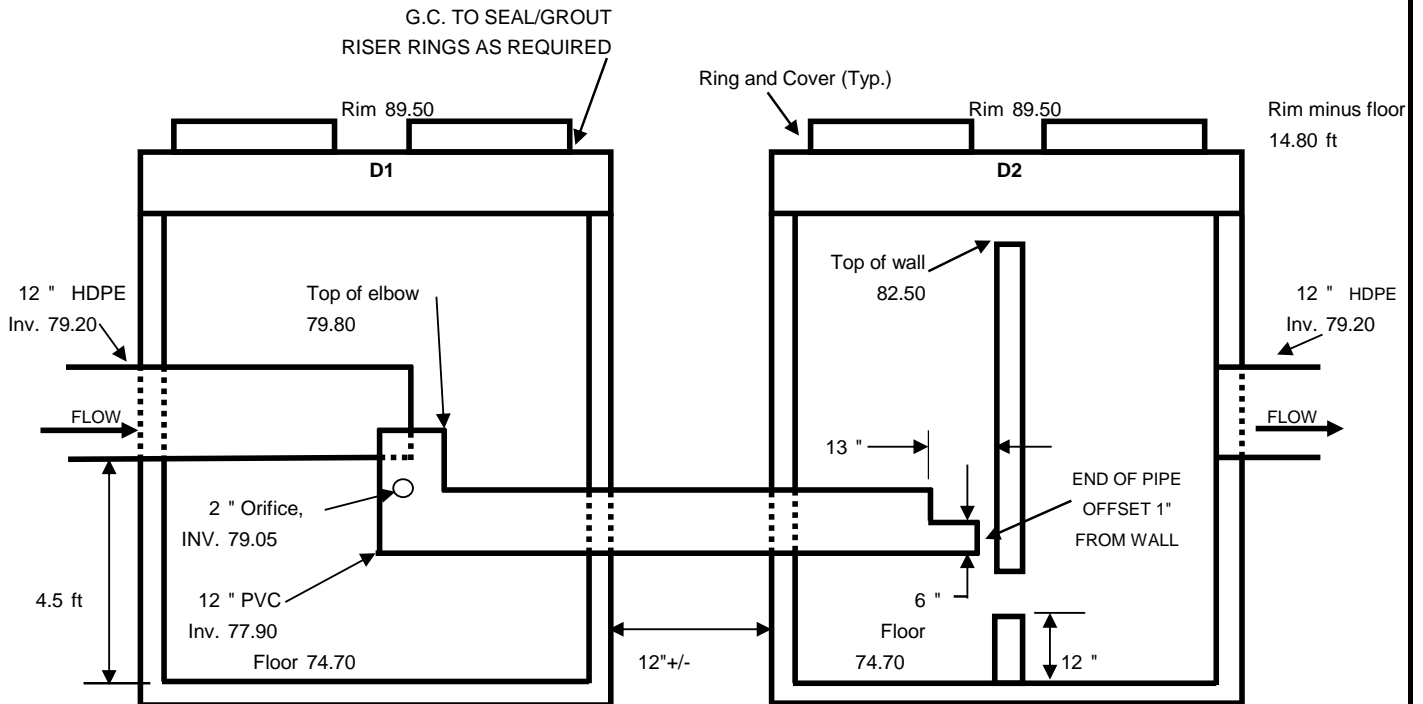
DESIGN STORM HYDROLOGY			
Return Interval, yrs	10	Area, acres	1.20
Average Intensity, in/hr	4.8	% paved	50
Rainfall rate, cfs	5.8	%roof	40
Flow to V2B1, cfs	4.84	%vegetation	10

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0.5" MAX. FROM PIPE O.D.
 TO INSIDE WALL



PLAN



SECTION

NOTES: THE INFORMATION IN THIS DRAWING IS PROPRIETARY. CONTACTOR SUBMITTAL MUST INCLUDE ENVIRONMENT 21 TECHNICAL ANALYSIS OF SITE HYDROLOGY AND STORM SEWER SYSTEM HYDRAULICS PROPRIETARY INFORMATION: ALL RIGHTS TO ENVIRONMENT 21, LLC.

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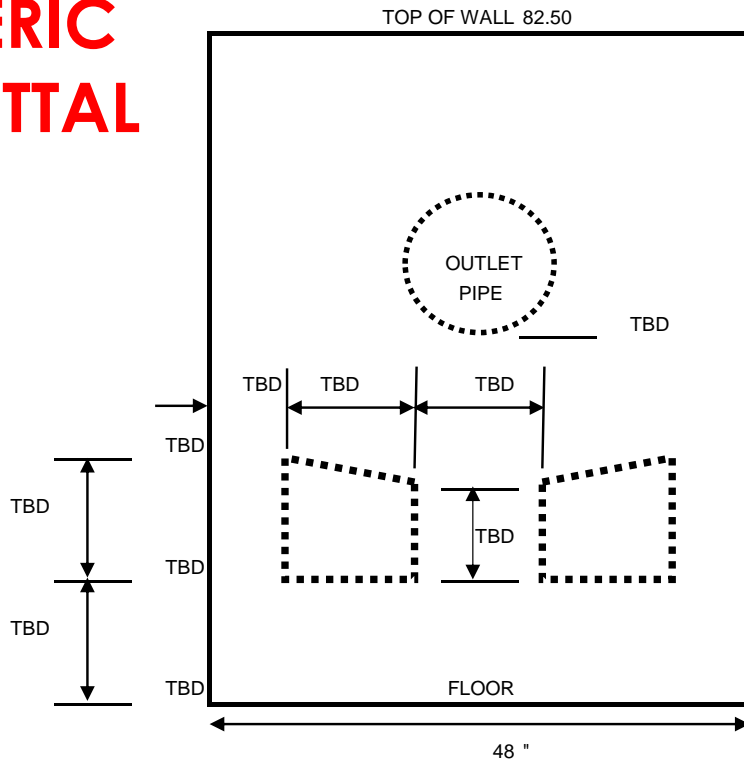
environment²¹
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	D1	D2
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ACCESS OPENING DIAM., IN.	24	24

DESIGN STORM HYDROLOGY			
Return Interval, yrs	10	Area, acres	1.2000
Average Intensity, in/hr	4.8	% paved	50
Rainfall rate, cfs	5.8	%roof	40
Flow to V2B1, cfs	4.84	%vegetation	10

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FLOW CONTROL WALL SECTION

NOTES: THE INFORMATION IN THIS DRAWING IS PROPRIETARY. CONTACTOR SUBMITTAL MUST INCLUDE ENVIRONMENT 21 TECHNICAL ANALYSIS OF SITE HYDROLOGY AND STORM SEWER SYSTEM HYDRAULICS PROPRIETARY INFORMATION: ALL RIGHTS TO ENVIRONMENT 21, LLC.

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Product Name: V2B1®

CALCULATED REMOVAL EFFICIENCIES BASED ON ANNUAL RAINFALL DATA

V2B1 CHAMBER DIMENSIONING			
Structure # SC-1			
Model # 2			
MH# D1		MH# D2	
Diameter, ft	4	Diam, ft	4
Rim	89.50	Rim	89.50
Inlet inv.	79.20	Outlet inv.	79.20
floor	74.70	floor	74.70

Area treated by V2B1		
Area, acres	1.200	C
% paved	50	0.90
% roof	40	0.90
% vegetation	10	0.30
CA	1.01	

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WQFR = 0.97 cfs

30 Min. Rainfall Depth (in.)	Rainfall intensity (in/hr)	Water flow rate (cfs)	Percentage of Annual Volume (%)	Percentage of Total Events (%)	Calculated removal efficiency at given flow rate of the 90 micron particle	Calculated critical settling velocity (ft/sec)	SOR (gpm/ft²)
0.25	0.50	0.50	17.27	70.75	100 %	0.02	6
0.50	1.00	1.01	17.06	12.80	72.75 %	0.04	12
0.75	1.50	1.51	13.35	5.97	59.40 %	0.06	17
1.00	2.00	2.02	11.96	3.74	51.44 %	0.09	23
1.25	2.50	2.52	10.61	2.61	46.01 %	0.11	29
1.50	3.00	3.02	7.16	1.43	42.00 %	0.13	35
1.75	3.50	3.53	5.05	0.86	38.88 %	0.15	40
2.00	4.00	4.03	3.62	0.53	36.37 %	0.17	46
2.25	4.50	4.54	2.61	0.34	34.29 %	0.19	52
2.50	5.00	5.04	2.19	0.26	32.53 %	0.21	58
2.75	5.50	5.54	2.11	0.22	31.02 %	0.24	64
3.00	6.00	6.05	1.10	0.10	29.70 %	0.26	69
3.25	6.50	6.55	0.80	0.07	28.53 %	0.28	75
3.50	7.00	7.06	1.18	0.09	27.50 %	0.30	81
3.75	7.50	7.56	0.76	0.06	26.56 %	0.32	87
4.00	8.00	8.06	0.34	0.02	25.72 %	0.34	92
4.25	8.50	8.57	0.34	0.02	24.95 %	0.36	98
4.50	9.00	9.07	0.38	0.02	24.25 %	0.39	104
4.75	9.50	9.58	0.59	0.03	23.60 %	0.41	110
5.00	10.00	10.08	0.00	0.00	23.00 %	0.43	115
5.25	10.50	10.58	0.21	0.01	22.45 %	0.45	121
5.50	11.00	11.09	0.21	0.01	21.93 %	0.47	127
5.75	11.50	11.59	0.00	0.00	21.45 %	0.49	133
6.00	12.00	12.10	0.25	0.01	21.00 %	0.51	139
6.25	12.50	12.60	0.00	0.00	20.58 %	0.54	144
6.50	13.00	13.10	0.55	0.02	20.18 %	0.56	150
6.75	13.50	13.61	0.00	0.00	19.80 %	0.58	156
7.00	14.00	14.11	0.00	0.00	19.44 %	0.60	162
7.25	14.50	14.62	0.29	0.01	19.10 %	0.62	167
7.50	15.00	15.12	0.00	0.00	18.78 %	0.64	173.2
7.75	15.50	15.62	0.00	0.00	18.48 %	0.66	179
8.00	16.00	16.13	0.00	0.00	18.19 %	0.69	185
8.25	16.50	16.63	0.00	0.00	17.91 %	0.71	191
8.35	16.70	16.83	0.00	0.00	17.80 %	0.72	193

Based on a particle size of 90 microns, and the percentage of total storm events, the average annual estimated removal efficiency = **88%**

Notes:

1. Based on DETPOND Detention Pond Treatment Model by Robert Pitt.
2. Critical settling velocity calculation based on the application of Stokes Law using the water flow rate, a partial specific gravity of 2.6 and a chamber surface area of 39.2 square feet.
3. Rainfall Depth, Percentage of Total Events, and Percentage of Annual Volume data was obtained at the Local Weather Station from Date to Date.