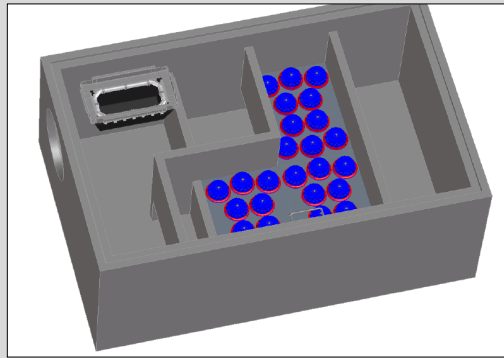
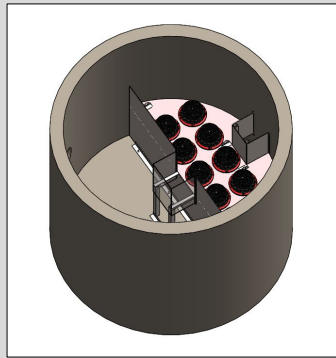


STORMSAFE CARTRIDGE VAULTS

Fabco Filter Cartridges can also be utilized for “Centralized” treatment options in a “StormSafe” configuration.

Relative to competitive vaults, Fabco StormSafe Vaults provide a highly effective treatment solution within a small footprint.

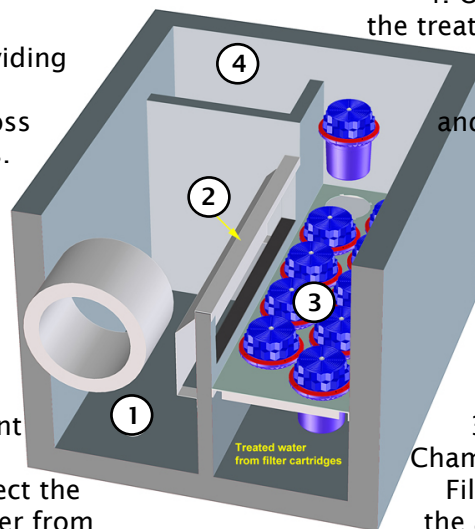
The StormSafe Cartridge Vault is a good choice for projects with a treatment flow rate of 3 cubic feet/sec or less.



STORMSAFE CARTRIDGE VAULTS are designed with multiple chambers

1. Pretreatment – untreated runoff enters here, providing settlement and separation of gross solids and debris.

2. The Pretreatment Chamber (or bay) has a weir to protect the Treatment Chamber from floatable pollutants.



4. Outlet Chamber – the treated runoff drains from under the cartridge deck and exits the vault.

3. The Treatment Chamber contains the Filter cartridges for the actual treatment.

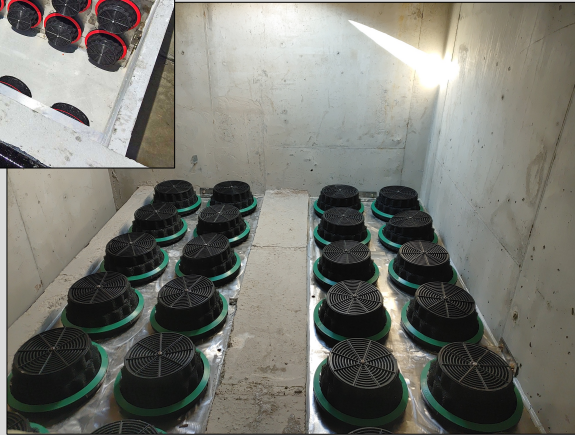
Centralized Cartridge Vault



StormSafe Cartridge Vault are configured with either a horizontal or vertical "Cartridge Deck".

Any Fabco Filter Cartridge can be deployed in any vault:

- TSS
- Nutrients
- Hydrocarbons
- Heavy Metals



Centralized Cartridge Vault Examples



Warren Cohn CPESC, CPSWQ Stormwater Product Specialist

Fabco-industries.com 484-689-1113 wcohn@fabco-industries.com



STORMSAFE PWD
WATER QUALITY UNIT



PWD Proprietary Media Compliance Design Worksheet

DESIGNER COMPANY / NAME: _____

PROJECT NAME: _____

PROJECT LOCATION: _____ DATE: _____

The StormSafe is a sub-surface Fabco Stormwater vault system that utilizes Fabco's proprietary filter media cartridges.

The external structure for the StormSafe is a Concrete precast product that can have a round or rectangular shape depending on many things including: treatment flow rate, required bypass flow rate, pipe materials and elevations to name just a few. Each of these parameters affect the overall form and function of the filter.

Fabco typically works between the customer and a commercial concrete company located near the construction site to design and supply the vault. This allows us to optimize the design for the application while at the same time managing the costs, required modifications (if any), production time frame and delivery of the vault.

To begin the design process Fabco's engineering group requires detailed information related to the construction site where the StormSafe will be installed and the functional stormwater treatment expected from the filter.

At a minimum the following information is required:

1. Final Rim Elevation = _____
2. Invert Elevations of pipes (24" offset between In/Out inverts is preferred for StormSafe Units)
 - a. Invert In = _____
 - b. Invert Out = _____
3. Pipe: Size = _____ and Material = _____
4. Orientation of pipes into the vault (plan view)
5. Sump depth of the unit, if required. _____
6. Targeted Pollutant(s) : _____
7. Treatment flow rate required = _____ cfs ****Include any required storm event specification from the design engineer****
 - a. Number of SCC Cartridges Required.....Treatment Flow Rate / 0.11 = _____ Cartridges
****Round up to nearest whole number****
8. Required bypass flow = _____
9. On-line or Off-line bypass required: _____
10. Site Location and Site Plan (if available)
11. Expected Lead Time _____
12. Any Competitor unit spec'd on the plans: _____

Post-Treatment Volume Management:

If infiltration or detention is needed after runoff has gone through the Fabco StormSafe PWD unit, the Ferguson R-Tank system can be utilized. The R-Tank is a modular subsurface storage system with 95% voids and is H-20 load rated. For assistance with sizing and unit selection contact Ferguson John Hilbert



If you have any questions regarding the Fabco StormSafe PWD or R-Tank System:

Contact John Hilbert / Urban Green Infrastructure BMP Specialist / Ferguson

C: 610-656-5640 / E: John.Hilbert@ferguson.com

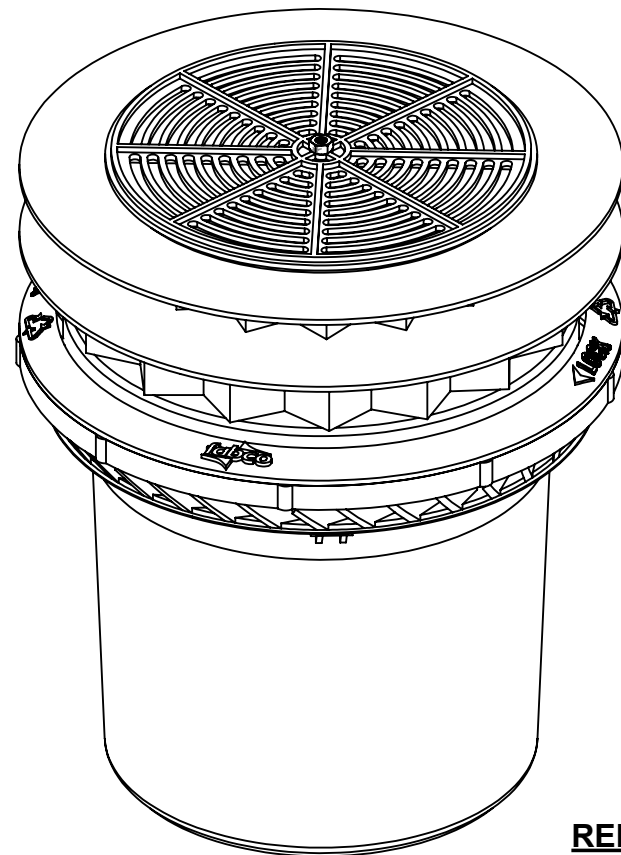
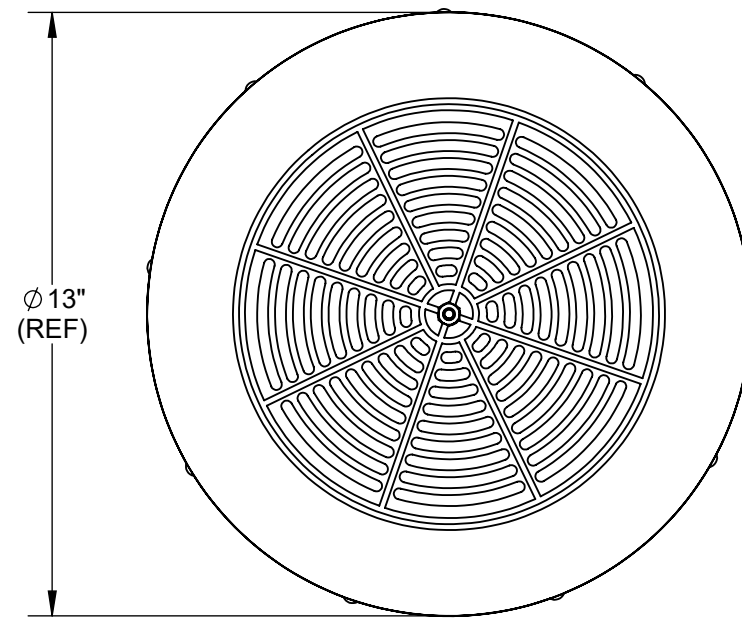


NOTES:

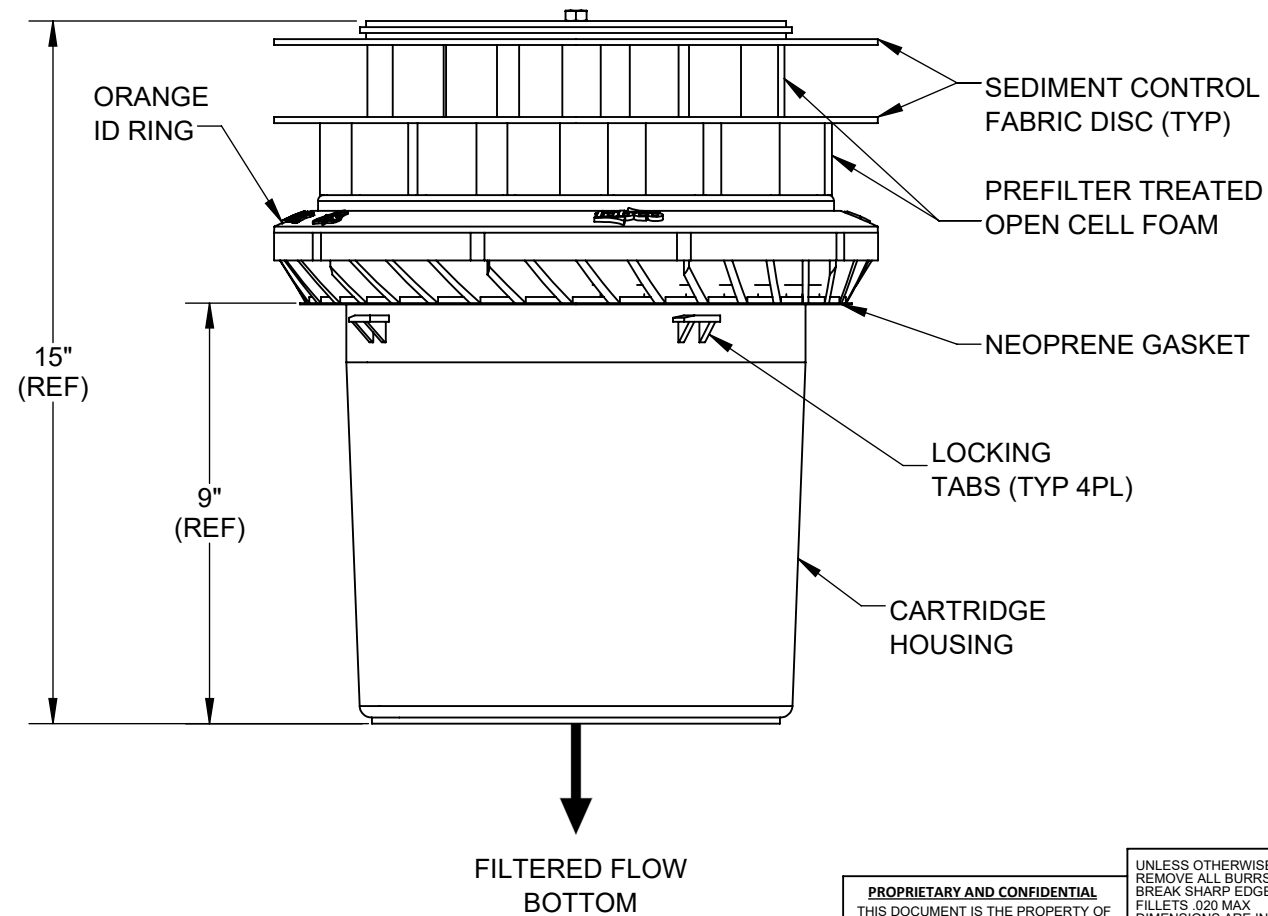
1. WEIGHT, DRY: 10 LB (MAX)
2. MATERIAL:
 - A) HOUSING: POLYETHYLENE POLYPROPYLENE COPOLYMER
 - B) EFFLUENT TREATMENT MEDIA: PROPRIETARY NON-TOXIC TREATMENT PRODUCTS.
 - C) SUPPORT HARDWARE: CRES 300 SERIES OR EQUAL
3. FLOW RATE (TYP): 50 GPM (0.11 CFS)
4. STORMWATER TREATMENT: MEETS 80% TSS REDUCTION REQUIREMENTS FOR PHILADELPHIA WATER DEPARTMENT (PWD)
5. RING IDENTIFICATION COLOR: ORANGE
6. INSTALLATION: INSERT INTO CARTRIDGE OPENING AND ROTATE CLOCKWISE 30-DEGREES TO LOCK CARTRIDGE IN PLACE
7. FITS ALL FABCO STORMBASIN AND STORMPOD PRODUCTS
8. DISPOSE OF CARTRIDGE IN ACCORDANCE WITH LOCAL REGULATIONS
9. ADDITIONAL CARTRIDGE DESIGNS ARE AVAILABLE TO TARGET SPECIFIC POLLUTANTS SEE TABLE 1 FOR DETAILS

TABLE 1

ORDER NUMBER	DESCRIPTION	COLOR CODE	FLOW RATE
9718-1	STANDARD	RED	115 GPM (0.26 CFS)
9718-2	BACTERIA	YELLOW	115 GPM (0.26 CFS)
9718-3	HYDROCARBONS	BLUE	115 GPM (0.26 CFS)
9718-4	HEAVY METALS	GREY	60 GPM (0.13 CFS)
9718-5	STANDARD (SHORT)	MINT	115 GPM (0.26 CFS)
9718-6	NUTRIENTS	GREEN	100 GPM (0.22 CFS)
9718-7	HIGH FLOW	RED (MARKED)	260 GPM (0.58 CFS)
9718-25	SEDIMENT CONTROL (NJCAT-78)	BROWN	50 GPM (0.11 CFS)
9718-26	SEDIMENT CONTROL (PWD-80)	ORANGE	50 GPM (0.11 CFS)



REFERENCE VIEW



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 REMOVE ALL BURRS
 BREAK SHARP EDGES .002 - .020
 FILLETS .020 MAX
 DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES

TOLERANCES:
 DEC .00 ± .01
 DEC .000 ± .005
 FRACT ± 1/16
 ANGLE ± 2°

APPROVAL	DATE
DWN H.A.	5/13/2021
CHKR R.W.	5/13/2021
ENGR J.P.	5/13/2021
UPD	

FABCO INDUSTRIES, INC.
 24 CENTRAL DRIVE
 FARMINGDALE, NY 11735
 WWW.FABCO-INDUSTRIES.COM

fabco
 industries inc

TITLE: **SEDIMENT CONTROL CARTRIDGE (PWD-80)**

SIZE DWG. NO. **B 9718-26-000** REV **A**

SCALE: NONE SHEET 1 OF 1



Inlet Filter Performance Testing of
Fabco Industries'
"High Efficiency" Sediment Control
Cartridge

TRI-MAPP Report

Issued April 2021

Final Report

Submitted to:
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Date Submitted:
April 30, 2021

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Inlet Filter Performance Testing of Fabco Industries' "High Efficiency" Sediment Control Cartridge

TRI-MAPP Report

Issued April 2021

April 30, 2021

Fabco Industries
24 Central Drive
Farmingdale, NY 11735

Attn: Hilme Athar
hathar@fabco-industries.com

REPORT: Inlet Filter Performance Testing of "High Efficiency" Sediment Control Cartridge

This testing program included three parts:

The hydraulic performance testing (Part 1) developed the relationship between flow rate and water depth for the sediment control cartridge (SCC) for a range of clean water flows.

The sediment removal efficiency testing (Part 2), performed at a prescribed maximum treatment flow rate (MTFR) of 50 gallons per minute and a prescribed sediment concentration of 200 mg/L, used bottle "grab" samples to demonstrate a significant sediment removal efficiency can be expected for a limited flow event at the MTFR. In this scenario, the sediment removal efficiency exceeded 91%.

The mass loading rate testing (Part 3) involved extended testing at the 50 gpm sediment-laden flow rate in order to characterize the longer-term performance of the SCC. The overall removal efficiency for the extended test was more than 80%.

C. Joel Sprague, P.E.
Technical Director
TRI-South Carolina

James E. (Jay) Sprague, CPESC
Laboratory Director
TRI-South Carolina

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“High Efficiency” Sediment Control Cartridge (SCC) Inlet Filter Performance Testing

Overview

This report presents the results of hydraulic performance and sediment removal efficiency testing executed on Sediment Control Cartridges manufactured by Fabco Industries. The testing was performed at TRI Environmental’s Roads to Rivers Research Institute (3RI) laboratory in Greenville, South Carolina. The testing protocol used was outlined by Fabco Industries and is derived from the New Jersey Department of Environmental Protection’s “Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device”. The testing used commonly manufactured components, manufacturer’s published installation details, and the maximum treatment flow rate (MTFR) as directed by the client (Fabco). Hydraulic performance was based on flow rate monitoring and water depth measurements within the test chamber. Sediment removal efficiency was based on both direct measurements (collecting, drying, and weighing input, captured, and passing sediments) and indirect measurements (suspended sediment concentration determination of influent and effluent bottle samples).

The SCC System

Fabco Industries manufactures and sells a cartridge based inlet filtration system designed to capture and retain pollutants such as sediment, trash, vegetation, nutrients, coliform bacteria, oil/grease and dissolved metals entering common storm drain inlets such as those you see in parking lots or alongside roadways. However, in this program, only sediment removal was evaluated. The cartridges, also called inlet filtration media inserts, provide two stages of filtration:

Stage 1: The top layers of the cartridge, consisting of a coarse open cell foam, work with the open volume of the surrounding collection basin to keep particulate in the basin and out of the cartridge. This is designed to maintain cartridge flow rates, extend the life of the cartridge, and facilitate easy cleanout of sediments and debris during maintenance activities.

Stage 2: Once the pretreated water enters the cartridge body it contacts one or more proprietary filter media products. Treated water exits the bottom of the cartridge and is released into the storm water system.

Filter cartridges are available in various configurations that target specific pollutants. The modular cartridge design allows quick and easy replacement while containing the spent material for safe transportation and disposal. The filter cartridge comes fully assembled and snaps into place.

Testing Objectives and General Outline of Testing Protocol

The principal objective of this testing was to quantify and report the sediment removal efficiency of the SCC filter. A secondary objective was to quantify and report the hydraulic capacity (head vs. flow) and mass loading capacity (cumulative sediment retention and maximum head) of the SCC.

Testing was conducted in accordance with the Fabco prescribed procedure. The “StormBasin welded aluminum housing” and the Sediment Control Cartridges (SCC) used in this test program were provided by Fabco. The SCC target removal rate was a minimum removal of 80% of Total Suspended Solids (TSS). TSS was measured in accordance with ASTM D3977 *Standard Test Method for Determining Sediment Concentration in Water Samples*. The test sediment utilized for this procedure (provided by Fabco) consisted of uniformly distributed inorganic materials compliant with NJDEP composition and Particle Size Distribution (PSD) criteria. The maximum allowable head was prescribed as 30 inches.

Test Setup

The test setup includes a test basin – the “StormBasin welded aluminium housing” – above and discharging to a combined weir box / sump box, a recirculating pumping/piping system, and a sediment injection system. Figure 1 shows the test setup used in the testing reported herein. Additional setup pictures are included in Appendix A.

The StormBasin welded aluminium housing test basin was provided by Fabco and measured 30” x 30” x 36” tall. The floor of the basin had a circular cut-out to accommodate the SCC and to enable a highly watertight installation. The test basin discharged (through the SCC) into a calibrated weir box with a water depth data logger for continuous monitoring and recording of flow rate. The weir box measured 4 ft wide x 8 ft long and incorporated a 30° V-notch weir. The weir box discharged to a sump that ensured a stable head on the recirculating flow system while also facilitating sediment deposition prior to recirculation. The sump was outfitted with a fabric baffle to assure that sediments contained in the effluent draining from the weir box settle before sump waters are recirculated. The sump box measured 4 ft wide x 8 ft long.

The 2400 gallon potable water reservoir system was comprised of eight 300 gallon “totes” connected to the pump/pipe recirculation system through a 2 inch PVC header system. The pump/pipe recirculation system was comprised of 4 inch PVC pump inlet piping and 2 inch PVC pump outlet piping and a variable speed 3 hp pump. Prior to discharging into the test basin, the 2 inch piping transitioned into 4 inch piping to facilitate slower flows that allowed for more sediment mixing time and easier bottle sampling. The recirculation system was able to maintain constant flows through the test basin and sump system at a wide range of flow rates.

V-notch weir readings were verified using an in-line flow meter: An EMF5000 – DN50 electromagnetic flow meter. Verification readings were within +/- 10% as shown in Table 1.

The sediment injection was accomplished using vibrating screw auger system. The auger system was able to maintain a constant feed rate into the influent flows enabling an accurate infiltrate concentration at the prescribed maximum treatment flow rate (MTFR).



Figure 1. Test Apparatus Setup

Testing Parameters

The first step in the testing was to characterize the sediment control cartridge (SCC) hydraulics by establishing the flow vs. head (within the test basin) for clear water flows. Equilibrium flow rates were established for depths up to 30 inches. Figure 2 shows pictures of monitoring the depth of water within the test basin as the flow rate is increased.

Subsequently, the sediment retention testing was done at the prescribed maximum treatment flow rate (MTFR). The MTFR for the SCC tested was given as 50 gallons per minute. The prescribed sediment concentration of 200 mg/L was obtained by augering sediments into the upstream flow set at the MTFR. The sediments used for this testing were provided by the client and the gradation provided by the client is included in Appendix B (MIX3). The testing protocol prescribed bottle “grab” sampling of both the influent and effluent at 30, 60, 90, 120, and 150 seconds after sediment initiation. Suspended Sediment Concentration (SSC) testing to quantify TSS was done on all bottle samples and used for filtration performance characterization. The total suspended solids removal efficiency was determined from the ratio of the influent and effluent bottle sample results. Figure 3 shows the augering system and typical discharge from the SCC.

Finally, the 50 gpm sediment-laden flow was continued until the head reached 30 inches, the maximum design driving head. At this point the testing was stopped and the total sediment retained was determined through a mass balance approach of collecting, drying, and weighing all sediment input into the system, retained by the SCC, and passing the SCC. This total sediment retained prior to an increase of head above maximum design driving head is the Sediment Mass Loading Capacity (SMLC) as determined from the mass balance determinations. Figure 4 shows the monitoring of water depth over time and the collection of sediments from the weir box for drying and weighing.



Figure 2. SCC Hydraulics – Measuring Head (Depth) at Different Flow Rates



Figure 3. SCC Removal Efficiency – Sediment Augered into Flow; Influent & Effluent Sampled



Figure 4. SCC Mass Loading Capacity – Monitoring Head and Collecting Passing Sediments

Testing Procedures

Testing was done in accordance with the procedure outlined by the client. The pre-test, component preparation, test setup, procedural, and breakdown steps are detailed in Tables 1a, 1b, 1c, and 1d. These tables specifically apply to sediment removal and mass loading tests. Hydraulic testing just involved clear water, so sediment-related steps are not applicable.

Table 1a. Pre-Test Determinations (example values shown)

Pre-1	Select the target influent suspended sediment concentration (SSC).	200	mg/L
Pre-2	Select the desired test flow rate (MTFR).	50	gpm
Pre-3	Calculate the sediment feed rate needed to achieve the target SSC.	38	g/min
Pre-4	Determine sampling interval. (5 influent and 5 effluent in first 3 minutes)	30	seconds

Table 1b. Component Preparation Steps (example values shown)

1	Weigh test sediment to be added to auger. Place in a clean bucket.	18 - 20	lbs
2	Weigh clean, dry 50µm sock	0.4	lbs
3	Weigh clean, dry Sediment Control Cartridge	5	lbs
4	Pre-position sample bottles for influent and effluent sampling (5 each)	10	bottles

Table 1c. Test Setup Steps

5	Install the Sediment Control Cartridge (SCC) Inlet Filter Testing unit into the test basin.
6	Attach 50µm sock to sump outlet.
7	Pour the preweighed test sediment into the vibrating auger feeder.
8	Pump or gravity feed clear water into the weir box and sump box until the water level is at the 0-point on the V-notch weir and 24 inches deep in the sump box.
9	Set zero depth on the weir box water level data logger and initiate data collection.

Table 1d. Test Procedure and Breakdown Steps

10	Close all valves to the water supply system and open other necessary valves so that only recirculation flows are used.
11	Set RPMs on the variable speed pump to the pre-calibrated speed for the desired test flow rate.
12	Turn on the pump and allow the flow to proceed into and through the test basin and SCC until a steady flow (constant depth on data logger) is maintained through the weir.
13	While the flow is stabilizing, calibrate the sediment auger to confirm the sediment feed rate (while catching and returning all sediments back to the auger). Adjust auger speed as needed.
14	Once stable flow and sediment feed rates are confirmed, begin introducing sediment into the influent pipe and start the test timer.
15	At 30, 60, 90, 120, and 150 seconds take a 1L bottle sample of both the influent and effluent.
16	After bottle sampling, monitor the depth of water over the SCC and record the time it reaches 30 inches.
17	Turn off the sediment auger and pump and allow the system to come to a complete stop.
18	Gradually disassemble setup and drain the weir box and sump box (through a 50µm sock)
19	Collect all sediments from all parts of the system and oven dry along with the SCC.
20	Vacuum / Weigh sediment remaining in auger feeder.

Testing Results

The first step in the testing was to characterize the cartridge hydraulics by establishing the flow vs. head (within the test basin) for clear water flows. Equilibrium flow rates were established for depths up to 30 inches. The test results are shown in Table 1 and presented graphically in Figure 5.

Table 1. SCC Hydraulic Testing Data

Pump	Electromagnetic Flow Meter	Weir Box		Average Q	Head on Cartridge
RPM	gpm	H (ft)	Q (gpm)	gpm	in.
1000	13.71	0.29	13.60	13.66	4.00
1250	35.96	0.42	35.35	35.66	14.70
1400	45.29	0.47	45.27	45.28	20.80
1500	51.27	0.49	50.22	50.74	25.00
1700	62.80	0.53	62.10	62.45	33.20

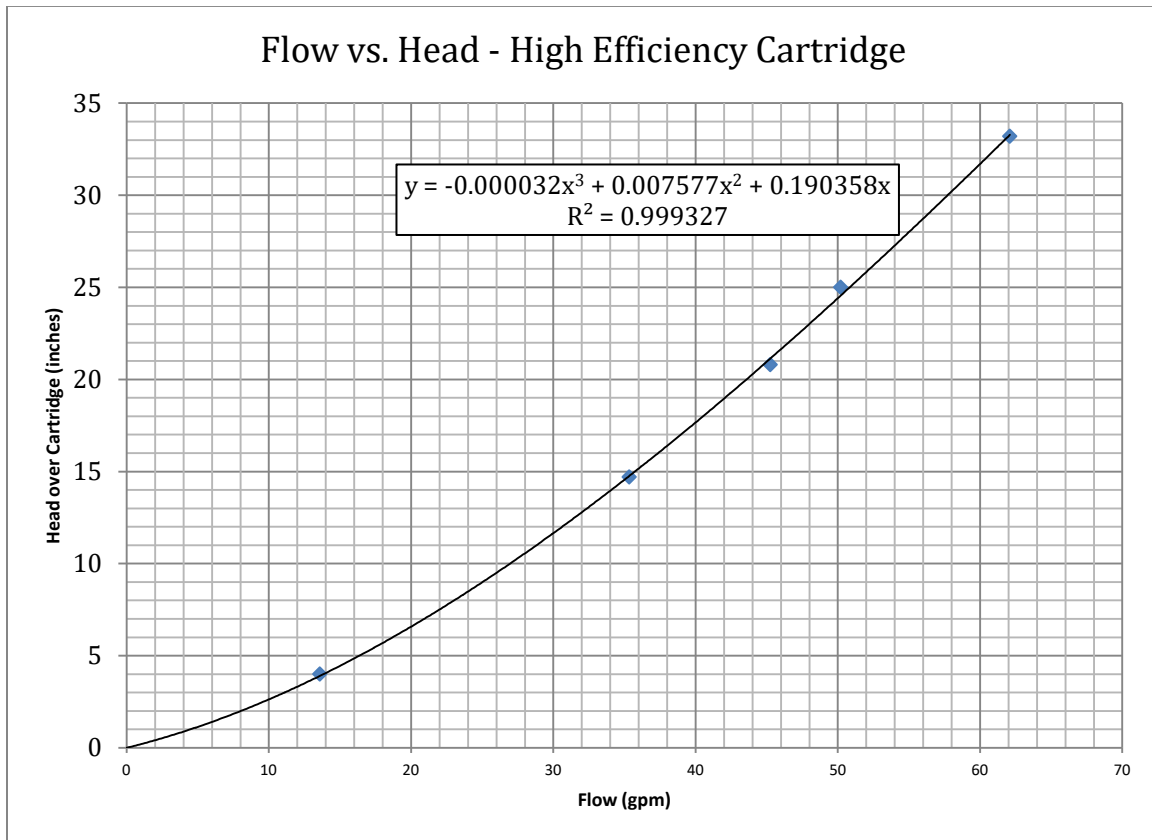


Figure 5. SCC Hydraulics

Subsequently, the sediment retention testing was done at the prescribed maximum treatment flow rate (MTFR). The MTFR for the SCC tested was prescribed by the client as 50 gallons per minute. The prescribed sediment concentration of 200 mg/L was obtained by augering sediments into the upstream flow set at the MTFR. The sediments used for this testing were provided by the client and the gradation report provided by the client is included in the appendix. The testing protocol prescribed bottle “grab” sampling of both the influent and effluent at 30, 60, 90, 120, and 150 seconds after sediment initiation. Suspended Sediment Concentration (SSC) testing to quantify TSS was done on all bottle samples and used for filtration performance characterization. The total suspended solids removal efficiency was determined from the ratio of the influent and effluent bottle sample results as shown in Table 2.

Table 2. SCC Sediment Removal Efficiency

Sample Time hrs:min:sec (Start time = 13:33:00)	Influent Concentration @ MTFR = 50 gpm			Effluent Concentration	Removal Efficiency (%)
	30 sec. dry feed (g)	Dry Feed Calc. (mg/L)	Bottle Sample (mg/L)	Bottle Sample (mg/L)	
13:33:30	19.24	204.5	206.2	5.6	
13:34:00	19.30	205.2	197.1	13.6	
13:34:30	19.35	205.7	200.9	18.8	
13:35:00	19.55	207.8	215.7	26.6	
13:35:30	19.69	209.3	198.0	24.3	
Average		206.5	203.6	17.8	

Finally, the 50 gpm sediment-laden flow was continued until the head reached 30 inches, the maximum design driving head. At this point the testing was stopped and the total sediment retained was determined through a mass balance approach of collecting, drying, and weighing all sediment input into the system, retained by the SCC, and passing the SCC. This total sediment retained prior to an increase of head above maximum design driving head is the Sediment Mass Loading Capacity (SMLC) as determined from the mass balance determinations as shown in Table 3.

Table 3. SCC Sediment Mass Loading Capacity

Test Time to Achieve Max. Driving Head (minutes)	Sediment in Influent @ MTFR = 50 gpm			Sediment Retained	Removal Efficiency (%)
	Avg Influent Concentration (mg/L)	Total In- flow (gal)	Total In (lbs)	Total Retained (lbs)	
5.4	200.9	270	0.451	0.367	81.3%

The detailed data collection sheets are included in the appendix.

Discussion

Hydraulic Performance: Figures 5 shows the relationship between flow rate and water depth in the test basin, for clean water flow. With clear water, the head to maintain the MTFR (50 gpm) through the SCC is just under 25 inches. More related to actual filtration performance is the head required to maintain the MTFR when the flow is sediment laden. As is demonstrated in the filtration efficiency and mass loading testing, the head continues to increase for a stable sediment-laden flow due to SCC blinding/clogging as sediment is filtered out of the influent.

Sediment Removal Efficiency: As shown in Table 2, bottle samples demonstrated significant sediment removal efficiency for a limited flow event at the MTFR. In this scenario, the sediment removal efficiency exceeded 91%.

Mass Loading Rate: To determine the longer-term effectiveness of the SCC, the MTFR was continued until clogging and blinding of the device caused the head within the test basin to rise beyond an acceptable level, determined by the client to be 30 inches. As shown in Table 3, the test was run for a total of 5.4 minutes at the MTFR and 200 mg/L while the depth of water over the SCC was measured. At 30 inches of depth the test was stopped. During the extended testing, very slight increasing turbidity was apparent in the waters in and passing through the weir box and sump box, suggesting that as the head increased, sediment particles were being forced through the device at only very slightly increasing rates. The overall removal efficiency for the extended test was more than 80%.

Appendix A: Additional Test Setup Pictures



Inlet Basin Resting on Weir Box



High Efficiency Cartridge



View of Testing – Sump Box in Foreground



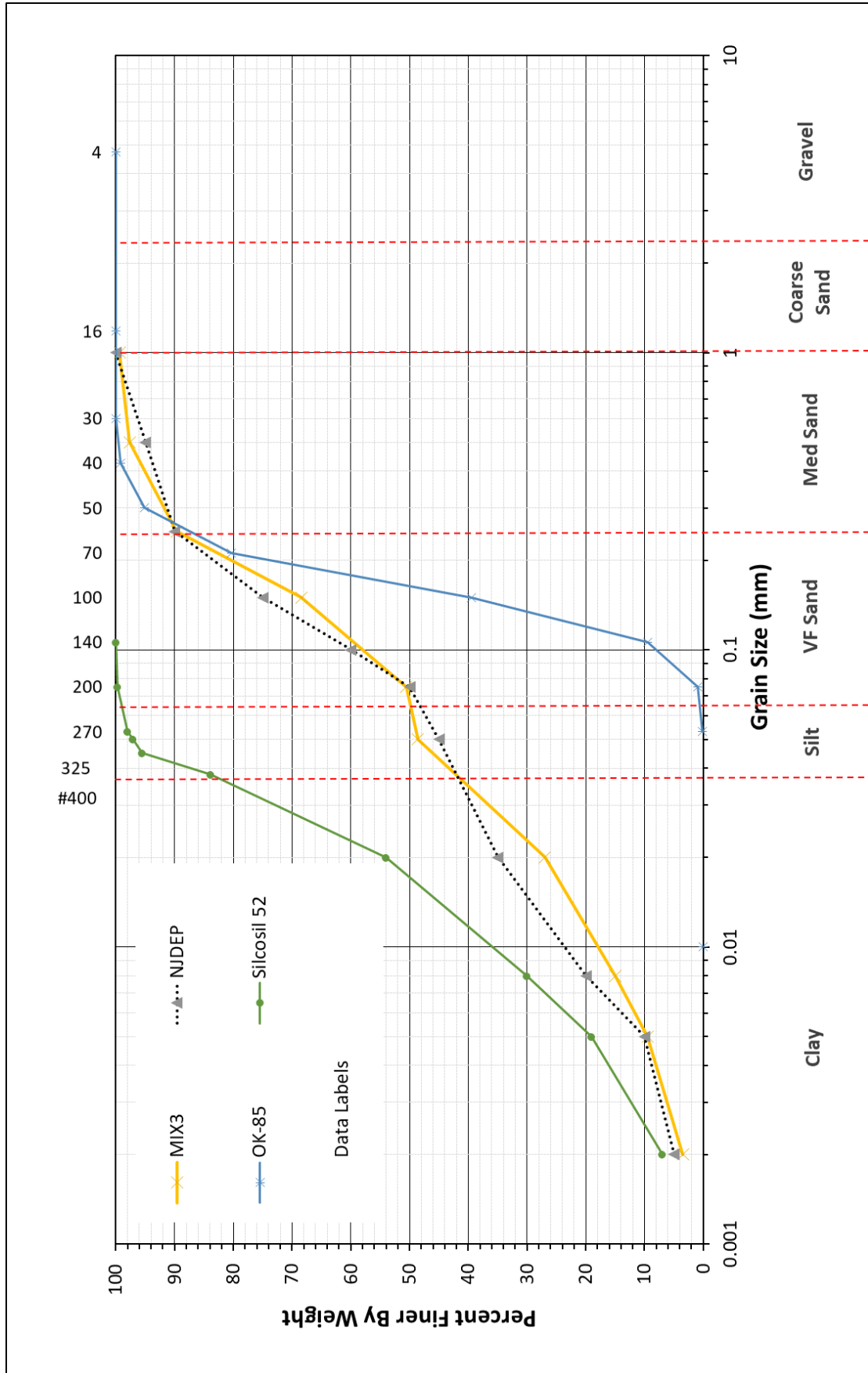
Drying of Sediment-laden Cartridge and Collected Retained Sediments (typical)



In-line Electromagnetic Flow Meter



Appendix B: Test Sediment





Appendix C: Test Data Sheets



Test Summary

Test Date:	4/23/2021		
Test ID:	SCC-High Efficiency		
Influent Volume per Sample:	25.00	gallons	
Sample Interval (first 3 minutes):	0.50	minutes	
Sample Interval (first 3 minutes):	0:00:30	hours:minutes:seconds	(convert decimal to minutes:seconds)
Total Test Length:	5.4	minutes	
Total Test Time:	0:05:25	minutes:seconds	(convert decimal to minutes:seconds)
Target Influent Concentration:	200	mg/L	
Target Sediment Injected:	0.452	lbs	
Target Sediment Injection Rate:	0.0834	lb/min	37.85 g/min (12 setting on auger)
Target Flow Rate:	50	gpm	189 lpm

Test Data Collection

DIRECT - USING SEDIMENT MEASUREMENTS:

Dry SCC Weight - Initial:	5.063	lbs
Dry SCC + Upstream Sed Weight - Final:	5.429	lbs
Dry 50µm Filter Sock Weight - Initial:	0.358	lbs
Dry Filter Sock & Other Deposition Weights - Final:	0.416	lbs
Dry Weight in Feeder - Initial:	18.000	lbs
Dry Weight in Feeder - Final:	17.549	lbs

SOLIDS MASS BALANCE	
Retained Solids - Within Units (lbs):	0.367
Passed/Collected Solids (lbs):	0.058
Actual Solids Injected (lbs):	0.451
Unaccounted Solids (lbs):	0.027

INDIRECT - USING CONCENTRATION MEASUREMENTS:

Pump Speed:	1480	rpm
Average Head on Weir:	0.485	ft
Avg Flow Rate:	50	gpm
		0.111 cfs
(Fill system from reservoirs at target flow rate until sump reaches the desired fill line. Close/open valves to create closed loop.)		
Final Stage Relative to Outlet (in)	30	inches
(Measure in well near end of test.)		

Equilibrium Start Time:	13:33:00	min.:sec.	(Begin test; Take sump temp.)
Equilibrium End Time:	13:38:25	min.:sec.	(Take first influent/effluent samples, then start feeder.)
Sump Water Temp / Time:	18.1	°C	/ 13:33:00
Initial Sample Time:	13:33:30	hours:minutes:sec	
Initial Sample - Sump Water Temp / Time:	18.1	°C	/ 13:33:30
Final Sample - Sump Water Temp / Time:	18.1	°C	/ 13:38:25

Sample Data Collection (ASTM D3977)											Concentration (mg/L)	
Sample Time	30 sec. dry	Time to Fill 1L,	Bottle Gross			Filtrate Tare					Dry Feed Calc.	Bottle Sample Calc
hrs:min:sec	feed (g)	Sample	sec	Bottle Tare (g)	(g)	Bottle Net (g)	Water (mL)	(g)	Filtrate Dry (g)	Solids (mg)		
13:33:00												
13:33:30	19.24	Influent 1	1 sec	50.55	1040.46	989.91	989.91	0.4288	0.6329	204.1	204.5	206.2
13:34:00	19.30	Influent 2	1 sec	49.67	1046.15	996.48	996.48	0.4266	0.6230	196.4	205.2	197.1
13:34:30	19.35	Influent 3	1 sec	50.47	1046.46	995.99	995.99	0.4284	0.6285	200.1	205.7	200.9
13:35:00	19.55	Influent 4	1 sec	50.46	978.71	928.25	928.25	0.4291	0.6293	200.2	207.8	215.7
13:35:30	19.69	Influent 5	1 sec	49.57	1022.09	972.52	972.52	0.4288	0.6214	192.6	209.3	198.0
Average Concentration:											206.5	203.6
13:33:00												
13:33:30		Effluent 1	< 5 sec	49.35	1047.31	997.96	997.96	0.4256	0.4312	5.6	n/a	5.6
13:34:00		Effluent 2	< 5 sec	49.58	1032.59	983.01	983.01	0.4247	0.4381	13.4	n/a	13.6
13:34:30		Effluent 3	< 5 sec	50.30	1061.30	1011.00	1011.00	0.4273	0.4463	19.0	n/a	18.8
13:35:00		Effluent 4	< 5 sec	49.41	1042.13	992.72	992.72	0.4275	0.4539	26.4	n/a	26.6
13:35:30		Effluent 5	< 5 sec	50.72	1056.50	1005.78	1005.78	0.4287	0.4531	24.4	n/a	24.3
Average Concentration:											n/a	17.8

Initial 2.5 Minute Performance

Based on Bottle Samples	Average Concentration in Influent (mg/L):	203.6	Average Concentration in Effluent (mg/L):	17.8	Removal Efficiency (%)	91.3%
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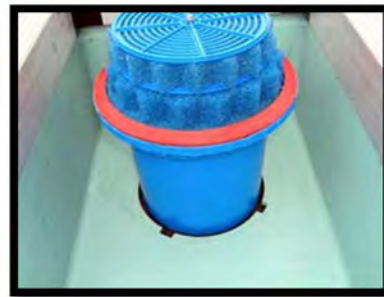
Full Test Performance (test time = 5.4 minutes)

Based on Mass Balance	Average Concentration in Influent (mg/L):	200.9	Average Concentration in Effluent (mg/L):	37.6	Removal Efficiency (%)	81.3%
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StormSafe PWD

Modular Stormwater Filtration System



Maintenance Guide

Vault and Manhole Configurations

Manufacturer:

Fabco Industries, Inc
66 Central Avenue
Farmingdale, NY 11735
Phone: (631)-393-6024





Caution:

The StormSafe should be maintained by trained individuals who are familiar with all confined space entry, disposal procedures and traffic safety regulations.

StormSafe Vault and Manhole Maintenance Guide

1.0 Inspecting the StormSafe

The StormSafe Cartridge System, like any other stormwater treatment device requires maintenance to remain efficient as a stormwater filter. Fabco Industries highly recommends inspecting the system within the first year after installation following the steps below.



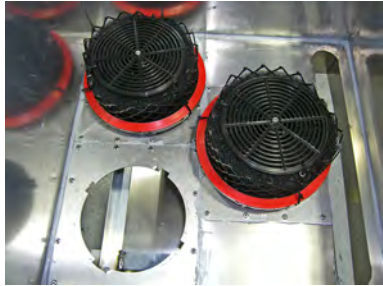
<p>Inspection and cleaning should be performed only after NO rainfall for at least 24 hours.</p> <p>If working in the street, proper safety equipment should be worn, including but not limited to a hardhat, vest, gloves and eye protection, and local traffic safety rules & regulations should be followed.</p> <p>Begin by removing the manhole access covers located over the inlet forebay, cartridge filtration deck and effluent chamber. Allow several minutes for the system to vent.</p> <p>CAUTION: Grates can be extremely heavy. Some type of lifting mechanism is highly recommended.</p>	 
<p>Visually inspect all chambers for heavy sediment, trash and debris loading. A battery powered flashlight or droplight is recommended for thorough inspection.</p> <p>Some telltale signs that cleaning or filter replacement is necessary are as follows:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Waterline marks within a couple inches of the top of the bypass weir. <input type="checkbox"/> Standing water in the outlet chamber because it was designed to drain down after a storm. <input type="checkbox"/> Cannot see the tops of the cartridges because they are covered with sediment, which indicates a sediment depth on top of the deck of greater than 6 inches. <p>Record observations and comments on the maintenance log sheet. In addition, the use of digital photographs and/or sketches may be warranted to maintain the most accurate historical records.</p>	 

StormSafe Vault and Manhole Maintenance Guide





2.0 Cleaning Frequency

The StormSafe Cartridge System requires periodic cleaning. There are no hard and fast rules in this regard. Small units and installation sites with higher than expected sediment loads or areas with significant trees and foliage require more maintenance. In general, Fabco Industries recommends cleaning out the unit(s) at least once per year by removing the debris, sand and silt from the inlet forebay and cartridge chamber with a vacuum assisted device and changing out the cartridges.

3.0 Cleaning out the StormSafe:

<p>Be sure to follow all safety and traffic control protocols.</p> <p>With the manhole access covers or hatches removed, the StormSafe is available for cleaning.</p> <p>Remove the sediment and debris from the system. This can be done manually or with a vacuum device.</p>	
<p>With the debris and sediment removed, the filter cartridge(s) will be visible on the deck surface. Fabco suggests removing the cartridge(s) from the StormSafe and removing any loose debris, sediment, trash from the blue foam pre-filter.</p> <p>To remove the cartridge(s) reach down into the basin and firmly grasp the plastic outer rim of the cartridge bod just below the foam. Twist the cartridge body counter-clock-wise about 1/4 turn until it stops. Lift the cartridge straight up to remove.</p>	
<p>The filter cartridge(s) install through a hole in the bottom of the support deck or collection basin. The hole has four (4) slots that accept 4 tabs molded into the underside of the cartridge body.</p>	

StormSafe Vault and Manhole Maintenance Guide

<p>Insert the filter cartridge down through the hole in the base of the unit. The colored ring on the cartridge should be facing upwards. Push the cartridge all the way through the hole until it rests on the bottom. Slowly turn the cartridge in a clockwise direction until the tabs align with the slots and the cartridge body drops about ¼' further down.</p>	
<p>Once the tabs fall through the slots, continue turning firmly in a clockwise direction until the tabs contact the STOPS. The cartridge is now installed.</p>	 
<p>With the StormSafe chambers and new cartridges installed the maintenance process is complete. Re-install the manhole access covers and demobilize.</p>	

4.0 Disposal

All liquid, oils, sediment, debris, trash and other accumulates removed from the StormSafe must be handled and disposed of in accordance with local, state and federal regulations.

Disposal considerations must be part of a well-planned and scheduled maintenance regime. Solid waste disposal can typically be coordinated with a local landfill, whereas liquid waste can be disposed of at either a wastewater treatment plant, or a municipal vacuum truck decant facility.



StormSafe Vault and Manhole Maintenance Guide

5.0 Selecting replacement cartridges

The Fabco filter cartridges used in the StormSafe product are designed primarily to capture: floating materials, sediments and suspended solids and emulsified products such as hydrocarbon compounds, dissolved heavy metals, nutrients (P&N) and pathogens (bacteria). Before ordering your cartridges make sure you select the correct type. Each cartridge type can be identified by a colored “Ring” located at the top of the cartridge.

Part Number	Targeted Pollutant	Ring Color
9718-1	Standard Cartridge Good All-purpose cartridge for common surface runoff that may contain a little bit of everything.	Red
9718-2	Pathogen Cartridge 2x's more pathogen treatment Vs. Std Cartridge. Use near sensitive water ways to keep beaches and shell fishing areas open.	Yellow
9718-3	Hydrocarbon Cartridge 25% more hydrocarbon filter media Vs Std cartridge. Excellent for vehicle or maintenance related applications.	Blue
9718-4	Heavy Metals Cartridge Uses unique FABLITE filter media for HV metals. Suggested for industrial usage where persistent HV metals have been identified in surface runoff.	Grey
9718-5	Standard Short Cartridge Reduced height version of std Cart.	Mint
9718-6	Nutrient Cartridge Uses proprietary FABPHOS media for nutrients. Highly effective on the critical dissolved Ortho-Phosphates. Helps reduce algae blooms keeping the water clean and healthy.	Green
9718-7	High Flow Cartridge Good all-purpose cartridge More high flow open cell foam layers than std Cart.	Red with Black mesh



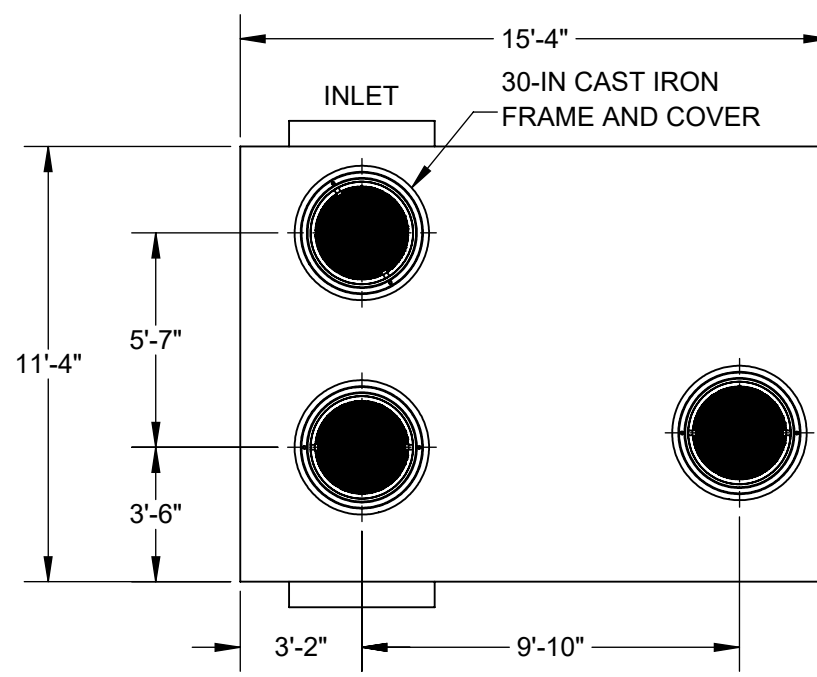
StormSafe Vault and Manhole Maintenance Guide

<u>Inspection and Maintenance Log- Sheet</u> StormSafe Cartridge Vault or Manhole System	
Maintenance Company	
Company Name:	
Onsite Technician:	
Contact Phone No:	
Treatment System	
Date of Maintenance:	StormSafe Model
Vault\Manhole Location:	
<u>Maintenance Item</u>	<u>Comments</u>
Water Depth (prior to maintenance) in forebay:	
Sediment Depth (prior to maintenance) in forebay:	
Sediment Depth (prior to maintenance) on cartridge deck:	
Structural Damage:	
Maintenance Performed:	
Additional Work Required:	
Structural Repairs:	

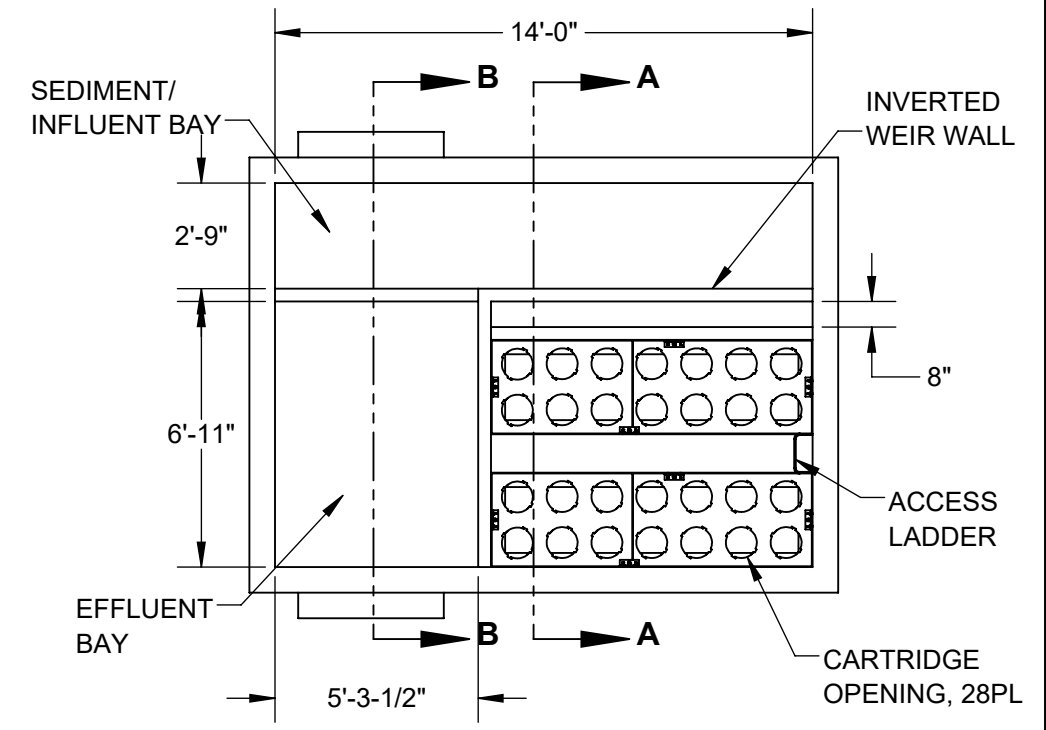
NOTES (REF):

- 1.0 WEIGHT ESTIMATE:
 - 1.1 COVER: 22,500-LB
 - 1.2 BASE W/ FILTERS: 65,000-LB
- 2.0 MATERIALS MEET OR EXCEEDS REQUIREMENTS:
 - 2.1 VAULT:
 - 2.1.1 REINFORCEMENT STEEL: REBAR, ASTM A-615 GRADE 60
 - 2.1.2 CEMENT: ASTM C-150 SPECIFICATIONS CONCRETE 28 DAY COMPRESSIVE STRENGTH SHALL BE 5000 PSI (MIN)
 - 2.2 ACCESS MANHOLES: ASTM-A-48, CLASS 35B GRAY IRON OR ASTM A536, GRADE 80-55-06 DUCTILE IRON.
- 3.0 CONCRETE STRUCTURE DESIGN LOADINGS:
 - 3.1 AASHTO HS-20 LOAD RATING.
 - 3.2 SOIL WEIGHT = 120 PCF
 - 3.3 DEPTH OF OVERBURDEN: <8-FT
 - 3.4 EQUIVALENT FLUID PRESSURE = 40 PCF
 - 3.5 LATERAL LIVE LOAD SURCHARGE PER SPECS.
- 4.0 PERFORMANCE CHARACTERISTICS (W/ FABCO SEDIMENT CONTROL CARTRIDGE):
 - 4.1 MAXIMUM CARTRIDGE CAPACITY = 28
 - 4.2 MAXIMUM TREATMENT CAPACITY = 3.08 CFS (1,400 GPM)
 - 4.3 BYPASS CAPACITY 27.6 CFS (12,390 GPM)
- 5.0 EAST JORDAN IRON WORKS (EJIW) UTILITY CONSTRUCTION CASTINGS ARE RATED FOR REPEATED VEHICULAR TRAFFIC AND CONFORM TO AASHTO M306 STANDARDS. FINAL MANHOLE OR ACCESS HATCH INSTALLATION, AND ADJUSTMENT TO GRADE, SHALL BE PERFORMED BY QUALIFIED PERSONNEL.
- 6.0 OFF-LOADING, SETTING, EXCAVATION, DEWATERING, DRAINAGE, AND BACK FILL OPERATIONS SHALL BE PERFORMED IN ACCORDANCE WITH OSHA AND LOCAL REGULATIONS AND ARE THE RESPONSIBILITY OF THE CONTRACTOR. SUB-BASE AND BACKFILL DEPTH ARE SITE SPECIFIC AND SHALL BE SPECIFIED BY THE ENGINEER OF RECORD.
- 7.0 THE CONTRACTOR SHALL VERIFY THAT THE UNIT IS VERTICALLY AND HORIZONTALLY PLUMB AND STABLE, WITH MINIMUM VOIDS AND MINIMUM UNCOMPACTED SOIL AFTER BACK FILL OPERATION.
- 8.0 CONNECT EXISTING DRAIN LINE TO STORMSAFE INLET AND OUTLET PORTS WITH APPROVED NON-SHRINKING GROUT-FILL IN ACCORDANCE WITH GROUT MANUFACTURERS INSTRUCTIONS. ALL GROUT-FILL MATERIALS SHALL BE SUPPLIED BY THE CONTRACTOR. THE STORMSAFE "INLET" AND "OUTLET" PORTS ARE CLEARLY LABELED WITH BLACK PAINT. INLET AND OUTLET DRAIN LINES ARE TO BE ALIGNED FLUSH WITH RESPECT TO THE INTERIOR VAULT WALLS.
- 9.0 MAINTENANCE AND CARTRIDGE FILTER REPLACEMENT INSTRUCTIONS ARE PROVIDED SEPARATELY BY FABCO AND ARE SITE SPECIFIC.
- 10.0 CARTRIDGE FILTER REPLACEMENT (IN GENERAL):

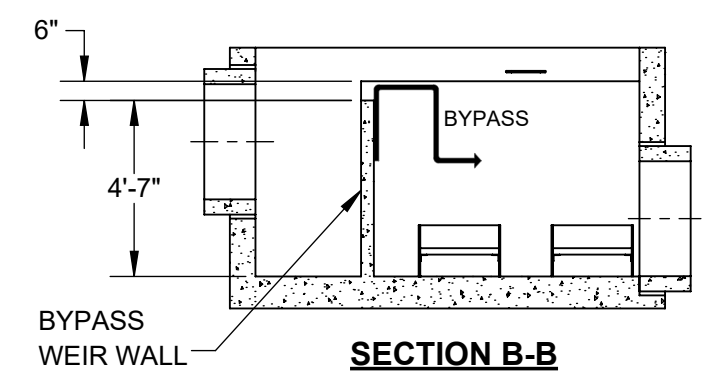
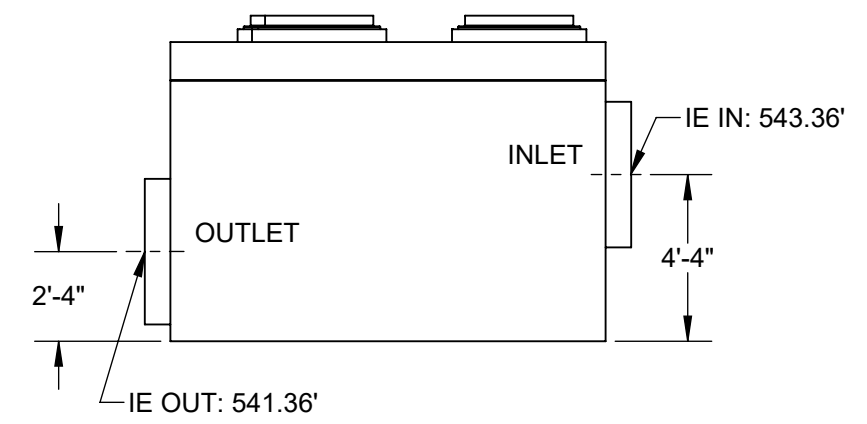
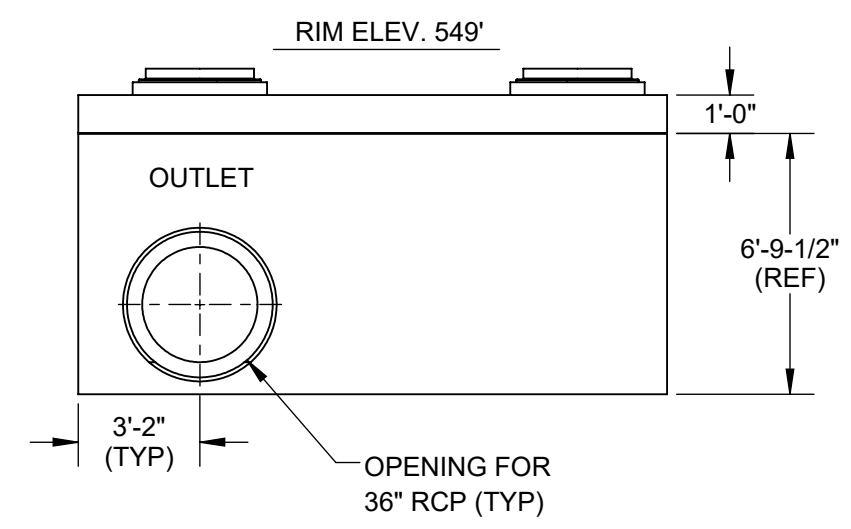
FOR BEST PERFORMANCE REPLACE CARTRIDGE FILTERS IAW FABCO RECOMMENDATIONS. HIGH CONTAMINANT LOCATIONS MAY REQUIRE MORE FREQUENT CARTRIDGE REPLACEMENT. REMOVE ANY DEBRIS OR HEAVY SEDIMENT FROM THE INFLUENT AND EFFLUENT CHAMBERS. ENTER THE STORMSAFE CARTRIDGE CHAMBER IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS FOR ENCLOSED SPACE ENTRY. REMOVE EACH CARTRIDGE BY ROTATING 30-DEG IN THE CLOCKWISE DIRECTION AND LIFTING. LIKEWISE, INSTALL THE NEW CARTRIDGE AND LOCK IN PLACE BY ROTATING 30-DEG IN THE COUNTER CLOCKWISE DIRECTION. DISPOSE OF USED FILTER CARTRIDGES PER LOCAL REGULATIONS.



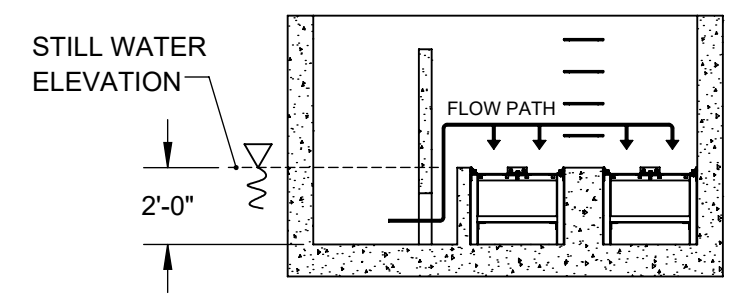
PLAN VIEW



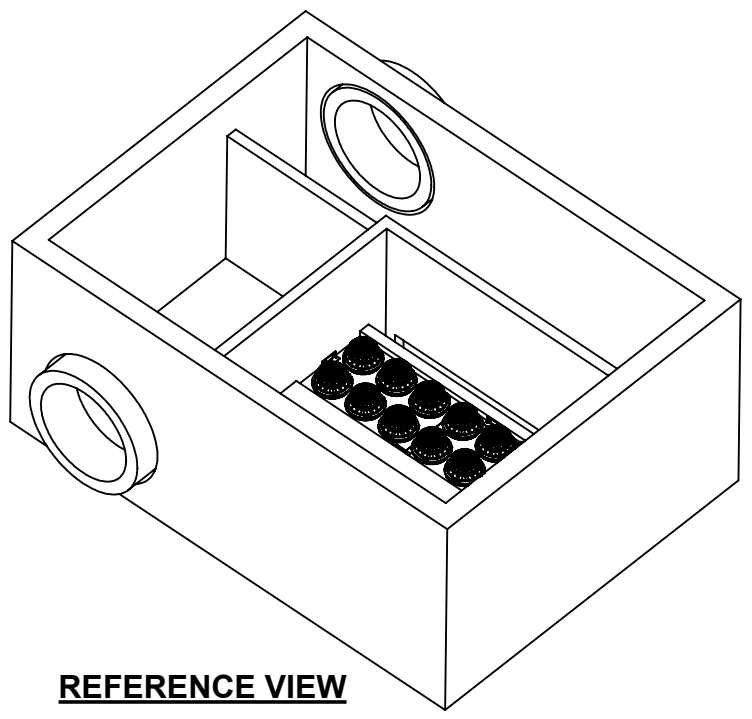
PLAN VIEW WITHOUT TOP SLAB



SECTION B-B



SECTION A-A



REFERENCE VIEW

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	PROJECT: FABCO INDUSTRIES, INC. 24 CENTRAL DRIVE FARMINGDALE, NY 11735 WWW.FABCO-INDUSTRIES.COM					
	MATERIAL:					
	PROJECT:					