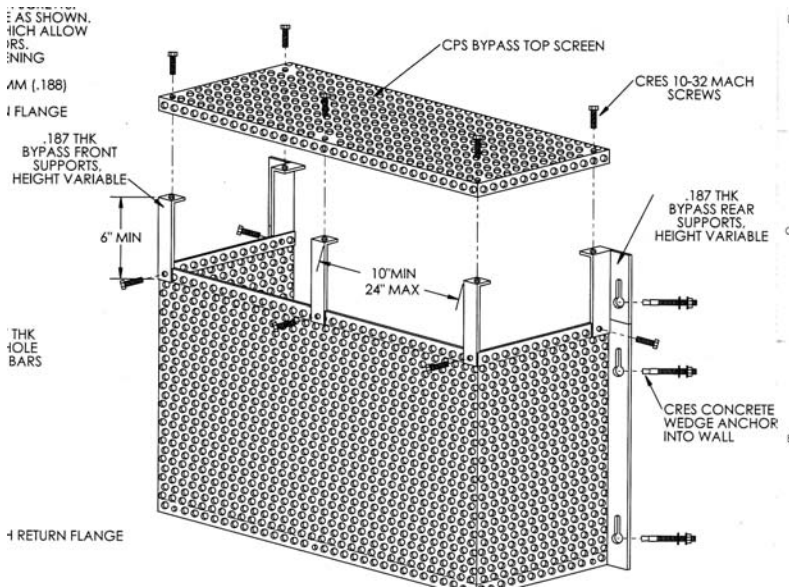


Catchbasin Insert, Full Capture Device

WCS-1 Connector Pipe Screen Connector pipe screen



<p>Company Contact: West Coast Storm, Inc., San Bernardino, CA Sales contact: Brian Martello, (909)717-8855 bmartello@wcstorm.net http://westcoaststorm.com</p>	
<p>Storage capacity: Depends on size of catchbasin</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: Maintenance crews should inspect and clean catch basins and installed devices bi-annually and/or immediately following a significant storm event.</p>	<p>Warranty: 10 yrs on parts</p>
<p>Material: Stainless steel</p>	<p>Delivery Time: "Estimated 3 days time per 1 day quantity of installs"</p>
<p>Pricing: See over. Have uninstalled price</p>	

Comments from reference checks

Device effectiveness in capturing trash

"In certain areas, very large storms may flood the CPS device. I do not recommend the placement of CPS devices on slopes or areas with a grade. Our experience is that trash will flow right past the devices."

"Only install in areas that are not prone to flooding. If an area is prone to flooding, the device will flood."

Pricing, including installation, is as follows:

Per unit cost for CPS Devices fitting a connector pipe of 6 inches to 48 inches.

For orders of 25 CPS devices or more:

\$ 428.18 each CPS device

Per unit cost for CPS Devices fitting a connector pipe of 6 inches to 48 inches.

For orders of 24 CPS devices or less:

\$ 575.00 each CPS device

West Coast Storm

WCS-1

Connector Pipe Screen

Including Installation

Device ID	Outlet Pipe Dimensions	Quantity	Price Stainless Baskets (C3) Per Unit
WCS-1	6" – 48"	1-24	\$ 575.00
WCS-1	6" – 48"	24 or more	\$ 428.18

Not Including Installation

Device ID	Outlet Pipe Dimensions	Quantity	Price Stainless Baskets (C3) Per Unit
WCS-1	6" – 48"	1 or more	\$370.00

Pricing, **NOT including installation**, is as follows:

Warranty is void if the device is not installed by a WCS Certified Installer. For single orders of 200 or more CPS devices, WCS will train and certify qualified installers. Price includes parts for installation of unit. Price does not include ACCESS database or drain mapping provisions as stated in vendor contract.

WCS-2

ARS- Automatic Retractable Screen

Including Installation

Device ID	Length	Quantity	Price Per Unit
WCS-2	Up to 48"	1 or more	\$327.00

Not Including Installation

Device ID	Length	Quantity	Price Per Unit
WCS-2	Up to 48"	1 or more	\$270.00

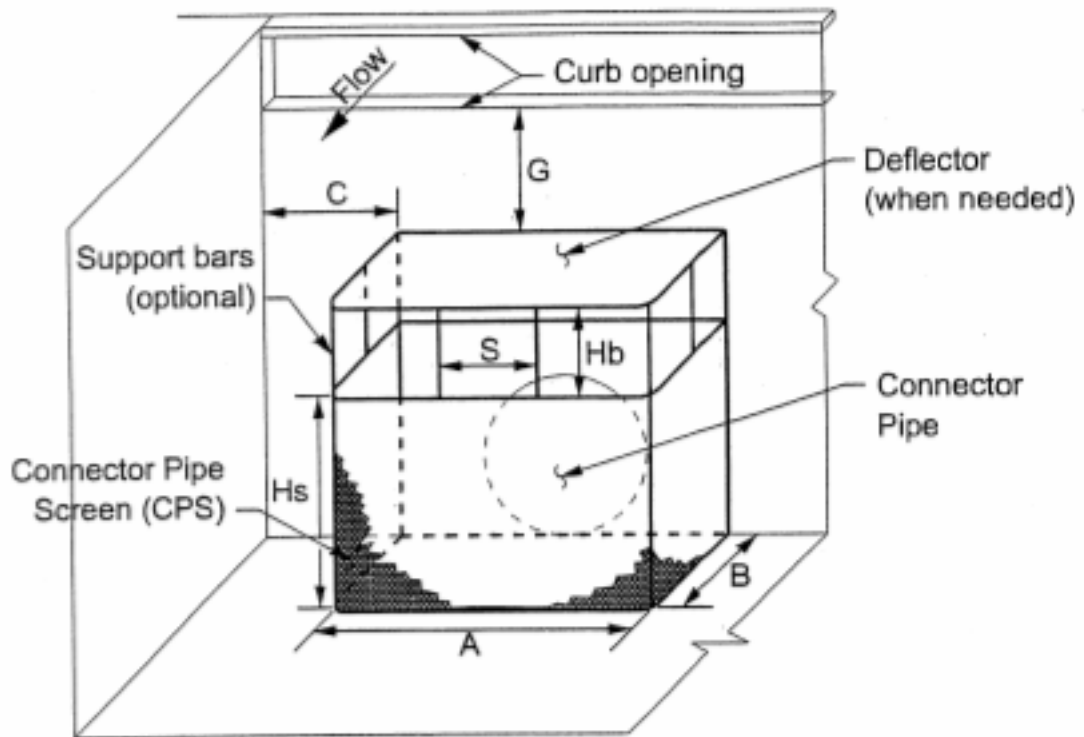
Pricing, **NOT including installation**, is as follows:

Warranty is void if the device is not installed by a WCS Certified Installer. For single orders of 200 or more ARS devices, WCS will train and certify qualified installers. Price includes parts for installation of unit. Price does not include ACCESS database or drain mapping provisions as stated in vendor contract

Catchbasin Insert, Full Capture Device

USW-1 Connector Pipe Screen

Connector pipe screen



<p>Company Contact: United Stormwater, Inc., City of Industry, CA Sales contact: Chris Anguiano, 626-290-5372 christian@unitedpumping.com http://www.unitedstormwater.com</p>	
<p>Storage capacity: Depends on size of catchbasin</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: "The catchbasin and CPS will need to be cleaned with a vacuum truck to remove the debris captured. Cleaning will take about 15-25 minutes per basin"</p>	<p>Warranty: 3 yrs</p>
<p>Material: 304 stainless steel</p>	<p>Delivery Time: Depending on the size of order, availability of material is generally 4-6 weeks, plus 2 weeks for manufacturing/installation.</p>
<p>Pricing: See over.</p>	

Comments from reference checks

Device effectiveness in capturing trash

"The CPS device does an adequate job. There is better workmanship out there....The devices mostly

United Stormwater Full-Capture Devices

USW-1 Connector Pipe Screen

***Minimum order is 5 units**

Device ID	Quantity	Price
USW-1	5 to 9	\$515.00
USW-1	10 to 49	\$475.00
USW-1	50 to 99	\$425.00
USW-1	100 or more	\$409.00

Prices exclude cleaning of Catch Basin, disposal of material. Price subject to increases in cost and material

United Stormwater Partial Capture Devices

USW-2 Clean Screen III

***Minimum order is 5 units**

Device ID	Quantity	Price
USW-2	5 to 9	\$636.00
USW-2	10 to 49	\$560.00
USW-2	50 to 99	\$515.00
USW-2	100 or more	\$490.00

Prices exclude cleaning of Catch Basin, disposal of material. Price subject to increases in cost and materials

USW-3 Manual Retractable Screen (Curb Inlet Screen)

Device ID	Quantity	Price
USW-3	1 to 9	\$450.00
USW-3	10 to 49	\$425.00
USW-3	50 to 99	\$400.00
USW-3	100 or more	\$375.00

USW-4 - DrainPac (Curb Inlet Design)

***Prices do not include installation**

Device ID	Size	Price
USW-4a	41"x12"x12"	\$375.00
USW-4b	48"x12"x12"	\$425.00
USW-4c	60"x12"x12"	\$475.00
USW-4d	82"x12"x12"	\$525.00

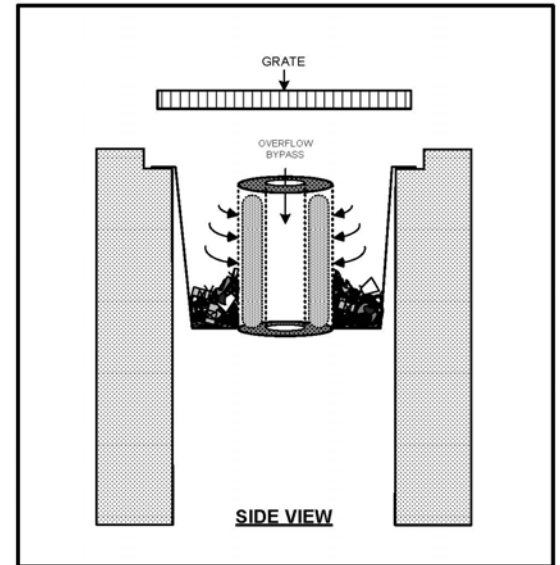
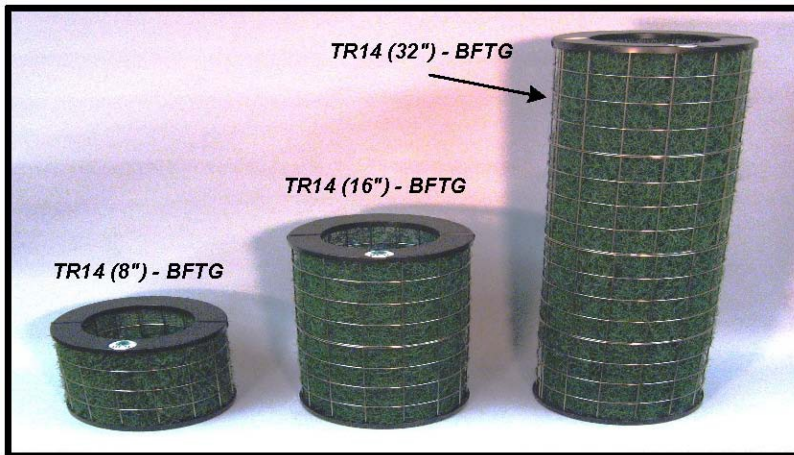
USW-5 - DrainPac (Drop Inlet Design)

***Prices do not include installation**

Device ID	Size	Price
USW-5a	12"x12"	\$275.00
USW-5b	18"x18"	\$325.00
USW-5c	24"x24"	\$385.00
USW-5d	36"x36"	\$450.00
USW-5e	48"x48"	\$650.00
USW-5f	25"x38"	\$425.00

Catchbasin Insert, Full Capture Device

REM-1 Triton Bioflex Drop Inlet Trash Guard Catchbasin filter insert



<p>Company Contact: Revel Environmental Manufacturing, Inc., Concord, CA Sales contact: Marcel Sloane, (925)-676-4736 Marcel@remfilters.com http://remfilters.com</p>	
<p>Storage capacity: Depends on each catchbasin's configuration, size of filter, etc.</p>	<p>Replacement Parts: Available, Replacement Filters</p>
<p>Vendor's maintenance estimate: The filter cleaning process and Bioflex media replacement should take no more than 15 minutes per filter. Maintained when debris accumulates up to 80% of the filter's capacity. Minimum 3 times per year.</p>	<p>Warranty: 1 yr, or 6 if REM contracts to do maintenance</p>
<p>Material: High density polyethylene, 304 stainless steel, polyester fiber mesh, coir fibers, water-based latex</p>	<p>Delivery Time: Within three weeks from receipt of order</p>
<p>Pricing: See over.</p>	
<p>Installed: Dublin</p>	

Comments from reference checks

Device effectiveness in capturing trash

Good, effective device in capturing trash (no complaints from the public or flooding occurring in the street).

Maintenance

Maintenance included 3 times a year but at a reasonable price by a contractor. Disposal of filters is an additional maintenance consideration (and an extra service also provided by cleaning contractor)

Other

Good customer service from vendor. Easy installation under the vendor's scheduled time quote. Some modifications were needed for installation based on field conditions. Optional hydrocarbon (oil, grease) removal is also available.



Revel Environmental Manufacturing Inc.

sales@remfilters.com (888) 526-4736 Lic. No. 857410

Northern California Southern California
 960-B Detroit Avenue 2110 South Grand Avenue
 Concord, California 94518 Santa Ana, California 92705
 P: (925) 676-4736 P: (714) 557-2676
 F: (925) 676-8676 F: (714) 557-2679

REM TRITON Bioflex Trash Guard (BFTG) Price List

Pricing includes municipal consultation, catch basin sizing, delivery and installation of complete TRITON BFTG filter system.

TR - BFTG Series (For Drop Inlets)		TRC - BFTG Series (For Curb Inlets)			
Catch Basin Size	Quantity Pricing	Curb Inlet Size	Quantity Pricing		
1' x 1' thru 1.5' x 2'	1 to 50: \$255ea.	2' thru 4'	1 to 50: \$360ea.		
	51 to 99: \$240ea.		51 to 99: \$340ea.		
	100 or more: \$230ea.		100 or more: \$320ea.		
2' x 2' thru 2.5' x 2.5'	1 to 50: \$335ea.	5' thru 7'	1 to 50: \$525ea.		
	51 to 99: \$320ea.		51 to 99: \$499ea.		
	100 or more: \$300ea.		100 or more: \$470ea.		
2' x 3' thru 4' x 4'	1 to 50: \$595ea.	<p><i>TRITON Curb Inlet filters are be teamed together inline and scalable for varying curb opening lengths. Most S. F. Bay Area curb style inlet openings range from 2 to 7' in length. Please call REM for more information regarding curb inlets openings longer than 7 feet.</i></p>			
	51 to 99: \$565ea.				
	100 or more: \$535ea.				
Replacement Bioflex Media Pricing for TR - BFTG				Replacement Bioflex Media for TRC - BFTG	
Drop Inlet Cartridge Model	Price			Bioflex Replacement Media Pricing is: \$3.70 per ft. / Linear Foot.	
TR6.5 (8") - BFTG	\$14.75ea.				
TR10 (8") - BFTG	\$14.75ea.				
TR14 (8") - BFTG	\$14.75ea.				
TR10 (16") - BFTG	\$16.25ea.				
TR14 (16") - BFTG	\$16.25ea.				
TR24 (17") - BFTG	\$19.50ea.				
TR24 (17") - BFTG	\$19.50ea.				
Drop inlet pricing is based on standard 8" and 16" cartridge height configurations. Taller cartridge configurations are available upon request					

Notes:

REM O&M Service programs include Bioflex media replacement. Custom service programs are available including: "Cartridge Core Change-out and Swap" upon request.

REM recommends that Bioflex Media be replaced at least once per year.

Pricing for Replacement Bioflex Media does not include delivery or installation.

REM-1
REM Triton Bioflex Trash Guard

TR - BFTG Series (For Drop Inlets)

Device ID	Catch Basin Size	Quantity	Pricing per Unit
REM-1a	1' x 1' thru 1.5' x 2'	1 to 50	\$255.00
REM-1a	1' x 1' thru 1.5' x 2'	51 to 99	\$240.00
REM-1a	1' x 1' thru 1.5' x 2'	100 or more	\$230.00
REM-1b	2' x 2' thru 2.5' x 2.5'	1 to 50	\$335.00
REM-1b	2' x 2' thru 2.5' x 2.5'	51 to 99	\$320.00
REM-1b	2' x 2' thru 2.5' x 2.5'	100 or more	\$300.00
REM-1c	2' x 3' thru 4' x 4'	1 to 50	\$595.00
REM-1c	2' x 3' thru 4' x 4'	51 to 99	\$565.00
REM-1c	2' x 3' thru 4' x 4'	100 or more	\$535.00

TR- Replacement Bioflex Media Pricing for TR – BFTG

Device ID	Outflow Pipe Diameter	Cartridge Height	Pricing per Unit
REM-1d	6.5"	8"	\$14.75
REM-1e	10"	8"	\$14.75
REM-1f	14"	8"	\$14.75
REM-1g	10"	16"	\$16.25
REM-1h	14"	16"	\$16.25
REM-1i	24"	17"	\$19.50
REM-1j	24"	17"	\$19.50

Note: Drop inlet pricing is based on standard 8" and 16" cartridge height configurations. Taller cartridge configurations are available upon request. Pricing includes municipal consultation, catch basin sizing, delivery and installation of complete TRITON BFTG filter system

TRC - BFTG Series (For Curb Inlets)

Device ID	Curb Inlet Size	Quantity	Pricing per Unit
REM-1k	2' to 4'	1 to 50	\$360.00
REM-1k	2' to 4'	51 to 99	\$340.00
REM-1k	2' to 4'	100 or more	\$320.00
REM-1l	5' to 7'	1 to 50	\$525.00
REM-1l	5' to 7'	51 to 99	\$499.00
REM-1l	5' to 7'	100 or more	\$470.00

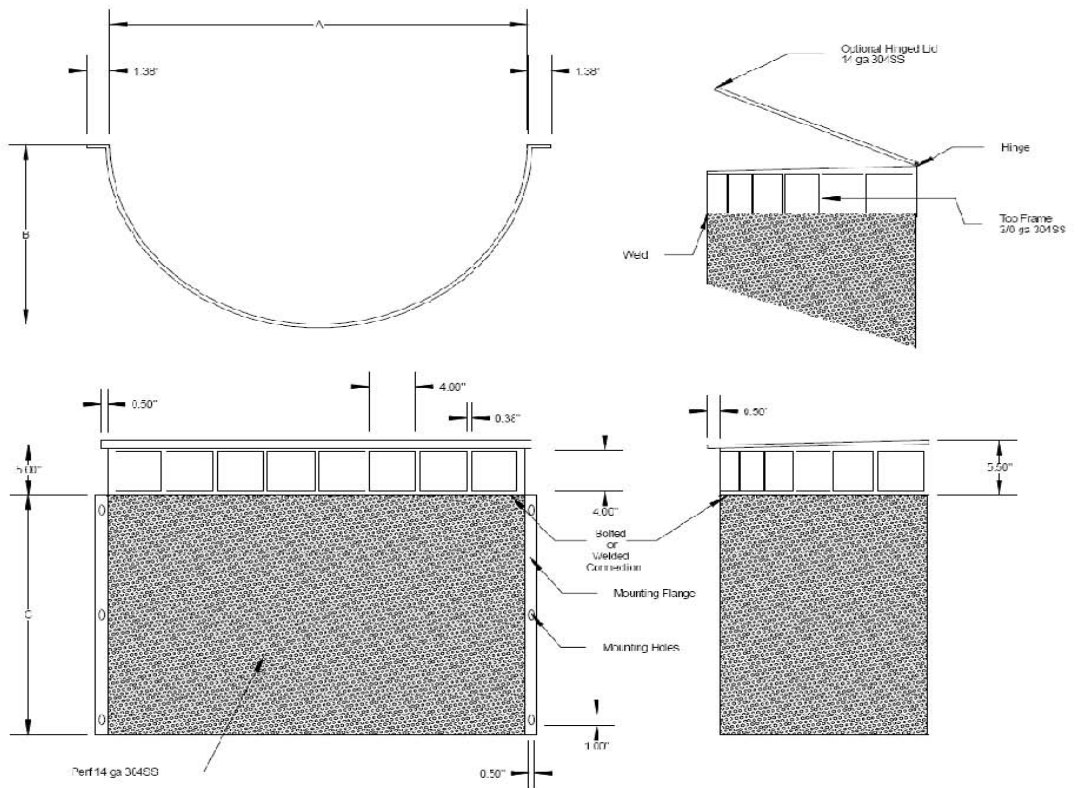
Replacement Bioflex Media for TRC – BFTG

Device ID	Pricing per Linear Foot
REM-1m	\$3.70

Notes: REM O&M Service programs include Bioflex media replacement. Custom service programs are available including; "Cartridge Core Change-out and Swap" upon request. REM recommends that Bioflex Media be replaced at least once per year. Pricing for Replacement Bioflex Media does not include delivery or installation.

Catchbasin Insert, Full Capture Device

KS-3 FloGard catchbasin Outlet Screen Inserts "Outlet Trash Screens" = Connector Pipe Screens



<p>Company Contact: KriStar Enterprises, Inc., Santa Rosa, CA Sales contact: Sue Lillo, 800-579-8819 slillo@kristar.com http://www.kristar.com</p>	
<p>Storage capacity: 7-10 cubic feet depending on size of catch basin</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: "Depends on the amount of runoff, pollutant loading and interference from debris"</p>	<p>Warranty: 5 years</p>
<p>Material: 304 stainless steel</p>	<p>Delivery Time: From receipt of order, typically 2-3 weeks</p>
<p>Pricing: See over.</p>	
<p>Installed: FloGard inserts are in use in County of Sonoma, Alameda County Transit, Santa Clara Valley Transit Authority, Riverside County-TLMA</p>	

No reference information was available for this device

Appendix B- Item Q Pricing Schedule

Name of Proposing Company: KriStar Enterprises, Inc.
Name of Device: FloGard Catch Basin Outlet Screens

	PIPE OUTLET MAXIMUM DIAMETER	UNIT PRICE
Small	18"	\$ 795.00
Medium	24"	\$ 905.00
Large	36"	\$ 995.00

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation
- (4) Prices do not include any applicable sales taxes
- (5) There are no quantity purchase discounts available for this item

Small Devices

KS-1

Combination Inlet Catch Basins

Device ID	Inside Dimensions	Price Stainless Baskets (C3) Per Unit
KS-1a	12 " x 12" - 24" x 24"	\$ 460.00
KS-1b	18"x 36" - 36" x 36"	\$ 530.00

KS-2(rect)

Flat Grated inlet style, Rectangular Inlet C3

Device ID	Inside Dimensions	Price Stainless Baskets (C3) Per Unit
KS-2a	12 " x 12" - 21" x 21"	\$405.00
KS-2b	22" x 22" - 24" x 36"	\$520.00
KS-2c	30" x 36" - 48" x 48"	\$880.00

KS-2(round)

Flat Grated inlet Style, Round Circular Inlet C3

Device ID	Inside Dimensions	Price Stainless Baskets (C3) Per Unit
KS-2d	12" - 21"	\$ 410.00
KS-2e	22" - 36"	\$ 620.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication/installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation
- (4) Prices do not include any applicable sales taxes
- (5) The following discounts are available for volume purchases
10-25 units Deduct \$10.00 per catch basin from above prices
More than 25 units Deduct \$25.00 per catch basin from above prices
- (6) Optional Items
 - (a) Fossil Rock Pouches @ \$15.00 per pouch
 - (b) Stainless Steel Trash and Debris Guards @ \$375.00 per each

KS-3

FlowGard Catch Basin Outlet Screen Insert

Device ID	Pipe Outlet Maximum Diameter	Unit Price
KS-3a	18"	\$ 795.00
KS-3b	24"	\$ 905.00
KS-3c	36"	\$995.00

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation

- (4) Prices do not include any applicable sales taxes
- (5) There are no quantity purchase discounts available for this item

KS-4

Trash and Debris Guards (stainless steel)

Device ID	Unit Price
KS-4	\$ 375.00

Large Devices

KS-5HF

Cleans All Gross Pollutant Trap

Device ID	Unit Price
KS-5HF	Pricing for this product is estimated to range from \$60,000 to \$220,000 per installation. Each location will need to be individually evaluated to determine final pricing based upon the site specific conditions.

KS-6HF

Downstream Defender

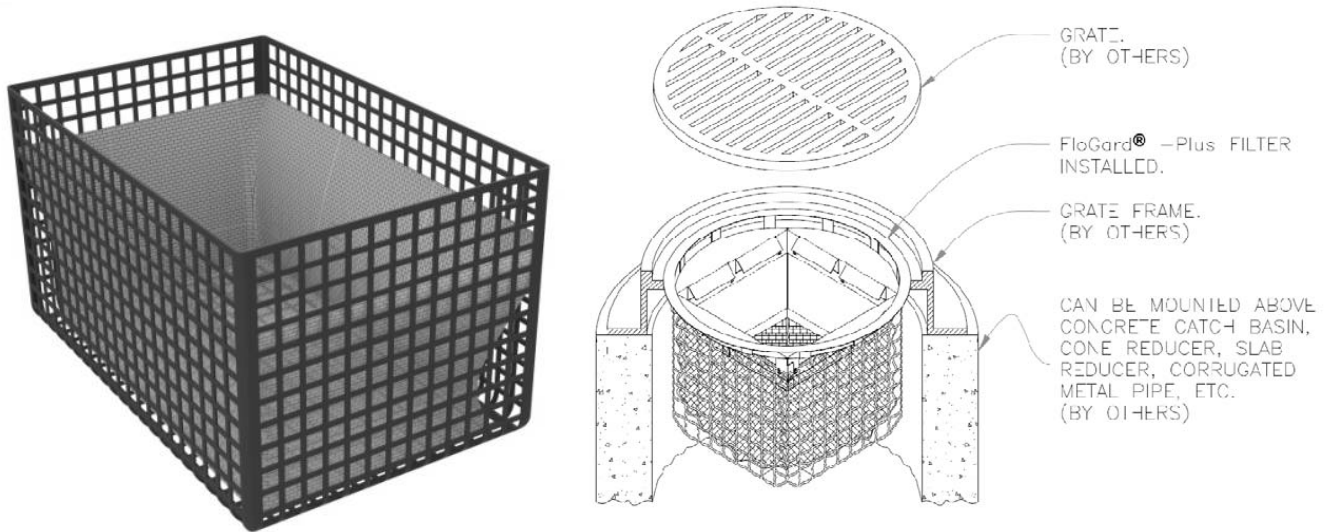
Device ID	Unit Price
KS-6HF4	\$ 12,900.00
KS-6HF6	\$ 22,500.00
KS-6HF8	\$37,500.00
KS-6HF10	\$65,000.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include precast concrete components, bolted, gasketed lids, factory-installed internal components and delivery to jobsite
- (4) Purchaser is responsible for offloading and setting of structures
- (5) Prices do not include diversion structures
- (6) Prices do not include any applicable sales taxes
- (7) There is no purchase quantity discount available for this product

Catchbasin Insert, Full Capture Device

KS-2 Flo Gard Plus catchbasin Filter Inserts, flat grated inlet style, rectangular or round, stainless steel only (C3)
Drop in Basket



<p>Company Contact: KriStar Enterprises, Inc., Santa Rosa, CA Sales contact: Sue Lillo, 800-579-8819 slillo@kristar.com http://www.kristar.com</p>	
<p>Storage capacity: Rectangular (0.4-10.5 cubic feet) Round (0.7-4.3 cubic feet)</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: "Depends on the amount of runoff, pollutant loading and interference from debris"</p>	<p>Warranty: 5 years</p>
<p>Material: 304 stainless steel</p>	<p>Delivery Time: Typically 1 week for standard products; 3 weeks for customized products</p>
<p>Pricing: See over.</p>	
<p>Installed: FloGard inserts are in use in County of Sonoma, Alameda County Transit, Santa Clara Valley Transit Authority, Riverside County-TLMA</p>	

Only the stainless steel version of this device is accepted in the project.

No reference information was available for this device

Appendix B- Item Q Pricing Schedule

Name of Proposing Company: KriStar Enterprises, Inc.

Name of Device: FloGard® Plus Catch Basin Inserts

FLAT GRATED CATCH BASINS				
	NOMINAL DIMENSIONS		PRODUCT UNIT PRICE	
	Minimum Inside Dimension	Maximum Inside Dimension	Standard Baskets (C1, C2, C4)	Stainless Baskets (C3)
Small	12" x 12"	21" x 21"	\$ 295.00	\$ 405.00
Medium	22" x 22"	24" x 36"	\$ 375.00	\$ 520.00
Large	30" x 36"	48" x 48"	\$ 765.00	\$ 880.00

CIRCULAR INLET CATCH BASINS				
	NOMINAL DIMENSIONS		PRODUCT UNIT PRICE	
	Minimum Inside Dimension	Maximum Inside Dimension	Standard Baskets (C1, C2, C4)	Stainless Baskets (C3)
Small	12" diameter	21" diameter	\$ 305.00	\$ 410.00
Large	22" diameter	36" diameter	\$ 495.00	\$ 620.00

COMBINATION INLET CATCH BASINS				
	NOMINAL DIMENSIONS		PRODUCT UNIT PRICE	
	Minimum Inside Dimension	Maximum Inside Dimension	Standard Baskets (C1, C2, C4)	Stainless Baskets (C3)
Small	12" x 12"	24" x 24"	\$ 345.00	\$ 460.00
Large	18" x 36"	36" x 36"	\$ 405.00	\$ 530.00

CURB INLET ONLY CATCH BASINS				
	NOMINAL DIMENSIONS		PRODUCT UNIT PRICE	
	Minimum Curb Opening	Maximum Curb Opening	Standard Baskets (C1, C2, C4)	Stainless Baskets (C3)
Small	2.0'	3.0'	\$ 325.00	\$ 430.00
Medium	3.1'	4.0'	\$ 415.00	\$ 535.00
Large	4.0'	7.0'	\$ 595.00	\$ 735.00

NOTES:

(1) Actual dimensions will be field verified by KriStar prior to fabrication/installation

(2) Products manufactured in accordance with Buy American contract provisions

(3) Prices include manufacturer installation

(4) Prices do not include any applicable sales taxes

(4) The following discounts are available for volume purchases

10-25 units Deduct \$10.00 per catch basin from above prices

More than 25 units Deduct \$25.00 per catch basin from above prices

(5) Optional Items (a) Fossil Rock Pouches @ \$15.00 per pouch

(b) Stainless Steel Trash and Debris Guards @ \$375.00 per each

Small Devices

KS-1

Combination Inlet Catch Basins

Device ID	Inside Dimensions	Price Stainless Baskets (C3) Per Unit
KS-1a	12 " x 12" - 24" x 24"	\$ 460.00
KS-1b	18"x 36" - 36" x 36"	\$ 530.00

KS-2(rect)

Flat Grated inlet style, Rectangular Inlet C3

Device ID	Inside Dimensions	Price Stainless Baskets (C3) Per Unit
KS-2a	12 " x 12" - 21" x 21"	\$405.00
KS-2b	22" x 22" - 24" x 36"	\$520.00
KS-2c	30" x 36" - 48" x 48"	\$880.00

KS-2(round)

Flat Grated inlet Style, Round Circular Inlet C3

Device ID	Inside Dimensions	Price Stainless Baskets (C3) Per Unit
KS-2d	12" - 21"	\$ 410.00
KS-2e	22" - 36"	\$ 620.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication/installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation
- (4) Prices do not include any applicable sales taxes
- (5) The following discounts are available for volume purchases
10-25 units Deduct \$10.00 per catch basin from above prices
More than 25 units Deduct \$25.00 per catch basin from above prices
- (6) Optional Items
 - (a) Fossil Rock Pouches @ \$15.00 per pouch
 - (b) Stainless Steel Trash and Debris Guards @ \$375.00 per each

KS-3

FlowGard Catch Basin Outlet Screen Insert

Device ID	Pipe Outlet Maximum Diameter	Unit Price
KS-3a	18"	\$ 795.00
KS-3b	24"	\$ 905.00
KS-3c	36"	\$995.00

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation

KS-7HF

FloGard Dual-Vortex Hydrodynamic Separator

Device ID	Unit Price
KS-7HF36	\$ 5,500.00
KS-7HF48	\$ 8,500.00
KS-7HF60	\$10,500.00
KS-7HF72	\$16,000.00
KS-7HF84	\$22,500.00
KS-7HF96	\$ 29,500.00
KS-7HF120	\$42,500.00
KS-7HF144	\$57,500.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include circular or square pre-cast concrete structures, joint sealant, factory installed internal components and access cover assemblies.
- (4) Purchaser is responsible for offloading and setting of structures
- (4) Prices do not include any applicable sales taxes
- (5) There is no purchase quantity discount available for this product

KS-8HF

FloGard Perk Filter

Device ID	Unit Price
KS-8HF50	\$ 6,500.00
KS-8HF49	\$ 23,700.00
KS-8HF611	\$41,600.00
KS-8HF818	\$85,750.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include precast concrete components, bolted, gasketed lids, factory-installed internal components and delivery to jobsite
- (4) Purchaser is responsible for offloading and setting of structures
- (4) Prices do not include any applicable sales taxes
- (5) There is no purchase quantity discount available for this product

KS-9HF

FloGard Swirl-Flo Screen Separator

Device ID	Nominal Manhole Diameter	Unit Price
KS-9HF48	48"	\$ 3,650.00
KS-9HF60	60"	\$ 5,495.00
KS-9HF96	96"	\$14,950.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include precast concrete components, bolted, gasketed lids, factory-installed internal components and delivery to jobsite
- (4) Purchaser is responsible for offloading and setting of structures
- (5) Prices do not include any applicable sales taxes
- (6) There is no purchase quantity discount available for this product

KS-10HF

Nettech Gross Pollutant Trap- In Line

Device ID	Nominal Pipe Diameter	Unit Price
KS-10HF _s	12"-24"	\$ 5,950.00
KS-10HF _m	30"-48"	\$ 8,950.00
KS-10HF _I	54"-72"	\$15,950.00

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation for interior or flange mount
- (4) Prices do not include any applicable sales taxes
- (5) There are no quantity purchase discounts available for this item

KS-11HF

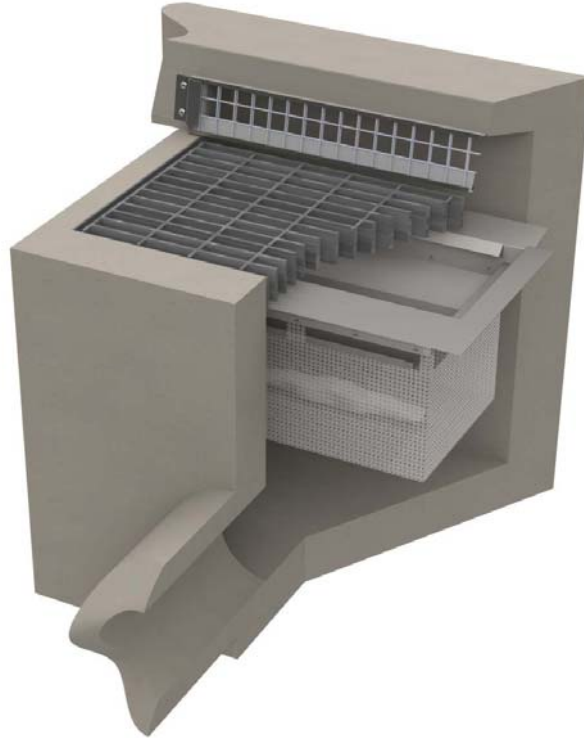
Nettech Gross Pollutant Trap- End of Line

Device ID	Nominal Pipe Diameter	Unit Price
KS-11HF _s	12"-24"	\$ 5,950.00
KS-11HF _m	30"-48"	\$ 8,950.00
KS-11HF _I	54"-72"	\$15,950.00

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation for interior or flange mount
- (4) Prices do not include any applicable sales taxes
- (5) There are no quantity purchase discounts available for this item

Catchbasin Insert, Full Capture Device

KS-1 Flo Gard Plus catchbasin filter Inserts, combination inlet style, stainless steel only (C3) Drop in Basket



Company Contact: KriStar Enterprises, Inc., Santa Rosa, CA Sales contact: Sue Lillo, 800-579-8819 slillo@kristar.com http://www.kristar.com	
Storage capacity: 1.8, 2.7 or 4.1 cubic feet depending on size of inlet	Replacement Parts: Available
Vendor's maintenance estimate: "Depends on the amount of runoff, pollutant loading and interference from debris"	Warranty: 5 years
Material: 304 stainless steel	Delivery Time: Typically 1 week for standard products; 3 weeks for customized products
Pricing: See over.	
Installed: FloGard inserts are in use in County of Sonoma, Alameda County Transit, Santa Clara Valley Transit Authority, Riverside County-TLMA	

Appendix B- Item Q Pricing Schedule

Name of Proposing Company: KriStar Enterprises, Inc.

Name of Device: FloGard® Plus Catch Basin Inserts

FLAT GRATED CATCH BASINS				
	NOMINAL DIMENSIONS		PRODUCT UNIT PRICE	
	Minimum Inside Dimension	Maximum Inside Dimension	Standard Baskets (C1, C2, C4)	Stainless Baskets (C3)
Small	12 " x 12"	21" x 21"	\$ 295.00	\$ 405.00
Medium	22" x 22"	24" x 36"	\$ 375.00	\$ 520.00
Large	30" x 36"	48" x 48"	\$ 765.00	\$ 880.00
CIRCULAR INLET CATCH BASINS				
	NOMINAL DIMENSIONS		PRODUCT UNIT PRICE	
	Minimum Inside Dimension	Maximum Inside Dimension	Standard Baskets (C1, C2, C4)	Stainless Baskets (C3)
Small	12 " diameter	21" diameter	\$ 305.00	\$ 410.00
Large	22" diameter	36" diameter	\$ 495.00	\$ 620.00
COMBINATION INLET CATCH BASINS				
	NOMINAL DIMENSIONS		PRODUCT UNIT PRICE	
	Minimum Inside Dimension	Maximum Inside Dimension	Standard Baskets (C1, C2, C4)	Stainless Baskets (C3)
Small	12 " x 12"	24" x 24"	\$ 345.00	\$ 460.00
Large	18"x 36"	36" x 36"	\$ 405.00	\$ 530.00
CURB INLET ONLY CATCH BASINS				
	NOMINAL DIMENSIONS		PRODUCT UNIT PRICE	
	Minimum Curb Opening	Maximum Curb Opening	Standard Baskets (C1, C2, C4)	Stainless Baskets (C3)
Small	2.0'	3.0'	\$ 325.00	\$ 430.00
Medium	3.1'	4.0'	\$ 415.00	\$ 535.00
Large	4.0'	7.0'	\$ 595.00	\$ 735.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication/installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation
- (4) Prices do not include any applicable sales taxes
- (4) The following discounts are available for volume purchases

10-25 units Deduct \$10.00 per catch basin from above prices
 More than 25 units Deduct \$25.00 per catch basin from above prices

- (5) Optional Items (a) Fossil Rock Pouches @ \$15.00 per pouch
- (b) Stainless Steel Trash and Debris Guards @ \$375.00 per each

Small Devices

KS-1

Combination Inlet Catch Basins

Device ID	Inside Dimensions	Price Stainless Baskets (C3) Per Unit
KS-1a	12 " x 12" - 24" x 24"	\$ 460.00
KS-1b	18"x 36" - 36" x 36"	\$ 530.00

KS-2(rect)

Flat Grated inlet style, Rectangular Inlet C3

Device ID	Inside Dimensions	Price Stainless Baskets (C3) Per Unit
KS-2a	12 " x 12" - 21" x 21"	\$405.00
KS-2b	22" x 22" - 24" x 36"	\$520.00
KS-2c	30" x 36" - 48" x 48"	\$880.00

KS-2(round)

Flat Grated inlet Style, Round Circular Inlet C3

Device ID	Inside Dimensions	Price Stainless Baskets (C3) Per Unit
KS-2d	12" - 21"	\$ 410.00
KS-2e	22" - 36"	\$ 620.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication/installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation
- (4) Prices do not include any applicable sales taxes
- (5) The following discounts are available for volume purchases
10-25 units Deduct \$10.00 per catch basin from above prices
More than 25 units Deduct \$25.00 per catch basin from above prices
- (6) Optional Items
 - (a) Fossil Rock Pouches @ \$15.00 per pouch
 - (b) Stainless Steel Trash and Debris Guards @ \$375.00 per each

KS-3

FlowGard Catch Basin Outlet Screen Insert

Device ID	Pipe Outlet Maximum Diameter	Unit Price
KS-3a	18"	\$ 795.00
KS-3b	24"	\$ 905.00
KS-3c	36"	\$995.00

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation

Catchbasin Insert, Full Capture Device

GFI-1 "Wavy" Grate Trash Catcher

Connector pipe screen; option for use with curb inlet catchbasins (add'l cost)



<p>Company Contact: Gentile Family Industries (Waterway Solutions) Sales contact: Gail Brice, 562-592-5989 gail.brice@waterwaysolution.com www.waterwaysolution.com</p>	
<p>Storage capacity: "For a 24" x 24" x 24" catchbasin, trash storage capacity will be 3.46 cubic feet of trash."</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: Routine trash removal & cleaning of deflector screen w/wire brush</p>	<p>Warranty: 5 yrs</p>
<p>Material: Marine-grade 316 stainless steel</p>	<p>Delivery Time: "45 days from initial order. Once inventory is in place, maximum of two weeks to installation."</p>
<p>Pricing: See over.</p>	

Comments from reference checks

Device effectiveness in capturing trash

Good ratings for installation process and durability

Other

Good customer service

"Installations in locations where street slope is in excess of 5% will need to be evaluated to determine if standard design is appropriate"

Gentile Family Industries – (Waterway Solutions)

SMALL CATCH BASINS < 36" DEEP

WAVY Grate Trash Catcher – Vendor Model GFI-1-GS (Grated Inlet)

Device ID	Number of Devices	Price per Unit (Includes Installation)
GFI-1GS	10-49	\$399.00
GFI-1GS	50-99	\$375.00
GFI-1GS	100-499	\$365.00
GFI-1GS	500-999	\$349.00
GFI-1GS	1000-2499	\$330.00
GFI-1GS	2499-5000+	\$299.00

Note: Orders of less than 10 units will be charged a minimum of \$4800.00

WAVY Grate Trash Catcher – Vendor Model GFI-1-CS (Curb Inlet)

Device ID	Number of Devices	Price per Unit (Includes Installation)
GFI-1CS	10-49	\$399.00
GFI-1CS	50-99	\$375.00
GFI-1CS	100-499	\$365.00
GFI-1CS	500-999	\$349.00
GFI-1CS	1000-2499	\$330.00
GFI-1CS	2499-5000+	\$299.00

Note: Orders of less than 10 units will be charged a minimum of \$4800.00

MEDIUM CATCH BASINS (36" – 60" Deep)

WAVY Grate Trash Catcher – Vendor Model GFI-1-GM (Grated Inlet)

Device ID	Number of Devices	Price per Unit (Includes Installation)
GFI-1GM	10-49	\$440.00
GFI-1GM	50-99	\$425.00
GFI-1GM	100-499	\$415.00
GFI-1GM	500-999	\$410.00
GFI-1GM	1000-2499+	\$375.00

Note: Orders of less than 10 units will be charged a minimum of \$4800.00

WAVY Grate Trash Catcher – Vendor Model GFI-1-CM (Curb Inlet)

Device ID	Number of Devices	Price per Unit (Includes Installation)
GFI-1CM	10-49	\$440.00
GFI-1CM	50-99	\$425.00
GFI-1CM	100-499	\$415.00
GFI-1CM	500-999	\$410.00
GFI-1CM	1000-2499+	\$375.00

Note: Orders of less than 10 units will be charged a minimum of \$4800.00

LARGE CATCH BASINS (61" – 96" Deep)

WAVY Grate Trash Catcher – Vendor Model GFI-1-GL (Grated Inlet)

Device ID	Number of Devices	Price per Unit (Includes Installation)
GFI-1GL	10-49	\$485.00
GFI-1GL	50-99	\$475.00
GFI-1GL	100-499	\$460.00
GFI-1GL	500-999	\$455.00
GFI-1GL	1000-2499	\$445.00
GFI-1GL	2499-5000+	\$425.00

Note: Orders of less than 10 units will be charged a minimum of \$4800.00

WAVY Grate Trash Catcher – Vendor Model GFI-1-CL (Curb Inlet)

Device ID	Number of Devices	Price per Unit (Includes Installation)
GFI-1CL	10-49	\$485.00
GFI-1CL	50-99	\$475.00
GFI-1CL	100-499	\$460.00
GFI-1CL	500-999	\$455.00
GFI-1CL	1000-2499	\$445.00
GFI-1CL	2499-5000+	\$425.00

Note: Orders of less than 10 units will be charged a minimum of \$4800.00

Curb Inlet Screens

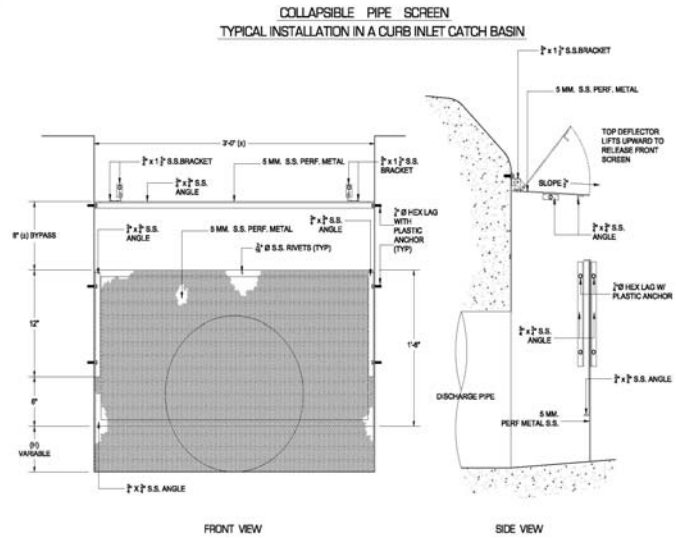
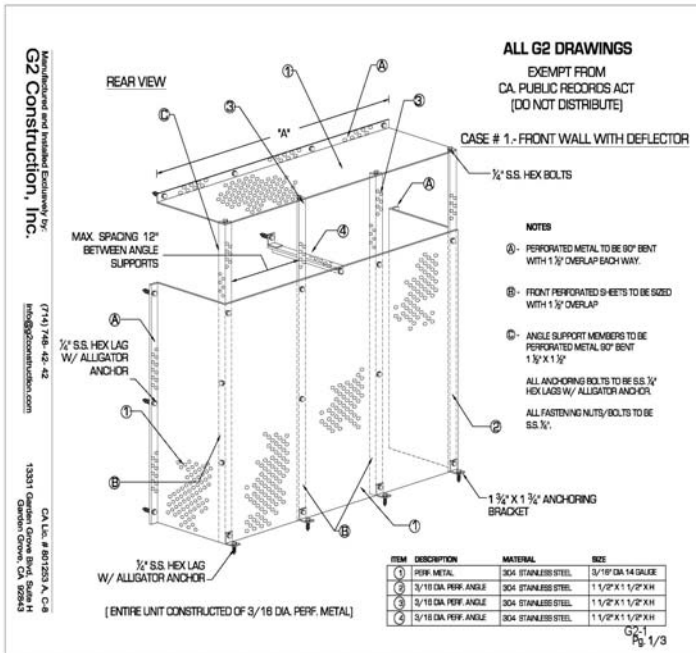
ARS- Automatic Retractable Screen – Vendor Model GFI TS (1 thru 6)

Device ID	Curb Opening Length	Vendor Model Number	Price per Unit (Includes Installation)
GFI-2TS1	<5 feet	GFI-2-TS-1	\$360.00
GFI-2TS2	5-10 feet	GFI-2-TS-2	\$425.00
GFI-2TS3	10-15 feet	GFI-2-TS-3	\$905.00
GFI-2TS4	15-20 feet	GFI-2-TS-4	\$1235.00
GFI-2TS5	20-25 feet	GFI-2-TS-5	\$1525.00
GFI-2TS6	25-30 feet	GFI-2-TS-6	\$2100.00

Note: Minimum order \$3600.00. 10% Discount for order of 100+ ARS devices.

Catchbasin Insert, Full Capture Device

G2-1, G2-1R Collector Pipe Screen, Collector Pipe Screen (Removable) Connector pipe screen



<p>Company Contact: G2 Construction, Inc., Garden Grove, CA Sales contact: John R. Alvarado, 714-448-8080 jalvarado@g2construction.com http://g2construction.com</p>	
<p>Storage capacity: depends on size of catchbasin</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: Clogged device requires 5-10 minutes to clean depending on size</p>	<p>Warranty: 1 yr workmanship/3 yrs parts+materials</p>
<p>Material: stainless steel 304 grade</p>	<p>Delivery Time: "G2 can provide product and installation within 10 working days of ordering"</p>
<p>Pricing: See over.</p>	

Comments from reference checks

Device effectiveness in capturing trash

All screens collected trash effectively. Some minor problems with mud getting into the catch basins but otherwise the screens performed well.

Maintenance issues/experience

Make sure the bypass of the water is the size appropriate for the inlet and screen device. Sharp edges on the screen are a hazard to municipal workers. Installation of screens was within the time specified by the vendor.

Other

Reference was satisfied with the vendor's customer service.

SFBA - G2 Removable "CPS"

Collector Pipe Screen Pricing Scale

These removable units are designed for the 2'x3' grates inlets around the Bay Area.

Qty. Units	Cost Per unit
100 - 500	\$475.00
501- 1500	\$450.00
1501 - 3500	\$425.00
3501 +	\$400.00

Notes; Pricing does not include catch basin cleaning
Pricing does not include permits or fees
Pricing does include product and installation at prevailing wages.
Pricing does not include hydraulic sizing analysis for device sizing.

This is a Stainless Steel 5mm perforated screen installed with approved plastic anchors and stainless steel hardware.

Our device is modeled after L.A. County designs and parameters.
New parameters or minimum device sizing will have to be determined by local agencies prior to installation.

Pricing to remain in effect for 2 years from bid due date.

G2-1 “CPS” Connector Pipe Screen

Device ID	Quantity	Price per Unit
G2-1	30-100	\$475.00
G2-1	101-500	\$450.00
G2-1	501-1000	\$390.00
G2-1	1001 +	\$350.00

Note: Pricing does not include catch basin cleaning
Pricing does not include permits or fees
Pricing does include product and installation at prevailing wages
Pricing does not include hydraulic sizing analysis for device sizing

This is a stainless steel 5mm perforated screen installed with approved Plastic anchors and stainless steel hardware.

Our device is modeled after L.A. County designs and parameters.
New parameters or minimum device sizing will have to be determined by local agencies prior to installation.

Pricing to remain in effect for 2 years from bid due date.

G2-1R “Removable CPS” Connector Pipe Screen

Device ID	Quantity	Price per Unit
G2-1R	30-100	\$475.00
G2-1R	101-500	\$450.00
G2-1R	501-1000	\$425.00
G2-1R	1001 +	\$400.00

Note: Pricing does not include catch basin cleaning
Pricing does not include permits or fees
Pricing does include product and installation at prevailing wages
Pricing does not include hydraulic sizing analysis for device sizing

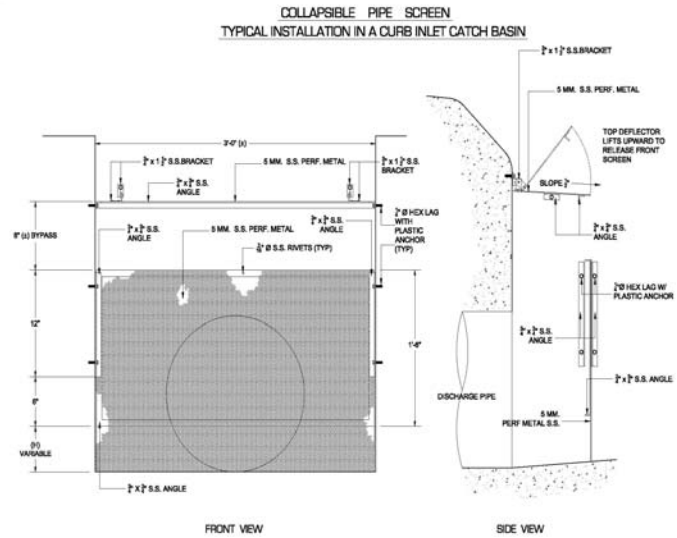
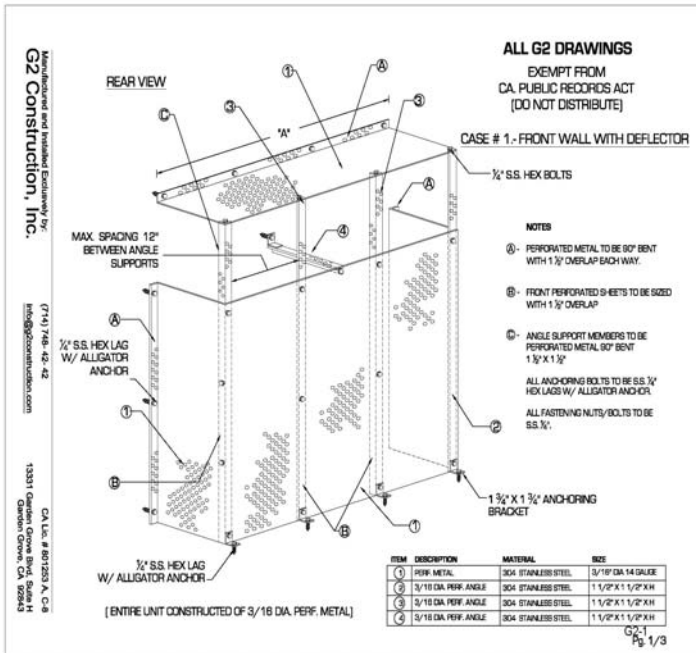
This is a stainless steel 5mm perforated screen installed with approved Plastic anchors and stainless steel hardware.

Our device is modeled after L.A. County designs and parameters.
New parameters or minimum device sizing will have to be determined by local agencies prior to installation.

Pricing to remain in effect for 2 years from bid due date.

Catchbasin Insert, Full Capture Device

G2-1, G2-1R Collector Pipe Screen, Collector Pipe Screen (Removable) Connector pipe screen



Manufactured and Installed Exclusively by:
G-2 Construction, Inc.
(714) 748-4242
info@g2construction.com
CA Lic. # B01263 A, C-B
13331 Garden Grove Blvd, Suite H
Garden Grove, CA 92643

<p>Company Contact: G2 Construction, Inc., Garden Grove, CA Sales contact: John R. Alvarado, 714-448-8080 jalvarado@g2construction.com http://g2construction.com</p>	
<p>Storage capacity: depends on size of catchbasin</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: Clogged device requires 5-10 minutes to clean depending on size</p>	<p>Warranty: 1 yr workmanship/3 yrs parts+materials</p>
<p>Material: stainless steel 304 grade</p>	<p>Delivery Time: "G2 can provide product and installation within 10 working days of ordering"</p>
<p>Pricing: See over.</p>	

Comments from reference checks

Device effectiveness in capturing trash

All screens collected trash effectively. Some minor problems with mud getting into the catch basins but otherwise the screens performed well.

Maintenance issues/experience

Make sure the bypass of the water is the size appropriate for the inlet and screen device. Sharp edges on the screen are a hazard to municipal workers. Installation of screens was within the time specified by the vendor.

Other

Reference was satisfied with the vendor's customer service.

SFBA "CPS" Collector Pipe Screen Pricing Scale

Qty. Units	Cost Per unit
100 - 500	\$500.00
501- 1500	\$445.00
1501 - 3500	\$390.00
3501 +	\$350.00

Notes; Pricing does not include catch basin cleaning
Pricing does not include permits or fees
Pricing does include product and installation at prevailing wages.
Pricing does not include hydraulic sizing analysis for device sizing.

This is a Stainless Steel 5mm perforated screen installed with approved plastic anchors and stainless steel hardware.

Our device is modeled after L.A. County designs and parameters.
New parameters or minimum device sizing will have to be determined by local agencies prior to installation.

Pricing to remain in effect for 2 years from bid due date.

G2-1 “CPS” Connector Pipe Screen

Device ID	Quantity	Price per Unit
G2-1	30-100	\$475.00
G2-1	101-500	\$450.00
G2-1	501-1000	\$390.00
G2-1	1001 +	\$350.00

Note: Pricing does not include catch basin cleaning
Pricing does not include permits or fees
Pricing does include product and installation at prevailing wages
Pricing does not include hydraulic sizing analysis for device sizing

This is a stainless steel 5mm perforated screen installed with approved Plastic anchors and stainless steel hardware.

Our device is modeled after L.A. County designs and parameters.
New parameters or minimum device sizing will have to be determined by local agencies prior to installation.

Pricing to remain in effect for 2 years from bid due date.

G2-1R “Removable CPS” Connector Pipe Screen

Device ID	Quantity	Price per Unit
G2-1R	30-100	\$475.00
G2-1R	101-500	\$450.00
G2-1R	501-1000	\$425.00
G2-1R	1001 +	\$400.00

Note: Pricing does not include catch basin cleaning
Pricing does not include permits or fees
Pricing does include product and installation at prevailing wages
Pricing does not include hydraulic sizing analysis for device sizing

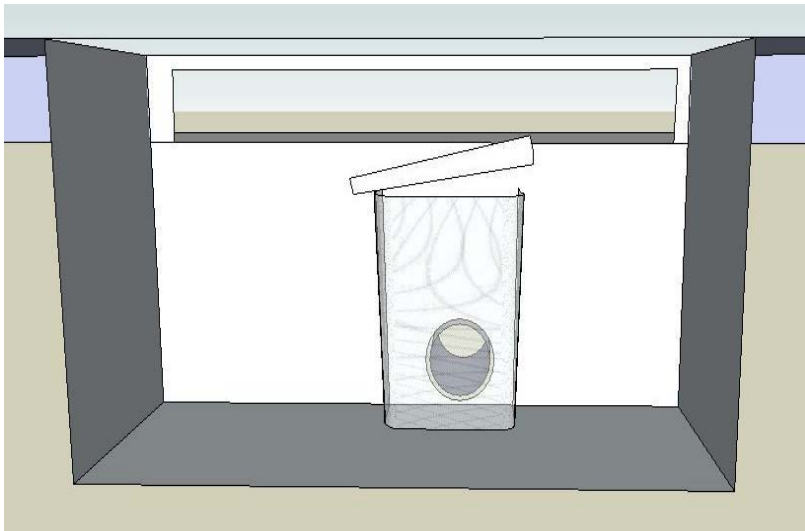
This is a stainless steel 5mm perforated screen installed with approved Plastic anchors and stainless steel hardware.

Our device is modeled after L.A. County designs and parameters.
New parameters or minimum device sizing will have to be determined by local agencies prior to installation.

Pricing to remain in effect for 2 years from bid due date.

Catchbasin Insert, Full Capture Device

ECI-1 Debris Dam Connector pipe screen



<p>Company Contact: Ecology Control Industries (American Stormwater), Torrance, CA Sales contact: Todd Waters, 310-354-9999 x284 twaters@ecologycontrol.com http://www.ecologycontrol.com</p>	
<p>Storage capacity: Depends on size of catchbasin</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: Remove trash when at least 40% full</p>	<p>Warranty: 1 yr workmanship/3 yrs parts+materials</p>
<p>Material: Series 304 stainless steel, 14 & 16 gauge</p>	<p>Delivery Time: Estimated delivery/installation time from receipt of order can range from 2 to 4 weeks depending on quantity</p>
<p>Pricing: See over.</p>	

Comments from reference checks

Device effectiveness in capturing trash

Reference satisfied with trash capture

Maintenance issues/experience

Inspection necessary after every significant storm

Price including price breaks or discounts for quantity orders. Price should include installation. Prices shall remain in effect for two years from contract execution. (Attach extra sheets or a detailed price list or spreadsheet as appropriate).

Options and/or exclusions; alternate prices dependent on the scope of work at a specific location: All work or devices not described within the RFP, will be quoted on a case by case basis.

Price Sheet

Item No.		Unit of Measure	Approx. Quantity	Automatic Retractable Curb Screens (ARS) Pricing	100% Full Capture Insert	
6	Furnish & Install Full Capture Insert	EA	N/A		\$375.00	

Ecology Control Industries (American Stormwater)

ECI-1 Debris Dam

Device ID	Price per Unit
ECI-1	\$375.00

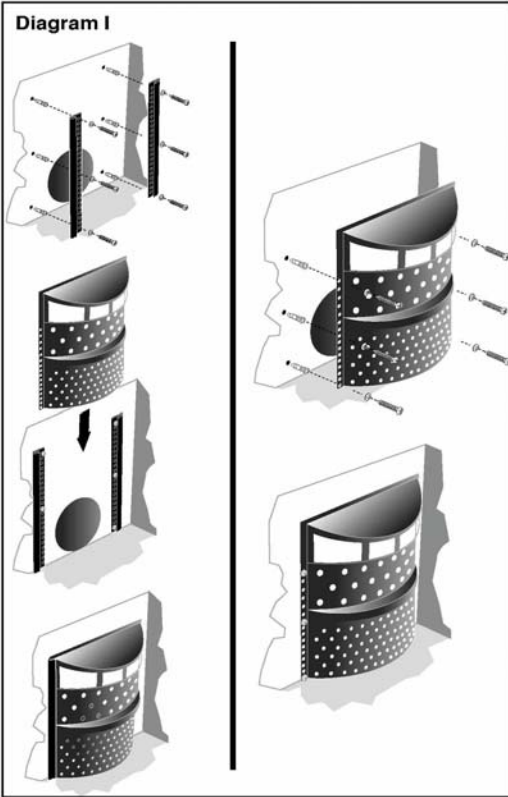
ECI-2 Surfgate (Automatic Retractable Screen)

Device ID	Size	# of Screens	Price per Unit
ECI-2a	0-5'	1	\$395.00
ECI-2b	5'-8'	2	\$770.00
ECI-2c	8'-15'	3-4	\$1190.00
ECI-2d	15'-22'	4-5	\$1590.00
ECI-2e	22'-29'	5	\$2500.00

Catchbasin Insert, Full Capture Device

BC-4 Trash Guard

Plastic (HDPE) catchbasin connector pipe screen.
3 standard sizes



Company Contact:

Bio Clean Environmental Services, Inc.,
Oceanside, CA
Sales contacts: Greg Kent, (760) 433-7640
or Kirk Vallejo, (760) 681-9583
gkent@biocleanenvironmental.net
kvallejo@biocleanenvironmental.net
<http://www.biocleanenvironmental.com>

Storage capacity: depends on size of catchbasin

Replacement Parts: Available

Vendor's maintenance estimate:

Between May 1 and Sept. 30, clean filter when
over 40% full

Warranty: 1 yr

Material: High-density polyethylene

Delivery Time: 50 or fewer 4 weeks; 50-100 6 weeks;
100-250 10 weeks; call for more than 250

Pricing: See over. Have uninstalled price. Traffic control not included in pricing

TrashGuard

Table 2

Prices for California "Full Trash Capture" TrashGuard Price Includes Installation

Size Range	Price per System Installed - 1 to 25	Price per System Installed - 26 to 99	Price Per System - 100 to 499	Price Per System Installed 500 to 999	Price Per System Installed 1000 +
23"	\$540.00	\$506.00	\$484.00	\$476.00	\$468.00
28"	\$565.00	\$529.00	\$505.00	\$497.00	\$489.00
34"	\$637.00	\$597.00	\$569.00	\$560.00	\$550.00

Prices for California "Full Trash Capture" TrashGuard Price Includes Installation and Vendor Measure

Size Range	Price per System Installed 1 to 25	Price per System Installed 26 to 99	Price per System Installed 100 to 499	Price per System Installed 500 to 999	Price per System Installed 1000 +
23"	\$575.00	\$541.00	\$519.00	\$511.00	\$503.00
28"	\$600.00	\$564.00	\$540.00	\$532.00	\$524.00
34"	\$672.00	\$623.00	\$604.00	\$595.00	\$585.00

Catch Basins Must Be Cleaned Prior To Installation

Installation is Based Upon Prevailing Rates

Distributed Exclusively by Bio Clean Environmental Services, Inc

US Patent # 7276156

1 Year Warranty



Southern California
2972 San Lus Rey Rd.
Oceanside, CA 92058
Phone 760-433-7640

Northern California
690 Sunlow St.
San Jose, CA 95126
Phone 760-579-1584

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BC-4**Prices for California "Full Trash Capture" TrashGard
Price Includes Installation (without Vendor Measure)**

Device ID	Size Range	Size Range Price per System Installed - 1 to 25	Price per System Installed 26 to 99	Price Per System - Installed 100 to 499	Price Per System Installed 500 to 999	Price Per System Installed 1000 +
BC-4a	23"	\$540.00	\$506.00	\$484.00	\$476.00	\$468.00
BC-4b	28"	\$565.00	\$529.00	\$505.00	\$497.00	\$489.00
BC-4c	34"	\$637.00	\$597.00	\$569.00	\$560.00	\$550.00

**Prices for California "Full Trash Capture" TrashGard
Price Includes Installation and Vendor Measure**

Device ID	Size Range	Price per System Installed 1 to 25	Price per System Installed 26 to 99	Price per System Installed 100 to 499	Price per System Installed 500 to 999	Price per System Installed 1000 +
BC-4d	23"	\$575.00	\$541.00	\$519.00	\$511.00	\$503.00
BC-4e	28"	\$600.00	\$564.00	\$540.00	\$532.00	\$524.00
BC-4f	34"	\$672.00	\$623.00	\$604.00	\$595.00	\$585.00

Catchbasin Insert, Full Capture Device

BC-3 Modular Connector Pipe Screen

Catchbasin connector pipe screen (CPS), removable



<p>Company Contact: Bio Clean Environmental Services, Inc., Oceanside, CA Sales contacts: Greg Kent, (760) 433-7640 or Kirk Vallejo, (760) 681-9583 gkent@biocleanenvironmental.net kvallejo@biocleanenvironmental.net http://www.biocleanenvironmental.com</p>	
<p>Storage capacity: depends on size of catchbasin</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: Between May 1 and Sept. 30, clean filter when over 40% full</p>	<p>Warranty: 5 yrs</p>
<p>Material: Type 316 stainless steel</p>	<p>Delivery Time: 50 or fewer 4 weeks; 50-100 6 weeks; 100-250 10 weeks; call for more than 250</p>
<p>Pricing: See over. Have uninstalled price. Traffic control not included in pricing</p>	

No reference information available

BIO CLEAN MODULAR CPS

TABLE 2

Prices Include Installation

Size	Price per System Installed	Price per System Installed - Vendor Measure	Discounted Price Installed - 50 to 200 units	Discounted Price Installed - 50 to 200 - Vendor Measure	Discounted Price Installed 200 Plus	Discounted Price Installed 200 Plus - Vendor Measure
26" Wide x 12" Tall	\$409.00	\$474.00	\$389.00	\$449.00	\$404.00	\$454.00
26" Wide x 18" Tall	\$656.00	\$721.00	\$685.00	\$745.00	\$670.00	\$720.00
26" Wide x 24" Tall	\$728.00	\$793.00	\$753.00	\$813.00	\$731.00	\$781.00
26" Wide x 30" Tall	\$975.00	\$1,040.00	\$988.00	\$1,048.00	\$943.00	\$993.00
26" wide x 36" Tall	\$1,047.00	\$1,112.00	\$1,056.00	\$1,116.00	\$1,004.00	\$1,054.00
32" Wide x 12" Tall	\$503.00	\$568.00	\$539.00	\$599.00	\$539.00	\$589.00
32" Wide x 18" Tall	\$820.00	\$885.00	\$840.00	\$900.00	\$810.00	\$860.00
32" Wide x 24" Tall	\$906.00	\$971.00	\$922.00	\$982.00	\$883.00	\$933.00
32" Wide x 30" Tall	\$1,243.00	\$1,308.00	\$1,242.00	\$1,302.00	\$1,171.00	\$1,221.00
32" wide x 36" Tall	\$1,329.00	\$1,394.00	\$1,324.00	\$1,384.00	\$1,245.00	\$1,295.00
36" Wide x 12" Tall	\$525.00	\$590.00	\$560.00	\$620.00	\$558.00	\$608.00
36" Wide x 18" Tall	\$868.00	\$933.00	\$886.00	\$946.00	\$851.00	\$901.00
36" Wide x 24" Tall	\$960.00	\$1,025.00	\$973.00	\$1,033.00	\$929.00	\$979.00
36" Wide x 30" Tall	\$1,293.00	\$1,358.00	\$1,240.00	\$1,350.00	\$1,215.00	\$1,301.00
36" wide x 36" Tall	\$1,400.00	\$1,465.00	\$1,391.00	\$1,451.00	\$1,305.00	\$1,355.00
42" Wide x 12" Tall	\$639.00	\$704.00	\$668.00	\$728.00	\$655.00	\$705.00
42" Wide x 18" Tall	\$1,042.00	\$1,107.00	\$1,051.00	\$1,111.00	\$999.00	\$1,049.00
42" Wide x 24" Tall	\$1,148.00	\$1,213.00	\$1,152.00	\$1,212.00	\$1,090.00	\$1,140.00
42" Wide x 30" Tall	\$1,551.00	\$1,616.00	\$1,535.00	\$1,595.00	\$1,435.00	\$1,485.00
42" wide x 36" Tall	\$1,657.00	\$1,722.00	\$1,635.00	\$1,695.00	\$1,525.00	\$1,575.00
48" Wide x 12" Tall	\$671.00	\$736.00	\$699.00	\$759.00	\$683.00	\$733.00
48" Wide x 18" Tall	\$1,080.00	\$1,146.00	\$1,088.00	\$1,148.00	\$1,033.00	\$1,083.00
48" Wide x 24" Tall	\$1,192.00	\$1,257.00	\$1,194.00	\$1,254.00	\$1,128.00	\$1,178.00
48" Wide x 30" Tall	\$1,601.00	\$1,666.00	\$1,582.00	\$1,642.00	\$1,477.00	\$1,527.00
48" wide x 36" Tall	\$1,713.00	\$1,778.00	\$1,689.00	\$1,749.00	\$1,574.00	\$1,624.00

Catch Basins Must Be Cleaned Prior To Installation

Installation is Based Upon Prevailing Wage Rates

5 Year Warranty



Southern California
 2972 San Lus Rey Rd.
 Oceanside, CA 92058
 Phone 760-433-7640

Northern California
 690 Sunlow St.
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BC-3**Prices Include Installation**

Device ID	Size	Size Price per System Installed	Price per System Installed - Vendor Measure	Discounted Price Installed - 50 to 200 units	Discounted Price Installed - 50 to 200 - Vendor Measure	Discounted Price Installed 200 Plus	Discounted Price Installed 200 Plus - Vendor Measure
BC-3a	26" Wide x 12" Tall	\$409.00	\$474.00	\$389.00	\$449.00	\$404.00	\$454.00
BC-3b	26" Wide x 18" Tall	\$656.00	\$721.00	\$685.00	\$745.00	\$670.00	\$720.00
BC-3c	26" Wide x 24" Tall	\$728.00	\$793.00	\$753.00	\$813.00	\$731.00	\$781.00
BC-3d	26" Wide x 30" Tall	\$975.00	\$1,040.00	\$988.00	\$1,048.00	\$943.00	\$993.00
BC-3e	26" wide x 36" Tall	\$1,047.00	\$1,112.00	\$1,056.00	\$1,116.00	\$1,004.00	\$1,054.00
BC-3f	32" Wide x 12" Tall	\$503.00	\$568.00	\$539.00	\$599.00	\$539.00	\$589.00
BC-3g	32" Wide x 18" Tall	\$820.00	\$885.00	\$840.00	\$900.00	\$810.00	\$860.00
BC-3h	32" Wide x 24" Tall	\$906.00	\$971.00	\$922.00	\$982.00	\$883.00	\$933.00
BC-3i	32" Wide x 30" Tall	\$1,243.00	\$1,308.00	\$1,242.00	\$1,302.00	\$1,171.00	\$1,221.00
BC-3j	32" wide x 36" Tall	\$1,329.00	\$1,394.00	\$1,324.00	\$1,384.00	\$1,245.00	\$1,295.00
BC-3k	36" Wide x 12" Tall	\$525.00	\$590.00	\$560.00	\$620.00	\$558.00	\$608.00
BC-3l	36" Wide x 18" Tall	\$868.00	\$933.00	\$886.00	\$946.00	\$851.00	\$901.00
BC-3m	36" Wide x 24" Tall	\$960.00	\$1,025.00	\$973.00	\$1,033.00	\$929.00	\$979.00
BC-3n	36" Wide x 30" Tall	\$1,293.00	\$1,358.00	\$1,240.00	\$1,350.00	\$1,215.00	\$1,301.00
BC-3o	36" wide x 36" Tall	\$1,400.00	\$1,465.00	\$1,391.00	\$1,451.00	\$1,305.00	\$1,355.00
BC-3p	42" Wide x 12" Tall	\$639.00	\$704.00	\$668.00	\$728.00	\$655.00	\$705.00
BC-3q	42" Wide x 18" Tall	\$1,042.00	\$1,107.00	\$1,051.00	\$1,111.00	\$999.00	\$1,049.00
BC-3r	42" Wide x 24" Tall	\$1,148.00	\$1,213.00	\$1,152.00	\$1,212.00	\$1,090.00	\$1,140.00
BC-3s	42" Wide x 30" Tall	\$1,551.00	\$1,616.00	\$1,535.00	\$1,595.00	\$1,435.00	\$1,485.00
BC-3t	42" wide x 36" Tall	\$1,657.00	\$1,722.00	\$1,635.00	\$1,695.00	\$1,525.00	\$1,575.00
BC-3u	48" Wide x 12" Tall	\$671.00	\$736.00	\$699.00	\$759.00	\$683.00	\$733.00
BC-3v	48" Wide x 18" Tall	\$1,080.00	\$1,146.00	\$1,088.00	\$1,148.00	\$1,033.00	\$1,083.00
BC-3w	48" Wide x 24" Tall	\$1,192.00	\$1,257.00	\$1,194.00	\$1,254.00	\$1,128.00	\$1,178.00
BC-3x	48" Wide x 30" Tall	\$1,601.00	\$1,666.00	\$1,582.00	\$1,642.00	\$1,477.00	\$1,527.00
BC-3y	48" wide x 36" Tall	\$1,713.00	\$1,778.00	\$1,689.00	\$1,749.00	\$1,574.00	\$1,624.00

Catch Basins Must Be Cleaned Prior To Installation Installation is Based Upon Prevailing Wage Rates

Catchbasin Insert, Full Capture Device

BC-2 Curb Inlet Basket (Standard, HC Round and Continues)



<p>Company Contact: Bio Clean Environmental Services, Inc., Oceanside, CA Sales contacts: Greg Kent, (760) 433-7640 or Kirk Vallejo, (760) 681-9583 gkent@biocleanenvironmental.net kvallejo@biocleanenvironmental.net http://www.biocleanenvironmental.com</p>	
<p>Storage capacity: range of sizes</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: Clean filter when over 40% full (May 1 - Sept 30); replace hydrocarbon boom at least 2 times per year</p>	<p>Warranty: 5 yrs</p>
<p>Material: Marine-grade fiberglass main body, stainless steel screen</p>	<p>Delivery Time: 50 or fewer 4 weeks; 50-100 6 weeks; 100-250 10 weeks; call for more than 250</p>
<p>Pricing: See over. Have uninstalled price. Traffic control not included in pricing</p>	

Comments from reference checks

Device effectiveness in capturing trash

Reference is positive. Prefers the round design for ease of maintenance and overall quality.

Maintenance issues/experience

Maintenance likes these. Uses a vactor truck to clean

Other:

Good customer service, on-time delivery, oil and grease absorbent filter

Curb Inlet Basket

Prices for Standard Curb Inlet Basket with "Easy Maintenance Shelf System"

Evaluated the easiest to clean by the City & County of Honolulu*
All Prices Include Installation

Size Range	Price per System	Price per System - Vendor Measured	Discounted Price - 25 to 100	Discounted Price - Vendor Measured - 25 to 100	Discounted Price - 101 and Over	Discounted Price - Vendor Measured - 101 and Over
2' - 4'	\$1,025.00	\$1,060.00	\$985.00	\$1,025.00	\$948.00	\$985.00
4'1" - 5'	\$1,085.00	\$1,125.00	\$1,045.00	\$1,085.00	\$1,006.00	\$1,045.00
5'1" - 7'	\$1,175.00	\$1,215.00	\$1,130.00	\$1,175.00	\$1,088.00	\$1,130.00
7'1" - 9'	\$1,280.00	\$1,330.00	\$1,235.00	\$1,280.00	\$1,190.00	\$1,235.00
9'1" - 11'	\$1,410.00	\$1,825.00	\$1,365.00	\$1,410.00	\$1,315.00	\$1,365.00
11'1" - 14'	\$1,515.00	\$1,565.00	\$1,460.00	\$1,515.00	\$1,407.00	\$1,460.00
14'1" - 18'	\$1,770.00	\$1,830.00	\$1,705.00	\$1,770.00	\$1,643.00	\$1,705.00
18'1" - 22'	\$1,950.00	\$2,020.00	\$1,880.00	\$1,950.00	\$1,812.00	\$1,880.00

Prices for High Capacity Round Curb Inlet Basket with "Easy Maintenance Shelf System"

All Prices Include Installation

Size Range	Price per System	Price per System - Vendor Measured	Discounted Price - 25 to 100	Discounted Price - Vendor Measured - 25 to 100	Discounted Price - 101 and Over	Discounted Price - Vendor Measured - 101 and Over
2' - 4'	\$1,170.00	\$1,210.00	\$1,125.00	\$1,170.00	\$1,083.00	\$1,125.00
4'1" - 5'	\$1,280.00	\$1,295.00	\$1,205.00	\$1,280.00	\$1,161.00	\$1,205.00
5'1" - 7'	\$1,365.00	\$1,415.00	\$1,315.00	\$1,365.00	\$1,267.00	\$1,315.00
7'1" - 9'	\$1,420.00	\$1,470.00	\$1,370.00	\$1,420.00	\$1,320.00	\$1,370.00
9'1" - 11'	\$1,535.00	\$1,590.00	\$1,480.00	\$1,535.00	\$1,426.00	\$1,480.00
11'1" - 14'	\$1,625.00	\$1,685.00	\$1,570.00	\$1,625.00	\$1,514.00	\$1,570.00
14'1" - 18'	\$1,730.00	\$1,900.00	\$1,770.00	\$1,730.00	\$1,707.00	\$1,770.00
18'1" - 22'	\$2,015.00	\$2,085.00	\$1,945.00	\$2,015.00	\$1,875.00	\$1,945.00

* Please reference "The Efficiency of Storm Drain Filters in Removing Pollutants from Urban Road Runoff". Prepared by Eric Heinen DeCarlo, PhD. & Robert J. Morenweck. Department of Oceanography, 1000 Pope Road, University of Hawaii, Honolulu, Hawaii 96822.

All of the Above System Prices Include "Easy Maintenance Shelf System"

Prices for Continues Curb Inlet Basket Without Easy Maintenance Shelf System

All Prices are per Basket Including Installation

Size Range	Price per Basket Installed	Price per Basket Installed - Vendor Measured	Discounted Price - 50 to 200 Baskets	Discounted Price - Vendor Measured - 50 to 200 Baskets	Discounted Price - 201 Baskets and Over	Discounted Price - Vendor Measured - 201 Baskets and Over
2' Basket	\$460.00	\$480.00	\$425.00	\$441.00	\$409.00	\$425.00
3' Basket	\$590.00	\$610.00	\$545.00	\$567.00	\$523.00	\$545.00
4' Basket	\$680.00	\$705.00	\$632.00	\$659.00	\$606.00	\$632.00

The Continues Baskets do not Include Shelf System

5 Year Warranty



Southern California
 2972 San Lus Rey Rd.
 Oceanside, CA 92058
 Phone 760-433-7640

Northern California
 690 Sunlow St.
 San Jose, CA 95126
 Phone 760-579-1584

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BC-2

Prices for Standard Curb Inlet Basket with "Easy Maintenance Shelf System"

All Prices Include Installation

Device ID	Size Range	Price per System	Price per System - Vendor Measured	Discounted Price - 25 to 100	Discounted Price - Vendor Measured - 25 to 100	Discounted Price - 101 and Over	Discounted Price - Vendor Measured - 101 and Over
BC-2a	2' - 4'	\$1,025.00	\$1,060.00	\$985.00	\$1,025.00	\$948.00	\$985.00
BC-2b	4'1" - 5'	\$1,085.00	\$1,125.00	\$1,045.00	\$1,085.00	\$1,006.00	\$1,045.00
BC-2c	5'1" - 7'	\$1,175.00	\$1,215.00	\$1,130.00	\$1,175.00	\$1,088.00	\$1,130.00
BC-2d	7'1" - 9'	\$1,280.00	\$1,330.00	\$1,235.00	\$1,280.00	\$1,190.00	\$1,235.00
BC-2e	9'1" - 11'	\$1,410.00	\$1,465.00	\$1,365.00	\$1,410.00	\$1,315.00	\$1,365.00
BC-2f	11'1" - 14'	\$1,515.00	\$1,565.00	\$1,460.00	\$1,515.00	\$1,407.00	\$1,460.00
BC-2g	14'1" - 18'	\$1,770.00	\$1,830.00	\$1,705.00	\$1,770.00	\$1,643.00	\$1,705.00
BC-2h	18'1" - 22'	\$1,950.00	\$2,020.00	\$1,880.00	\$1,950.00	\$1,812.00	\$1,880.00

Prices for High Capacity Round Curb Inlet Basket with "Easy Maintenance Shelf System"

All Prices Include Installation

Device ID	Size Range	Price per System	Price per System - Vendor Measured	Discounted Price - 25 to 100	Discounted Price - Vendor Measured - 25 to 100	Discounted Price - 101 and Over	Discounted Price - Vendor Measured - 101 and Over
BC-2ar	2' - 4'	\$1,170.00	\$1,210.00	\$1,125.00	\$1,170.00	\$1,083.00	\$1,125.00
BC-2br	4'1" - 5'	\$1,280.00	\$1,295.00	\$1,205.00	\$1,280.00	\$1,161.00	\$1,205.00
BC-2cr	5'1" - 7'	\$1,365.00	\$1,415.00	\$1,315.00	\$1,365.00	\$1,267.00	\$1,315.00
BC-2dr	7'1" - 9'	\$1,420.00	\$1,470.00	\$1,370.00	\$1,420.00	\$1,320.00	\$1,370.00
BC-2er	9'1" - 11'	\$1,535.00	\$1,590.00	\$1,480.00	\$1,535.00	\$1,426.00	\$1,480.00
BC-2fr	11'1" - 14'	\$1,625.00	\$1,685.00	\$1,570.00	\$1,625.00	\$1,514.00	\$1,570.00
BC-2gr	14'1" - 18'	\$1,730.00	\$1,900.00	\$1,770.00	\$1,730.00	\$1,707.00	\$1,770.00
BC-2hr	18'1" - 22'	\$2,015.00	\$2,085.00	\$1,945.00	\$2,015.00	\$1,875.00	\$1,945.00

All of the Above System Prices Include "Easy Maintenance Shelf System"

Prices for Continues Curb Inlet Basket Without Easy Maintenance Shelf System

All Prices are per Basket Including Installation

Device ID	Size Range	Price per Basket Installed	Price per Basket Installed - Vendor Measured	Discounted Price - 50 to 200 Baskets	Discounted Price - Vendor Measured - 50 to 200 Baskets	Discounted Price - 201 Baskets and Over	Discounted Price - Vendor Measured - 201 Baskets and Over
BC-2i	2' Basket	\$460.00	\$480.00	\$425.00	\$441.00	\$409.00	\$425.00
BC-2j	3' Basket	\$590.00	\$610.00	\$545.00	\$567.00	\$523.00	\$545.00
BC-2k	4' Basket	\$680.00	\$705.00	\$632.00	\$659.00	\$606.00	\$632.00

Note: The Continues Baskets do not Include Shelf System

Catchbasin Insert, Full Capture Device

BC-1 Grate Inlet Skimmer Box (square design) Catchbasin filter



<p>Company Contact: Bio Clean Environmental Services, Inc., Oceanside, CA Sales contacts: Greg Kent, (760) 433-7640 or Kirk Vallejo, (760) 681-9583 gkent@biocleanenvironmental.net kvallejo@biocleanenvironmental.net http://www.biocleanenvironmental.com</p>	
<p>Storage capacity: range of sizes</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: Clean filter when over 40% full (May 1 - Sept 30); replace hydrocarbon boom at least 2 times per year</p>	<p>Warranty: 5 yrs</p>
<p>Material: Marine-grade fiberglass main body, stainless steel screen</p>	<p>Delivery Time: 50 or fewer 4 weeks; 50-100 6 weeks; 100-250 10 weeks; call for more than 250</p>
<p>Pricing: See over. Have uninstalled price. Traffic control not included in pricing</p>	

Comments from reference checks

Device effectiveness in capturing trash

Reference is positive. Prefers the round design for ease of maintenance and overall quality.

Maintenance issues/experience

Maintenance likes these. Uses a vactor truck to clean

Other:

Good customer service, on-time delivery, oil and grease absorbent filter

GRATE INLET SKIMMER BOX

Prices for Standard Grate Inlet Skimmer Box

Inlet Baskets for Grated Type Catch Basins

All Prices Include Installation Under Grate

Size Range	Price per System	Price per System - Vendor Measured	Discounted Price - 40 to 100	Discounted Price - Vendor Measured - 40 to 100	Discounted Price - 101 and Over	Discounted Price - Vendor Measured - 101 and Over
Up to 12" x 12"	\$662.00	\$688.00	\$635.00	\$662.00	\$609.00	\$630.00
To 18" x 18"	\$777.00	\$808.00	\$725.00	\$757.00	\$694.00	\$725.00
To 24" x 24"	\$813.00	\$848.00	\$780.00	\$793.00	\$727.00	\$760.00
To 24" x 36"	\$866.00	\$901.00	\$810.00	\$846.00	\$725.00	\$810.00
To 36" x 36"	\$938.00	\$976.00	\$880.00	\$918.00	\$842.00	\$880.00
To 40" x 40"	\$1,043.00	\$1,086.00	\$980.00	\$1,023.00	\$937.00	\$980.00
To 48" x 48"	\$1,148.00	\$1,205.00	\$1,100.00	\$1,128.00	\$1,032.00	\$1,100.00
Filter Basket is Manufactured to Fit Catch Basin Dimensions at No Additional Cost						
Depths Can Vary from 12" to 24"						

Prices for "Tray" Grate Inlet Skimmer Box

Inlet Baskets for Shallow Grated Type Catch Basins and Have No Deflector Shield

All Prices Include Installation Under Grate

Size Range	Price per System	Price per System - Vendor Measured	Discounted Price - 40 to 100	Discounted Price - Vendor Measured - 40 to 100	Discounted Price - 101 and Over	Discounted Price - Vendor Measured - 101 and Over
Up to 12" x 12"	\$600.00	\$624.00	\$575.00	\$600.00	\$551.00	\$575.00
To 18" x 18"	\$704.00	\$733.00	\$665.00	\$694.00	\$637.00	\$665.00
To 24" x 24"	\$741.00	\$771.00	\$710.00	\$741.00	\$680.00	\$710.00
To 24" x 36"	\$813.00	\$846.00	\$760.00	\$793.00	\$727.00	\$760.00
To 36" x 36"	\$866.00	\$901.00	\$810.00	\$846.00	\$775.00	\$810.00
To 40" x 40"	\$960.00	\$1,000.00	\$920.00	\$960.00	\$880.00	\$920.00
To 48" x 48"	\$1,065.00	\$1,110.00	\$1,020.00	\$1,065.00	\$975.00	\$1,020.00
Filter Basket is Manufactured to Fit Catch Basin Dimensions at No Additional Cost						
Depths Can Vary from 8" to 11"						

Undermount Installation is an Additional 5% Cost per Basket

Steel Flanges are an Additional \$50.00 Cost per Basket

Catch Basin Must be Cleaned Prior to Installation

5 Year Warranty



Southern California
2972 San Lus Rey Rd.
Oceanside, CA 92058
Phone 760-433-7640

Northern California
690 Sunlow St.
San Jose, CA 95126
Phone 760-579-1584

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BC-1**Standard Grate Inlet Skimmer Box
Inlet Baskets for Grated Type Catch Basins**

All Prices Include Installation Under Grate

Depths Can Vary from 12" to 24"

Project Device ID	Size Range	Price per System	Price per System Vendor Measured	Discounted Price 40 to 100	Discounted Price - Vendor Measured 40 to 100	Discounted Price - 101 and Over	Discounted Price - Vendor Measured 101 and Over
BC-1a	Up to 12" x 12"	\$662.00	\$688.00	\$635.00	\$662.00	\$609.00	\$630.00
BC-1b	To 18" x 18"	\$777.00	\$808.00	\$725.00	\$757.00	\$694.00	\$725.00
BC-1c	To 24" x 24"	\$813.00	\$848.00	\$780.00	\$793.00	\$727.00	\$760.00
BC-1d	To 24" x 36"	\$866.00	\$901.00	\$810.00	\$846.00	\$725.00	\$810.00
BC-1e	To 36" x 36"	\$938.00	\$976.00	\$880.00	\$918.00	\$842.00	\$880.00
BC-1f	To 40" x 40"	\$1,043.00	\$1,086.00	\$980.00	\$1,023.00	\$937.00	\$980.00
BC-1g	To 48" x 48"	\$1,148.00	\$1,205.00	\$1,100.00	\$1,128.00	\$1,032.00	\$1,100.00

**"Tray" Grate Inlet Skimmer Box
Inlet Baskets for Shallow Grated Type Catch Basins
and Have No Deflector Shield**

All Prices Include Installation Under Grate

Depths Can Vary from 8" to 11"

Project Device ID	Size Range	Price per System	Price per System Vendor Measured	Discounted Price 40 to 100	Discounted Price - Vendor Measured 40 to 100	Discounted Price - 101 and Over	Discounted Price - Vendor Measured 101 and Over
BC-1Ta	Up to 12" x 12"	\$600.00	\$624.00	\$575.00	\$600.00	\$551.00	\$575.00
BC-1Tb	To 18" x 18"	\$704.00	\$733.00	\$665.00	\$694.00	\$637.00	\$665.00
BC-1Tc	To 24" x 24"	\$741.00	\$771.00	\$710.00	\$741.00	\$680.00	\$710.00
BC-1Td	To 24" x 36"	\$813.00	\$846.00	\$760.00	\$793.00	\$727.00	\$760.00
BC-1Te	To 36" x 36"	\$866.00	\$901.00	\$810.00	\$846.00	\$775.00	\$810.00
BC-1Tf	To 40" x 40"	\$960.00	\$1,000.00	\$920.00	\$960.00	\$880.00	\$920.00
BC-1Tg	To 48" x 48"	\$1,065.00	\$1,110.00	\$1,020.00	\$1,065.00	\$975.00	\$1,020.00

Undermount Installation is an Additional 5% Cost per Basket

Steel Flanges are an Additional \$50.00 Cost per Basket

Catch Basin Must be Cleaned Prior to Installation

Catchbasin Insert, Full Capture Device

AS-1,AS-2 Stormtek ST3 and ST3G

Catchbasin Connector Pipe Screen (CPS), removable



ST3G



ST3

Company Contact: Advanced Solutions, Corona, CA Sales contact: Octavio Lugo, 714-457-3283 advancedsolutions@gmail.com http://www.advancedsolutionsla.com	
Storage capacity: 90% of the volume of the catchbasin	Replacement Parts: Available
Vendor's maintenance recommendation: Inspect before and after major rain event	Warranty: 2 yrs
Material: S-304 stainless steel	Delivery Time: For 100 Units, approx. 3-4 Weeks

Comments from reference checks

Device effectiveness in capturing trash

Overflow was not adequate, device clogged quickly in an intense storm in Southern California

Maintenance issues/experience

Couldn't pull out when very full, suggested a handle and larger mounting pins to vendor

Other:

Note that pricing is the same for both models

Reference reports great customer service

Installed in Oakland, San Jose, and Sunnyvale

AS-1 & AS-2**ST3 or ST3-G**

StormTek device pricing

*Municipal staff installation reduces cost by \$190 per unit

ST3

Device ID	Number of Units	Price Per Unit
AS-1	1 - 99 units	\$1,429
AS-1	100 - 250 units	\$ 1,399
AS-1	251 - 500 units	\$ 1,299
AS-1	501 - 750 units	\$ 1,199
AS-1	750 +	\$ 1,099

ST3-G

Device ID	Number of Units	Price Per Unit
AS-2	1 - 99 units	\$1,429
AS-2	100 - 250 units	\$ 1,399
AS-2	251 - 500 units	\$ 1,299
AS-2	501 - 750 units	\$ 1,199
AS-2	750 +	\$ 1,099

High Flow Capacity Device

RMC-1HF Storm Flo Screen

Linear radial gross solids removal device (GSRD)



<p>Company Contact: Roscoe Moss Company, Los Angeles, CA Sales contact: Kevin McGillicuddy, 323-263-4111 kmc@roscoemoss.com http://roscoemoss.com</p>	
<p>Storage capacity: 4.4-70.7 cubic feet depending on screen diameter</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: "It is recommended that the device be cleaned when half full. Cleaning the interior is best accomplished using a vehicle-based vacuum unit. The captured debris is accessed through large hatchways that are located on top of the screen. There is no maintenance required on the device itself other than cleaning of the interior."</p>	<p>Warranty: 2 yrs</p>
<p>Material: Type 304L or 316L grade steel, or galvanized steel</p>	<p>Delivery Time: Depending on size and number of devices, delivery is estimated to be 4 to 8 weeks from receipt of order</p>
<p>Pricing: See over.</p>	

Comments from reference checks

Device effectiveness in capturing trash

The overall effectiveness of capturing trash with the screen was excellent. The field performance and the vendor's claims regarding the amount of anticipated trash captured and the frequency of cleaning the device were the same.

Vendor does not install the device. The reference spoken to installed the device themselves and did not experience a large amount of rainfall. The reference recommends doubling the size of the device you think will handle the biggest storm event in your area. Installation requires know how and heavy-duty equipment.

Attachment C

SF Bay Area-wide Trash Capture Device Demonstration Project

Storm Flo[®] Screen Price List

Diameter in.	1 - 5 ft screen + bypass	Each additional 5 ft screen	Each additional 10 ft screen
24.5	\$8,495.00	\$4,559.00	\$9,118.00
30.5	\$13,629.00	\$6,787.00	\$13,575.00
36.5	\$14,845.00	\$7,939.00	\$15,877.00
42.5	\$16,595.00	\$9,310.00	\$18,620.00
48.5	\$19,280.00	\$10,250.00	\$20,500.00

Notes:

Devices manufactured with 0.25" wall Type 304 stainless steel

Prices for galvanized steel discounted 15%, for SST 316L additional 30%

Devices include cost for structural bypass section - 3 ft long for diameters up to 42", 4 ft long for 48" dia.

Prices quoted FOB jobsite

Terms: through March 31, 2012

Roscoe Moss Company

RMC-1HF

StormFlo Screen

Device ID	Diameter	1-5ft Screen + Bypass	Each Additional 5ft Screen	Each Additional 10ft Screen
RMC-1HFa	24.5"	\$8,495.00	\$4,559.00	\$9,118.00
RMC-1HFB	30.5"	\$13,629.00	\$6,787.00	\$13,575.00
RMC-1HFc	36.5"	\$14,845.00	\$7,939.00	\$15,877.00
RMC-1HFd	42.5"	\$16,595.00	\$9,310.00	\$18,620.00
RMC-1HFe	48.5"	\$19,280.00	\$10,250.00	\$20,500.00

Notes:

Devices manufactured with 0.25" wall Type 304 stainless steel

Prices for galvanized steel discounted 15%, for SST 316L additional 30%

Devices include cost for structural bypass section - 3 ft long for diameters up to 42", 4 ft long for 48" dia.

Prices quoted FOB jobsite

Terms: through March 31, 2012

High Flow Capacity, Requires Water Board Approval

KS-11HF Nettek Gross Pollutant Trap- End of Line End of pipe net



Company Contact: KriStar Enterprises, Inc., Santa Rosa, CA Sales contact: Sue Lillo, 800-579-8819 slillo@kristar.com http://www.kristar.com	
Storage capacity: range of capacities 4 to 319 cubic feet	Replacement Parts: Available
Vendor's maintenance estimate: "Depends on the amount of runoff, pollutant loading and interference from debris"	Warranty: Stainless steel 25yrs, netting materials 10yrs
Material: 304 stainless steel, flexible knit nylon mesh, and UV-resistant nylon netting	Delivery Time: 3-5 weeks from receipt of order
Pricing: See over.	

Comments from reference checks

Maintenance Issues/Experience

"The net is supposed to collect debris and easily slip off. It never did. The cable system that wraps around the pipe had problems as well. We had problems getting the right tension for the net so that when the bag is full, it releases. It never released."

Appendix B- Item Q Pricing Schedule

Name of Proposing Company: KriStar Enterprises, Inc.
Name of Device: Nettech Gross Pollutant Trap

	NOMINAL PIPE DIAMETER	UNIT PRICE
Small	12" - 24"	\$ 5,950.00
Medium	30" - 48"	\$ 8,950.00
Large	54" - 72"	\$ 15,950.00

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation for interior or flange mount
- (4) Prices do not include any applicable sales taxes
- (5) There are no quantity purchase discounts available for this item

KS-9HF

FloGard Swirl-Flo Screen Separator

Device ID	Nominal Manhole Diameter	Unit Price
KS-9HF48	48"	\$ 3,650.00
KS-9HF60	60"	\$ 5,495.00
KS-9HF96	96"	\$14,950.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include precast concrete components, bolted, gasketed lids, factory-installed internal components and delivery to jobsite
- (4) Purchaser is responsible for offloading and setting of structures
- (5) Prices do not include any applicable sales taxes
- (6) There is no purchase quantity discount available for this product

KS-10HF

Nettech Gross Pollutant Trap- In Line

Device ID	Nominal Pipe Diameter	Unit Price
KS-10HF _s	12"-24"	\$ 5,950.00
KS-10HF _m	30"-48"	\$ 8,950.00
KS-10HF _I	54"-72"	\$15,950.00

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation for interior or flange mount
- (4) Prices do not include any applicable sales taxes
- (5) There are no quantity purchase discounts available for this item

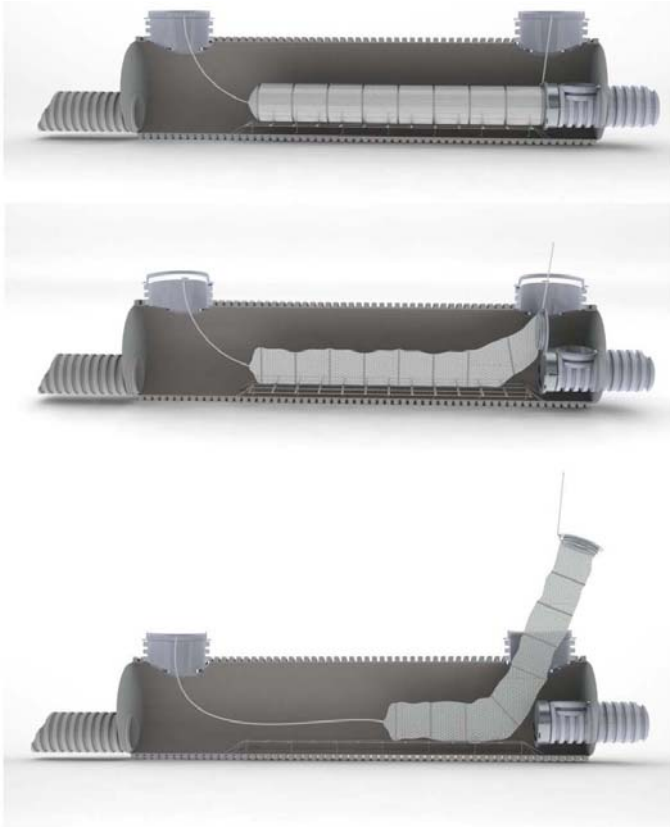
KS-11HF

Nettech Gross Pollutant Trap- End of Line

Device ID	Nominal Pipe Diameter	Unit Price
KS-11HF _s	12"-24"	\$ 5,950.00
KS-11HF _m	30"-48"	\$ 8,950.00
KS-11HF _I	54"-72"	\$15,950.00

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation for interior or flange mount
- (4) Prices do not include any applicable sales taxes
- (5) There are no quantity purchase discounts available for this item

KS-10HF Nettech Gross Pollutant Trap — In Line
 Inline gross pollutant trap



<p>Company Contact: KriStar Enterprises, Inc., Santa Rosa, CA Sales contact: Sue Lillo, 800-579-8819 slillo@kristar.com http://www.kristar.com</p>	
<p>Storage capacity: rectangular (range of capacities from 0.4 to 10.5 cubic feet) round (range of capacities from 0.7 to 4.3 cubic feet)</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: "Depends on the amount of runoff, pollutant loading and interference from debris"</p>	<p>Warranty: 5 yrs</p>
<p>Material: 304 stainless steel, woven polypropylene geotextile, reinforced polypropylene geogrid, recycled polypropylene plastic</p>	<p>Delivery Time: 3-5 weeks from receipt of order</p>
<p>Pricing: See over.</p>	

Appendix B- Item Q Pricing Schedule

Name of Proposing Company: KriStar Enterprises, Inc.
Name of Device: Nettech Gross Pollutant Trap

	NOMINAL PIPE DIAMETER	UNIT PRICE
Small	12" - 24"	\$ 5,950.00
Medium	30" - 48"	\$ 8,950.00
Large	54" - 72"	\$ 15,950.00

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation for interior or flange mount
- (4) Prices do not include any applicable sales taxes
- (5) There are no quantity purchase discounts available for this item

KS-9HF

FloGard Swirl-Flo Screen Separator

Device ID	Nominal Manhole Diameter	Unit Price
KS-9HF48	48"	\$ 3,650.00
KS-9HF60	60"	\$ 5,495.00
KS-9HF96	96"	\$14,950.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include precast concrete components, bolted, gasketed lids, factory-installed internal components and delivery to jobsite
- (4) Purchaser is responsible for offloading and setting of structures
- (5) Prices do not include any applicable sales taxes
- (6) There is no purchase quantity discount available for this product

KS-10HF

Nettech Gross Pollutant Trap- In Line

Device ID	Nominal Pipe Diameter	Unit Price
KS-10HF _s	12"-24"	\$ 5,950.00
KS-10HF _m	30"-48"	\$ 8,950.00
KS-10HF _I	54"-72"	\$15,950.00

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation for interior or flange mount
- (4) Prices do not include any applicable sales taxes
- (5) There are no quantity purchase discounts available for this item

KS-11HF

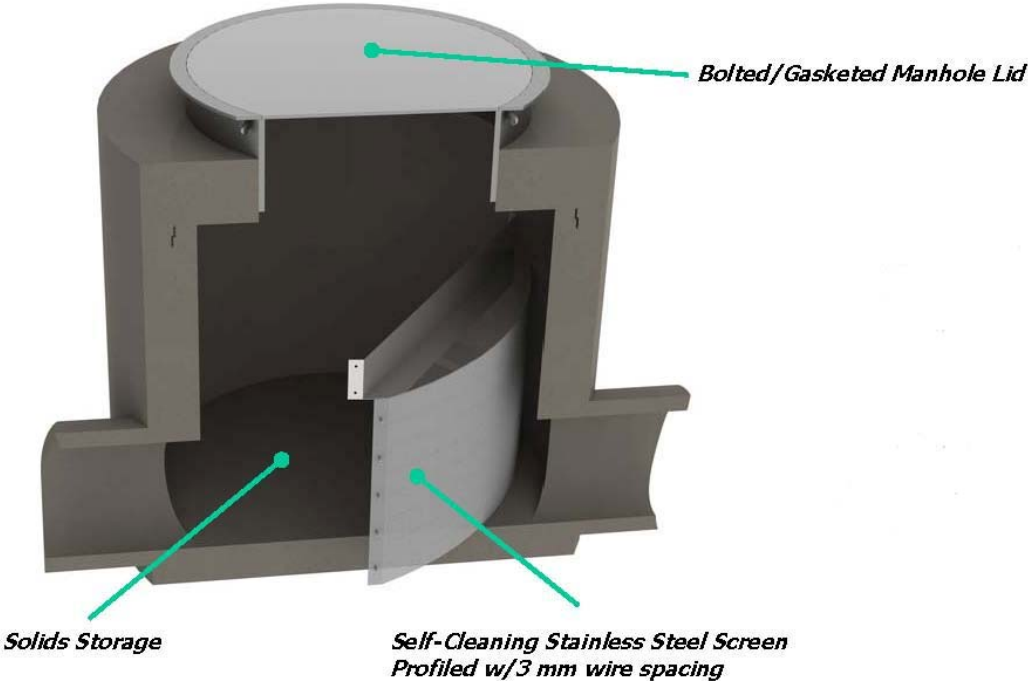
Nettech Gross Pollutant Trap- End of Line

Device ID	Nominal Pipe Diameter	Unit Price
KS-11HF _s	12"-24"	\$ 5,950.00
KS-11HF _m	30"-48"	\$ 8,950.00
KS-11HF _I	54"-72"	\$15,950.00

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation for interior or flange mount
- (4) Prices do not include any applicable sales taxes
- (5) There are no quantity purchase discounts available for this item

High Flow Capacity Device

KS-9HF FloGard Swirl-Flo Screen Separator trash capture screen for manhole



<p>Company Contact: KriStar Enterprises, Inc., Santa Rosa, CA Sales contact: Sue Lillo, 800-579-8819 slillo@kristar.com http://www.kristar.com</p>	
<p>Storage capacity: 23-100 cubic feet depending on size of device</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: "It is generally recommended that filters be maintained when they have reached half their maximum storage volume."</p>	<p>Warranty: 5 yrs</p>
<p>Material: 304 stainless steel, precast concrete</p>	<p>Delivery Time: Typical time from receipt of order to installation will range from 3 to 5 weeks</p>
<p>Pricing: See over.</p>	

Appendix B- Item Q Pricing Schedule

Name of Proposing Company: KriStar Enterprises, Inc.
Name of Device: FloGard® Swirl-Flo Screen Separator

Nominal Manhole Diameter	List Price
48"	\$ 3,650.00
60"	\$ 5,495.00
96"	\$ 14,950.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include precast concrete components, bolted, gasketed lids, factory-installed internal components and delivery to jobsite
- (4) Purchaser is responsible for offloading and setting of structures
- (5) Prices do not include any applicable sales taxes
- (6) There is no purchase quantity discount available for this product

KS-9HF

FloGard Swirl-Flo Screen Separator

Device ID	Nominal Manhole Diameter	Unit Price
KS-9HF48	48"	\$ 3,650.00
KS-9HF60	60"	\$ 5,495.00
KS-9HF96	96"	\$14,950.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include precast concrete components, bolted, gasketed lids, factory-installed internal components and delivery to jobsite
- (4) Purchaser is responsible for offloading and setting of structures
- (5) Prices do not include any applicable sales taxes
- (6) There is no purchase quantity discount available for this product

KS-10HF

Nettech Gross Pollutant Trap- In Line

Device ID	Nominal Pipe Diameter	Unit Price
KS-10HF _s	12"-24"	\$ 5,950.00
KS-10HF _m	30"-48"	\$ 8,950.00
KS-10HF _I	54"-72"	\$15,950.00

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation for interior or flange mount
- (4) Prices do not include any applicable sales taxes
- (5) There are no quantity purchase discounts available for this item

KS-11HF

Nettech Gross Pollutant Trap- End of Line

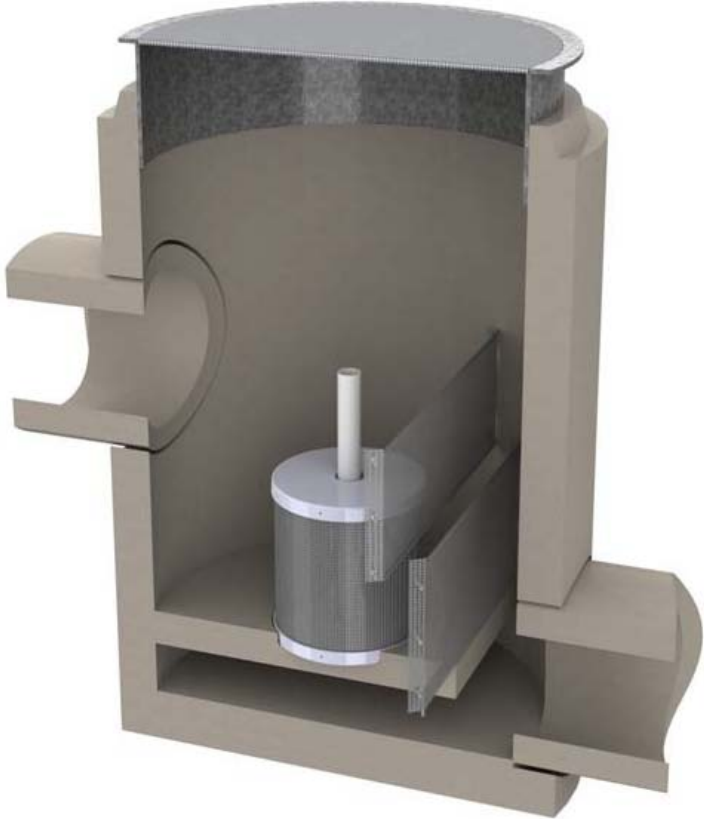
Device ID	Nominal Pipe Diameter	Unit Price
KS-11HF _s	12"-24"	\$ 5,950.00
KS-11HF _m	30"-48"	\$ 8,950.00
KS-11HF _I	54"-72"	\$15,950.00

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include manufacturer installation for interior or flange mount
- (4) Prices do not include any applicable sales taxes
- (5) There are no quantity purchase discounts available for this item

High Flow Capacity Device

KS-8HF FloGard® Perk Filter

Radial cartridge filter with trash capture screening



Company Contact: KriStar Enterprises, Inc., Santa Rosa, CA Sales contact: Sue Lillo, 800-579-8819 slillo@kristar.com http://www.kristar.com	
Storage capacity: 18-128 cubic feet depending on size of device	Replacement Parts: Available
Vendor's maintenance estimate: "It is generally recommended that filters be maintained when they have reached half their maximum storage volume."	Warranty: 5 yrs
Material: 304 stainless steel, precast concrete	Delivery Time: Typical time from receipt of order to installation will range from 3 to 5 weeks
Pricing: See over.	

Appendix B- Item Q Pricing Schedule

Name of Proposing Company: KriStar Enterprises, Inc.
Name of Device: Perk Filter

Model	LIST PRICE
CF-50PFC136S	\$ 6,500.00
CF-49PF536S	\$ 23,700.00
CF-611PF1136S	\$ 41,600.00
CF-818PF3136S	\$ 85,750.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include precast concrete components, bolted, gasketed lids, factory-installed internal components and delivery to jobsite
- (4) Purchaser is responsible for offloading and setting of structures
- (4) Prices do not include any applicable sales taxes
- (5) There is no purchase quantity discount available for this product

KS-7HF

FloGard Dual-Vortex Hydrodynamic Separator

Device ID	Unit Price
KS-7HF36	\$ 5,500.00
KS-7HF48	\$ 8,500.00
KS-7HF60	\$10,500.00
KS-7HF72	\$16,000.00
KS-7HF84	\$22,500.00
KS-7HF96	\$ 29,500.00
KS-7HF120	\$42,500.00
KS-7HF144	\$57,500.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include circular or square pre-cast concrete structures, joint sealant, factory installed internal components and access cover assemblies.
- (4) Purchaser is responsible for offloading and setting of structures
- (4) Prices do not include any applicable sales taxes
- (5) There is no purchase quantity discount available for this product

KS-8HF

FloGard Perk Filter

Device ID	Unit Price
KS-8HF50	\$ 6,500.00
KS-8HF49	\$ 23,700.00
KS-8HF611	\$41,600.00
KS-8HF818	\$85,750.00

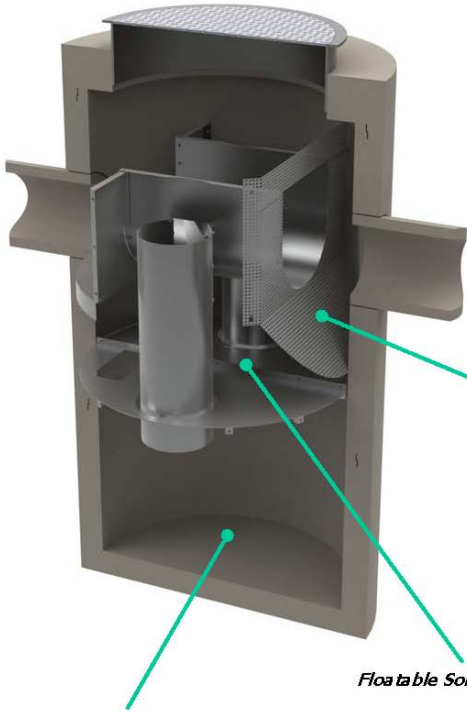
NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include precast concrete components, bolted, gasketed lids, factory-installed internal components and delivery to jobsite
- (4) Purchaser is responsible for offloading and setting of structures
- (4) Prices do not include any applicable sales taxes
- (5) There is no purchase quantity discount available for this product

High Flow Capacity Device

KS-7HF FloGard® Dual-Vortex Hydrodynamic Separator

Hydrodynamic separator with trash capture screen



TRASH REMOVAL CAPACITY CHART				
Model	Inside Diameter (in)	Settleable Solids Storage (cu ft)	Floatable Solids Storage (cu ft)	Treated Flow Capacity (cfs)
DVS-36-S	36	8	6	0.50
DVS-48-S	48	18	15	1.25
DVS-60-S	60	35	29	2.50
DVS-72-S	72	60	50	4.25
DVS-84-S	84	95	82	6.50
DVS-96-S	96	142	123	9.50
DVS-120-S	120	278	242	16.8
DVS-144-S	144	481	416	26.4

*Inclined Outlet Screen
Type 304 Stainless Steel
0.1875 in / 4.76 mm
Staggered Round Performances*



Settleable Solids Storage

Floatable Solids Storage

<p>Company Contact: KriStar Enterprises, Inc., Santa Rosa, CA Sales contact: Sue Lillo, 800-579-8819 slillo@kristar.com http://www.kristar.com</p>	
<p>Storage capacity: 8-481 cubic feet depending on size of device</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: "It is generally recommended that filters be maintained when they have reached half their maximum storage volume."</p>	<p>Warranty: 5 yrs</p>
<p>Material: 304 stainless steel, precast concrete</p>	<p>Delivery Time: Typical time from receipt of order to installation will range from 3 to 5 weeks</p>
<p>Pricing: See over.</p>	
<p>Installed: City of Fremont</p>	

Appendix B- Item Q Pricing Schedule

Name of Proposing Company: KriStar Enterprises, Inc.
Name of Device: FloGard® Dual Vortex Hydrodynamic Separator

Model	LIST PRICE
DVS-36	\$5,500.00
DVS-48	\$ 8,500.00
DVS-60	\$ 10,500.00
DVS-72	\$ 16,000.00
DVS-84	\$ 22,500.00
DVS-96	\$ 29,500.00
DVS-120	\$ 42,500.00
DVS-144	\$ 57,500.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include circular or square pre-cast concrete structures, joint sealant, factory installed internal components and access cover assemblies.
- (4) Purchaser is responsible for offloading and setting of structures
- (4) Prices do not include any applicable sales taxes
- (5) There is no purchase quantity discount available for this product

KS-7HF

FloGard Dual-Vortex Hydrodynamic Separator

Device ID	Unit Price
KS-7HF36	\$ 5,500.00
KS-7HF48	\$ 8,500.00
KS-7HF60	\$10,500.00
KS-7HF72	\$16,000.00
KS-7HF84	\$22,500.00
KS-7HF96	\$ 29,500.00
KS-7HF120	\$42,500.00
KS-7HF144	\$57,500.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include circular or square pre-cast concrete structures, joint sealant, factory installed internal components and access cover assemblies.
- (4) Purchaser is responsible for offloading and setting of structures
- (4) Prices do not include any applicable sales taxes
- (5) There is no purchase quantity discount available for this product

KS-8HF

FloGard Perk Filter

Device ID	Unit Price
KS-8HF50	\$ 6,500.00
KS-8HF49	\$ 23,700.00
KS-8HF611	\$41,600.00
KS-8HF818	\$85,750.00

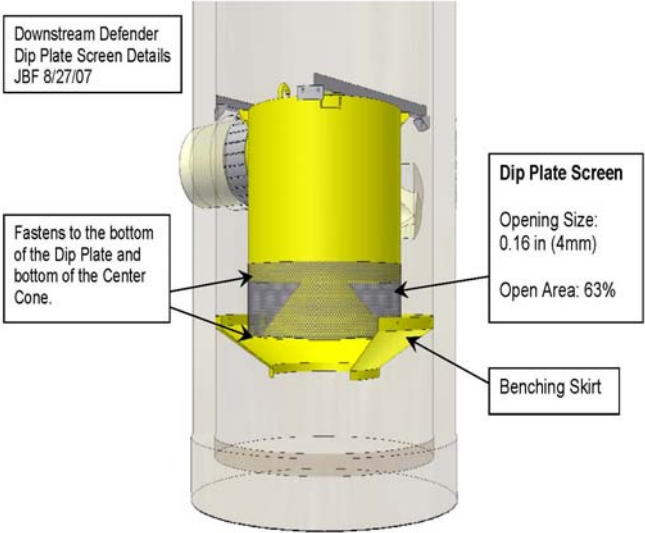
NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include precast concrete components, bolted, gasketed lids, factory-installed internal components and delivery to jobsite
- (4) Purchaser is responsible for offloading and setting of structures
- (4) Prices do not include any applicable sales taxes
- (5) There is no purchase quantity discount available for this product

High Flow Capacity Device

KS-6HF Downstream Defender

Hydrodynamic separator with trash capture screen



<p>Company Contact: KriStar Enterprises, Inc., Santa Rosa, CA Sales contact: Sue Lillo, 800-579-8819 slillo@kristar.com http://www.kristar.com</p>	
<p>Storage capacity: 21.2 cubic feet for 6 foot model</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: "The frequency of the sump vac procedure is determined in the field after installation. During the first year of operation, the units should be inspected every six months to determine the rate of sediment and floatables accumulation."</p>	<p>Warranty: 5 yrs</p>
<p>Material: 304 stainless steel, aluminum alloy, cross-linked high density polyethylene, co-polymer polypropylene</p>	<p>Delivery Time: Typical time from receipt of order to installation will range from 3 to 5 weeks</p>
<p>Pricing: See over.</p>	
<p>Installed: At Los Angeles International Airport (LAX)</p>	

Comments from reference checks

Device effectiveness in capturing trash

One reference reported poor performance. Installation at LAX was in process at time of call.

Good customer service; durable device

Appendix B- Item Q Pricing Schedule

Name of Proposing Company: KriStar Enterprises, Inc.
Name of Device: Downstream Defender

Model	LIST PRICE
DD-4	\$ 12,900.00
DD-6	\$ 22,500.00
DD-8	\$ 37,500.00
DD-10	\$ 65,000.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include precast concrete components, bolted, gasketed lids, factory-installed internal components and delivery to jobsite
- (4) Purchaser is responsible for offloading and setting of structures
- (5) Prices do not include diversion structures
- (6) Prices do not include any applicable sales taxes
- (7) There is no purchase quantity discount available for this product

- (4) Prices do not include any applicable sales taxes
- (5) There are no quantity purchase discounts available for this item

KS-4

Trash and Debris Guards (stainless steel)

Device ID	Unit Price
KS-4	\$ 375.00

Large Devices

KS-5HF

Cleans All Gross Pollutant Trap

Device ID	Unit Price
KS-5HF	Pricing for this product is estimated to range from \$60,000 to \$220,000 per installation. Each location will need to be individually evaluated to determine final pricing based upon the site specific conditions.

KS-6HF

Downstream Defender

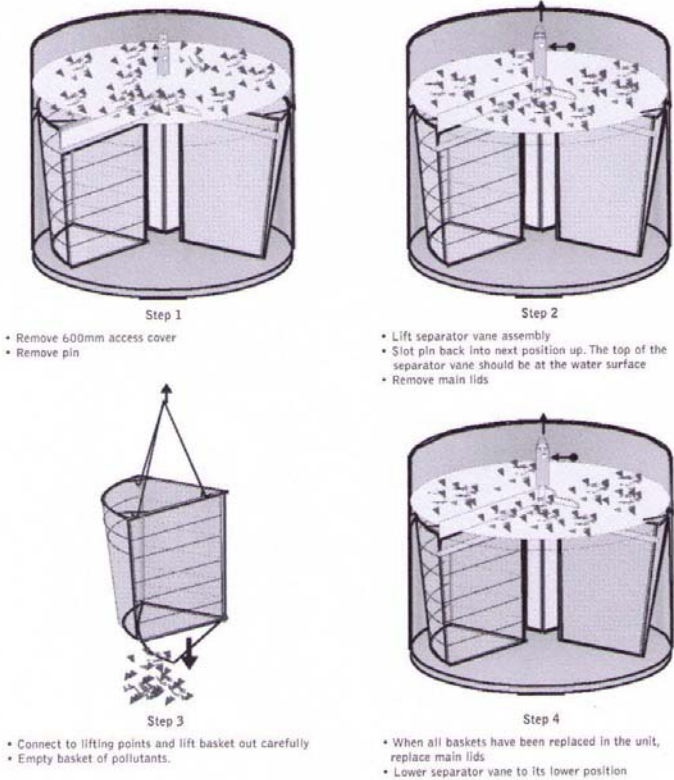
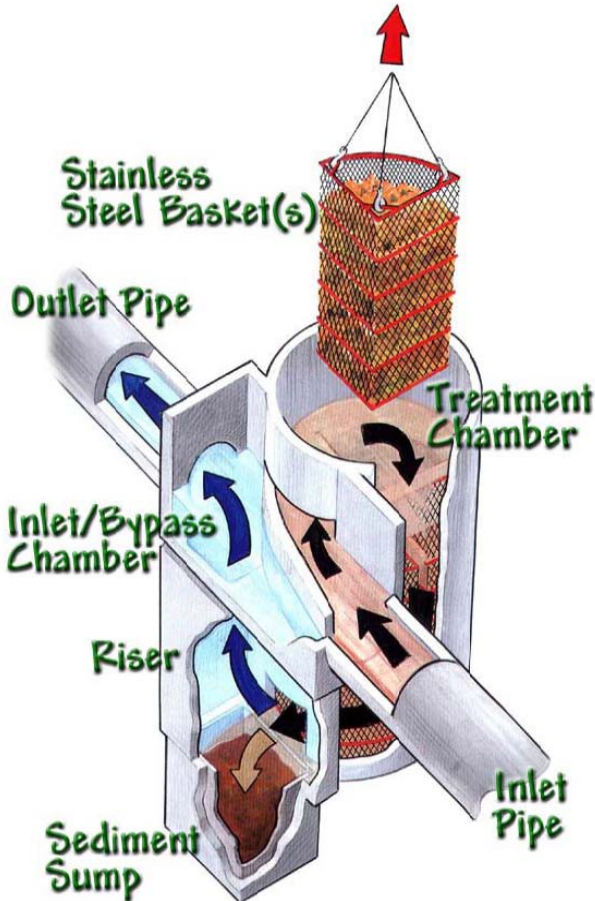
Device ID	Unit Price
KS-6HF4	\$ 12,900.00
KS-6HF6	\$ 22,500.00
KS-6HF8	\$37,500.00
KS-6HF10	\$65,000.00

NOTES:

- (1) Actual dimensions will be field verified by KriStar prior to fabrication and installation
- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include precast concrete components, bolted, gasketed lids, factory-installed internal components and delivery to jobsite
- (4) Purchaser is responsible for offloading and setting of structures
- (5) Prices do not include diversion structures
- (6) Prices do not include any applicable sales taxes
- (7) There is no purchase quantity discount available for this product

High Flow Capacity Device

KS-5HF CleansAll Gross pollutant trap



Maintenance Procedure

<p>Company Contact: KriStar Enterprises, Inc., Santa Rosa, CA Sales contact: Sue Lillo, 800-579-8819 slillo@kristar.com http://www.kristar.com</p>	
<p>Storage capacity: 0.46-13.9 cubic yard depending on size of device</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: Vendor refers to diagram above</p>	<p>Warranty: 5 yrs</p>
<p>Material: 304 stainless steel, precast concrete</p>	<p>Delivery Time: Typical time from receipt of order to installation will range from 3 to 5 weeks</p>
<p>Pricing: "Pricing for this product is estimated to range from \$60,000 to \$220,000 per installation. Each location will need to be individually evaluated to determine final pricing based upon the site-specific conditions".</p>	

No reference available

Pricing for this product is estimated to range from \$60,000.00 to \$220,000.00 per installation. Each location will need to be individually evaluated to determine final pricing based upon the site specific conditions.

- (4) Prices do not include any applicable sales taxes
- (5) There are no quantity purchase discounts available for this item

KS-4

Trash and Debris Guards (stainless steel)

Device ID	Unit Price
KS-4	\$ 375.00

Large Devices

KS-5HF

Cleans All Gross Pollutant Trap

Device ID	Unit Price
KS-5HF	Pricing for this product is estimated to range from \$60,000 to \$220,000 per installation. Each location will need to be individually evaluated to determine final pricing based upon the site specific conditions.

KS-6HF

Downstream Defender

Device ID	Unit Price
KS-6HF4	\$ 12,900.00
KS-6HF6	\$ 22,500.00
KS-6HF8	\$37,500.00
KS-6HF10	\$65,000.00

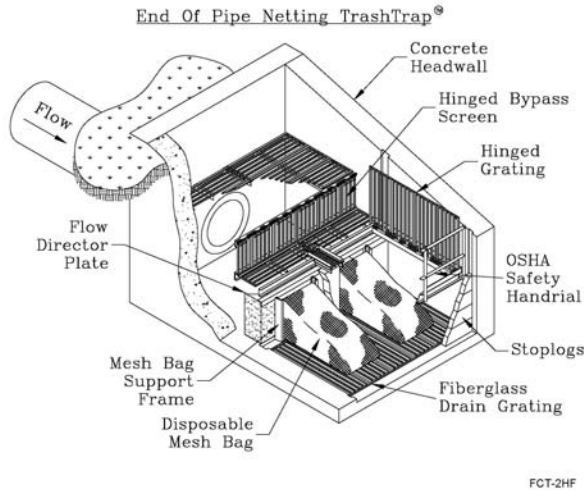
NOTES:

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- (2) Products manufactured in accordance with Buy American contract provisions
- (3) Prices include precast concrete components, bolted, gasketed lids, factory-installed internal components and delivery to jobsite
- (4) Purchaser is responsible for offloading and setting of structures
- (5) Prices do not include diversion structures
- (6) Prices do not include any applicable sales taxes
- (7) There is no purchase quantity discount available for this product

High Flow Capacity, Requires Water Board Approval

FCT-2HF End of Pipe Netting Trash Trap

End of pipe net



<p>Company Contact: Fresh Creek Technologies, Inc., Cedar Grove, NJ Sales contact: Walter C. Trnka, 215-272-8213 wtrnka@freshcreek.com http://www.freshcreek.com</p>	<p>If net is 5mm, meets trash capture minimum specifications</p>
<p>Storage capacity: "The storage capacity for one net can be estimated between 200 to 2000 pounds of wet trash and debris with at volume density of 50lbs per cubic foot."</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: "Net change is routinely accomplished in under 30 minutes. Frequency of net change determined by wet weather events and the amount of trash in the flow"</p>	<p>Warranty: 2 yrs</p>
<p>Material: Nylon nets, plastic or wooden frames, 316 stainless steel bypass screen and removal device, fiberglass drain grating</p>	<p>Delivery Time: Delivery to site is 6-8 weeks after the receipt of approved drawings.</p>
<p>Pricing: See over.</p>	

Comments from reference checks

Device effectiveness in capturing trash

"We are not getting the materials that we expected. The net works as a great leaf catcher. We are getting more leaves than trash."

"It performed well. We tried different netting devices from different vendors. We shifted back to Fresh Creek."

Maintenance issues/experience

"..storms caused some damage to the device. The doors bent upwards due to the severe nature of the flows." Netting had to be modified to accommodate fish passage



Attachment "P"

Confidential

1425 Pompton Ave. Ste 1-2, Cedar Grove, NJ 07009
 800-741-9487
 973-237-9099
 973-237-0744(Fax)
www.freshcreek.com

**Price-Product Matrix High Flow Capacity Trash Capture Devices
 in the San Francisco Bay Region**

Date: February 2, 2010

Flow rate	<u>In-Line - FLNTT</u>			
	# Nets	Equipment Price	Installation Price	Total
1241-2480 cfs	40	\$3,798,116	\$9,495,290	\$13,293,405
621-1240 cfs	20	\$1,913,624	\$4,784,060	\$6,697,684
249-620 cfs	10	\$971,378	\$2,428,445	\$3,399,823
125-248 cfs	4	\$406,031	\$1,015,076	\$1,421,107
63-124 cfs	2	\$217,581	\$543,954	\$761,535
5-62 cfs	1	\$123,357	\$308,392	\$431,749
0-5 cfs	1	\$40,000	\$100,000	\$140,000

Flow rate	<u>End-of-Pipe - EOPNTT</u>			
	# Nets	Equipment Price	Installation Price	Total
1241-2480 cfs	40	\$2,379,871	\$4,759,742	\$7,139,613
621-1240 cfs	20	\$1,204,502	\$2,409,003	\$3,613,505
249-620 cfs	10	\$616,817	\$1,233,634	\$1,850,451
125-248 cfs	4	\$264,206	\$528,412	\$792,618
63-124 cfs	2	\$146,669	\$293,338	\$440,007
5-62 cfs	1	\$87,901	\$175,801	\$263,702

Flow rate	<u>Floating - FLNTT</u>			
	# Nets	Equipment Price	Installation Price	Total
1241-2480 cfs	10	\$839,551	\$1,259,327	\$2,098,878
621-1240 cfs	4	\$353,300	\$529,950	\$883,249
249-620 cfs	2	\$191,216	\$286,824	\$478,040
125-248 cfs	2	\$191,216	\$286,824	\$478,040
63-124 cfs	2	\$191,216	\$286,824	\$478,040
5-62 cfs	2	\$191,216	\$286,824	\$478,040

Notes:

1. Nets for the In-Line and End-of-Pipe are 30"W x 60"H at the opening.
2. Nets for the Floating are 30"W x 30"H at the opening.
3. All Netting TrashTrap® nets are made of heavy duty Nylon or resin coated heavy duty Nylon, where applicable.
4. Nets are nominally 8 feet long. Other lengths are available based on size, design, flow and velocity.
5. Net mesh opening size used is 5 mm. Other sizes are available.
6. Nets are designed for nominal 5 feet/second at the net frame opening.
7. All Netting TrashTrap systems are constructed of 316 stainless steel.
8. Concrete chambers are included with the in-line style @ a Invert of 6'-0", but End-of-Pipe and Floating do not include any concrete.
9. Total installed cost will be a function of the site conditions, elevation, and inverts, but in the installation price above was calculated using the following factors:
 - a. In-Line Systems Factor 2.5 x Equipment Price
 - b. End-of-Pipe Systems Factor 2.0 x Equipment Price
 - c. Floating System Factor 1.5 x Equipment Price
10. Prices subject to change pending contract execution.

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FCT-1HF
Fresh Creek Technologies
In-Line Netting Trash Trap

Device ID	Flow Rate	In-Line #Nets	Equipment Price	Installation Price	Total
FCT-1HFa	1241-2480 cfs	40	\$3,798,116	\$9,495,290	\$13,293,405
FCT-1HFB	621-1240 cfs	20	\$1,913,624	\$4,784,060	\$6,697,684
FCT-1HFc	249-620 cfs	10	\$971,378	\$2,428,445	\$3,399,823
FCT-1HFd	125-248 cfs	4	\$406,031	\$1,015,076	\$1,421,107
FCT-1HFe	63-124 cfs	2	\$217,581	\$543,954	\$761,535
FCT-1HFF	5-62 cfs	1	\$123,357	\$308,392	\$431,749
FCT-1HFG	0-5 cfs	1	\$40,000	\$100,000	\$140,000

FCT-2HF
Fresh Creek Technologies
End of Pipe Netting Trash Trap

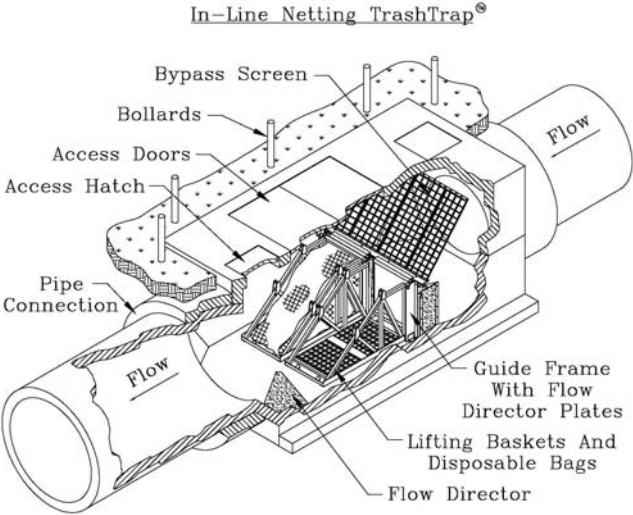
Device ID	Flow Rate	End of Pipe #Nets	Equipment Price	Installation Price	Total
FCT-2HFa	1241-2480 cfs	40	\$2,379,871	\$4,759,742	\$7,139,613
FCT-2HFB	621-1240 cfs	20	\$1,204,502	\$2,409,003	\$3,613,505
FCT-2HFc	249-620 cfs	10	\$616,817	\$1,233,634	\$1,850,451
FCT-2HFd	125-248cfs	4	\$264,206	\$528,412	\$792,618
FCT-2HFe	63-124 cfs	2	\$146,669	\$293,338	\$440,007
FCT-2HFF	5-62 cfs	1	\$87,901	\$175,801	\$263,702

Notes:

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2. Nets for the Floating are 30"W x 30"H at the opening.
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4. Nets are nominally 8 feet long. Other lengths are available based on size, design, flow and velocity.
5. Net mesh opening size used is 5 mm. Other sizes are available.
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FCT-1HF Inline Netting Trash Trap

Inline pipe net



FCT-1HF

<p>Company Contact: Fresh Creek Technologies, Inc., Cedar Grove, NJ Sales contact: Walter C. Trnka, 215-272-8213 wtrnka@freshcreek.com http://www.freshcreek.com</p>	<p>If net is 5mm, meets trash capture minimum specifications</p>
<p>Storage capacity: "The storage capacity for one net can be estimated between 200 to 2000 pounds of wet trash and debris with at volume density of 50lbs per cubic foot."</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: "Net change is routinely accomplished in under 30 minutes, frequency of net change determined by wet weather events and the amount of trash in the flow"</p>	<p>Warranty: 2 yrs</p>
<p>Material: Nylon nets, plastic or wooden frames, 316 stainless steel bypass screen and removal device, fiberglass drain grating</p>	<p>Delivery Time: The delivery to site is 6-8 weeks after the receipt of the approved drawings.</p>
<p>Pricing: See over.</p>	

Comments from reference checks

Device effectiveness in capturing trash

"The device is incredible. Depending on future funding, our plan is to purchase additional nets." "It performed well. We tried different netting devices from different vendors. We shifted back to Fresh Creek." "The netting trash trap is operating as designed and functions as designed."

Maintenance issues/experience

Fresh Creek has come out to reposition the nets to alleviate problems." "Trash traps installed in high trash areas will require more maintenance. You do not need to enter vault to perform maintenance. A small crane is required to remove nets."



Attachment "P"

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Date: February 2, 2010

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5-62 cfs	1	\$123,357	\$308,392	\$431,749
0-5 cfs	1	\$40,000	\$100,000	\$140,000

Flow rate	<u>End-of-Pipe - EOPNTT</u>			
	# Nets	Equipment Price	Installation Price	Total
1241-2480 cfs	40	\$2,379,871	\$4,759,742	\$7,139,613
621-1240 cfs	20	\$1,204,502	\$2,409,003	\$3,613,505
249-620 cfs	10	\$616,817	\$1,233,634	\$1,850,451
125-248 cfs	4	\$264,206	\$528,412	\$792,618
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Notes:

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In-Line Netting Trash Trap

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FCT-1HFD	125-248 cfs	4	\$406,031	\$1,015,076	\$1,421,107
FCT-1HFE	63-124 cfs	2	\$217,581	\$543,954	\$761,535
FCT-1HFF	5-62 cfs	1	\$123,357	\$308,392	\$431,749
FCT-1HFG	0-5 cfs	1	\$40,000	\$100,000	\$140,000

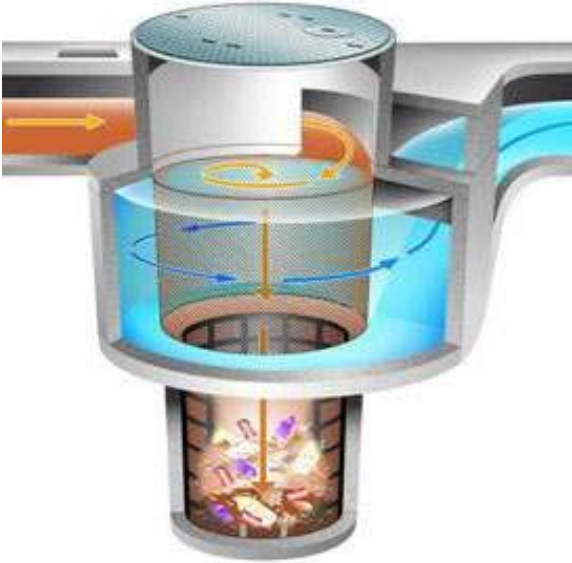
FCT-2HF
Fresh Creek Technologies
End of Pipe Netting Trash Trap

Device ID	Flow Rate	End of Pipe #Nets	Equipment Price	Installation Price	Total
FCT-2HFa	1241-2480 cfs	40	\$2,379,871	\$4,759,742	\$7,139,613
FCT-2HFB	621-1240 cfs	20	\$1,204,502	\$2,409,003	\$3,613,505
FCT-2HFc	249-620 cfs	10	\$616,817	\$1,233,634	\$1,850,451
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Notes:

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 - b. End-of-Pipe Systems Factor 2.0 x Equipment Price
 - c. Floating System Factor 1.5 x Equipment Price
10. Prices subject to change pending contract execution.

CCP-1HF Continuous Deflective Separator (CDS) Hydrodynamic separator



<p>Company Contact: Contech Construction Products, Novato, CA Sales contact: Curt Kruger, 415-897-8587 or Paul Jacob, 925-283-1205 krugerc@contech-cpi.com jacobp@contech-cpi.com http://contech-cpi.com</p>	
<p>Storage capacity: 25-134 cubic feet depending on size</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: "We recommend at least two inspections during the first year of operation, with the inspection schedule adjusted thereafter based on experience. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit."</p>	<p>Delivery Time: Lead time is 3-6 weeks after release to manufacture. If final construction drawings do not accompany the order, then delivery is 3-6 weeks after such drawings are approved.</p>
<p>Material: concrete, fiberglass, stainless steel, cast iron</p>	<p>Warranty: 2 yrs</p>
<p>Pricing: See over.</p>	

Comments from reference checks

Device effectiveness in capturing trash

"Trash is mostly removed. The first flush captures all the trash."

Maintenance issues/experience

Also captures sediments, oil and grease. "Each unit requires less and less maintenance after the first flush. Vector control is an issue. CDS units capture a lot of trash." "Vector control is an issue. I suggest plugging some of the holes to prevent vectors from entering the unit." "I would suggest the addition of a screen to keep vectors out of the top of the CDS unit. We had a problem with a lot of mosquitoes one year." "Due to its large footprint and required depth placement, I would also evaluate smaller and similar products (e.g., Vortechincs) that CONTECH markets. They may work just as well as a CDS unit."

Prices below DO NOT include installation:

Size A	\$9,180	Size K	\$45,306
Size B	\$10,260	Size L	\$43,481 *
Size C	\$12,830	Size M	\$44,312 *
Size D	\$17,993	Size N	\$51,440 *
Size E	\$23,760	Size O	\$63,202 *
Size F	\$27,130	Size P	\$77,101 *
Size G	\$29,938	Size Q	\$79,477 *
Size H	\$32,141	Size R	\$147,692 *
Size I	\$34,333	Size S	\$156,229 *
Size J	\$39,917	Size T	\$164,339 *

Quantity Discount: 3 or more of Sizes A-K ordered at the same time, 10% discount

*Diversion Box likely required

Typical Diversion Box Prices:

6' x 12'	\$13,000
8' x 14'	\$15,000
12' x 18'	\$19,000

CCP-1HF
Continuous Deflective Separator

Prices DO NOT include installation.

Device ID	Size (manufacturer reference)	Price	Diversion Box Likely Required
CCP-1HFa	A	\$9,180.00	
CCP-1HFb	B	\$10,260.00	
CCP-1HFc	C	\$12,830.00	
CCP-1HFd	D	\$17,993.00	
CCP-1HFe	E	\$23,760.00	
CCP-1HFf	F	\$27,130.00	
CCP-1HFg	G	\$29,938.00	
CCP-1HFh	H	\$32,141.00	
CCP-1HFi	I	\$34,333.00	
CCP-1HFj	J	\$39,917.00	
CCP-1HFk	K	\$45,306.00	
CCP-1HFl	L	\$43,481.00	*
CCP-1HFm	M	\$44,312.00	*
CCP-1HFn	N	\$51,440.00	*
CCP-1HFo	O	\$63,202.00	*
CCP-1HFp	P	\$77,101.00	*
CCP-1HFq	Q	\$79,477.00	*
CCP-1HFr	R	\$147,692.00	*
CCP-1HFs	S	\$156,229.00	*
CCP-1HFt	T	\$164,339.00	*

Quantity Discount: 3 or more of sizes A-K ordered at the same time, 10% discount.

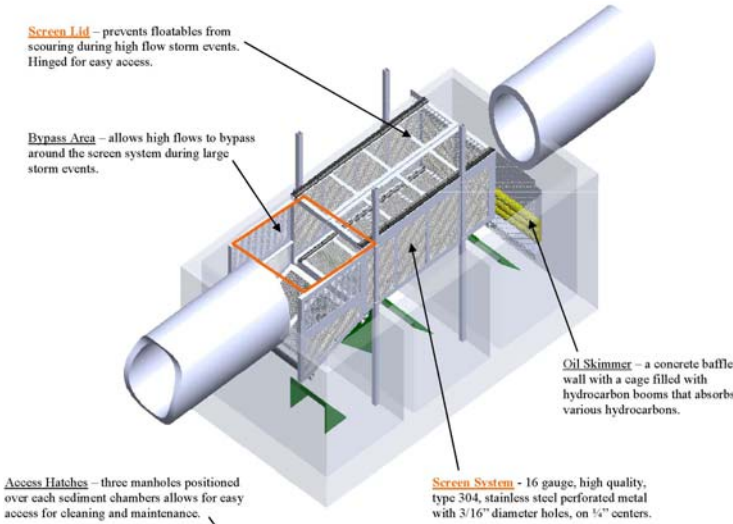
* = Diversion box likely required

Diversion Box Prices:

Device ID	Size	Price
CCP-1HFd1	6' X 12'	\$13,000
CCP-1HFd2	8' X 14'	\$15,000
CCP-1HFd3	12' X 18'	\$19,000

BC-5HF Nutrient Separating Baffle Box

Inline treatment system for Total Suspended Solids, Hydrocarbons (oils and grease), and Gross Solids



<p>Company Contact: Bio Clean Environmental Services, Inc., Oceanside, CA Sales contacts: Greg Kent, (760) 433-7640 or Kirk Vallejo, (760) 681-9583 gkent@biocleanenvironmental.net kvallejo@biocleanenvironmental.net http://www.biocleanenvironmental.com</p>	
<p>Storage capacity: "The treatment capacity of this NSBB can easily exceed the one-year, one-hour intensity when properly sized."</p>	<p>Replacement Parts: Available</p>
<p>Vendor's maintenance estimate: "inspect a minimum of once every six months; cleaning and debris removal maintenance, minimum of once a year; replacement of hydrocarbon booms, once a year."</p>	<p>Warranty: 5 yrs</p>
<p>Material: precast concrete, 6061-T6 aluminum, stainless steel, steel reinforcement, laminated fiberglass</p>	<p>Delivery Time: 1 to 5 units, 8 weeks; 6 to 15 units, 10 weeks; 16 to 25 units, 12-16 weeks</p>
<p>Pricing: See over.</p>	

No reference information available

Nutrient Separating Baffle Box

Price for Standard Built Box - Grade to 5 Feet of Cover or Less

Normal Soil Conditions and No Groundwater

Price Does Not Include Delivery to Jobsite Unless Otherwise Noted**

NSBB Model	Price per System	Discounted Price - 6 to 20	Discounted Price - 21 and Over	Delivery Cost
4-6.5-72	\$17,768.00	\$16,879.00	\$15,991.00	Per Job*
4-8-84	\$19,448.00	\$18,475.00	\$17,503.00	Per Job*
5-10-84	\$22,844.00	\$21,701.00	\$20,559.00	Per Job*
6-12-84	\$27,123.00	\$25,766.00	\$24,410.00	Per Job*
8-12-96	\$35,197.00	\$33,437.00	\$31,677.00	Per Job*
8-14-96	\$37,941.00	\$36,043.00	\$34,146.00	Per Job*
10-14-96	\$44,000.00	\$41,800.00	\$39,600.00	Per Job*
11-16-114	\$68,500.00*	\$65,075.00	\$61,650.00	\$5,000.00

Additional Cost to Above Pricing for Corrosive Soil Conditions or Groundwater Installation

Custom Engineered Box - Installation at Over 5 Feet of Cover

Depth of Box, Soil Conditions and Groundwater are Unknown Factors and Costs Vary Per Job

Prices are Based Upon Standard Pricing and Actual Costs for Special Concrete Mixtures and Wall Thickness

NSBB Model	Price per System	Discounted Price - 6 to 20	Discounted Price - 21 and Over	Delivery Cost
4-6.5-72	Per Quote	Per Quote	Per Quote	Per Job*
4-8-84	Per Quote	Per Quote	Per Quote	Per Job*
5-10-84	Per Quote	Per Quote	Per Quote	Per Job*
6-12-84	Per Quote	Per Quote	Per Quote	Per Job*
6-12-96	Per Quote	Per Quote	Per Quote	Per Job*
8-14-96	Per Quote	Per Quote	Per Quote	Per Job*
10-14-96	Per Quote	Per Quote	Per Quote	Per Job*
11-16-114	Per Quote	Per Quote	Per Quote	\$5,000.00

Pricing Includes:

304 Stainless Steel Basket with 4.75 mm Openings(Full Capture)

Assistance with Preliminary Design

NSBB Drawing Stamped by Engineer

Supervision at Installation

*Delivery Charge from Plant in Pleasanton, California is Based Upon Mileage to Jobsite

**Delivery Charge is \$5,000.00 from Manufacturing Plant in Fontana, California

5 Year Warranty



Southern California
2972 San Lus Rey Rd.
Oceanside, CA 92058
Phone 760-433-7640

Northern California
690 Sunol St.
San Jose, CA 95126
Phone 760-579-1584

BC-5HF Nutrient Separating Baffle Box

**Price for Standard Built Box - Grade to 5 Feet of Cover or Less
Normal Soil Conditions and No Groundwater**

Price Does Not Include Delivery to Jobsite Unless Otherwise Noted**

Device ID	Model #	Price per system	Discounted Price 6-20	Discounted Price 21 and over	Delivery Cost
BC-5HFa	4-6.5-72	\$17,768.00	\$16,879.00	\$15,991.00	Per Job
BC-5HFb	4-8-84	\$19,448.00	\$18,475.00	\$17,503.00	Per Job
BC-5HFc	5-10-84	\$22,844.00	\$21,701.00	\$20,559.00	Per Job
BC-5HFd	6-12-84	\$27,123.00	\$25,766.00	\$24,410.00	Per Job
BC-5HFe	8-12-96	\$35,197.00	\$33,437.00	\$31,677.00	Per Job
BC-5HFf	8-14-96	\$37,941.00	\$36,043.00	\$34,146.00	Per Job
BC-5HFg	10-14-96	\$44,000.00	\$41,800.00	\$39,600.00	Per Job
BC-5HFh	11-16-114	\$68,500.00	\$65,075.00	\$61,650.00	\$5,000.00

Additional Cost to Above Pricing for Corrosive Soil Conditions or Groundwater Installation

Pricing Includes:

304 Stainless Steel Basket with 4.75 mm Openings (Full Capture)
Assistance with Preliminary Design
NSBB Drawing Stamped by Engineer
Supervision at Installation

ADS - FLEXSTORM CPS PRICING

ADS FLEXSTORM: CONNECTOR PIPE SCREEN (CPS)

SIZING TABLE

CPS Flow Rates by Model						MINIMUM BYPASS RATINGS for lid designs with 6" Freeboard									
Model	Screen Length	Screen Height	A_{screen} (Net open area)	Q_{screen} Flow Rate (cfs)	L_{bypass} (ft)	B (bypass height) = 4"		B (bypass height) = 6"		B (bypass height) = 8"		B (bypass height) = 10"		B (bypass height) = 12"	
						Q4	H4	Q6	H6	Q8	H8	Q10	H10	Q12	H12
3L18H-Bypass-Shape	3	18	1.80	8.72	3.00	3.93	8	5.52	7	6.81	6	7.77	5	13.19	10
4L18H-Bypass-Shape	4	18	2.45	11.84	4.00	5.24	8	7.35	7	9.08	6	10.36	5	17.58	10
5L18H-Bypass-Shape	5	18	3.09	14.96	5.00	6.55	8	9.19	7	11.35	6	12.95	5	21.98	10

Determine CPS model number based on screen length and height - bypass height - and screen shape. For example Model 3L18H-8-U is 3' wide x 18" tall, has 8" bypass height, and is "U" shaped. Custom lengths and heights are available for any catch basin.

*LA County approved
 *Full Capture Device as Certified by the California Regional Water Quality Control Board (CRWQCB)

ALL PRODUCTS MANUFACTURED BY INLET & PIPE PROTECTION, INC. A DIVISION OF ADS, INC. WWW.INLETFILTERS.COM (866) 287-8655 PH (630) 352-3477 FX INF@INLETFILTERS.COM

SIZE: CPS DRAWING NO: QUANTITY: REV: A

SCALE: TITLE: CPS Flexstorm CPS A SHEET 1 OF 1

ADS-FLEXSTORM CPS			Unit Pricing for CPS with Deflector Lids			
Screen Length (L)	Base Screen Pricing	Protective Lid Pricing	1-9	10-49	50-99	100+
3'-4'	\$275	\$100	\$375	\$335	\$320	\$265
5'-6'	\$325	\$125	\$450	\$400	\$385	\$300
7'-10'	\$375	\$150	\$525	\$475	\$440	\$365
Add Professional Installation Cost			\$200	\$175	\$165	\$150

Note: Pricing shown is for standard shapes and lids. Custom sizes or configurations need to be quoted on a case by case basis.

Company Contact:

Advanced Drainage Systems, FLEXSTORM division
 Sales Contact: Derek Ramsey 559 906-3319
derek.ramsey@ads-pipe.com
<http://www.inletfilters.com/products/connector-pipe-screen-cps>

Warranty: 3 years

Lead Time: 2-4 weeks

Material: 304 Stainless Steel

San Francisco Bay Regional Water Board Approved

LA County Approved

Maintenance: Catch basin cleaning required using a vacuum truck per maintenance schedule, typically every 3-6 months depending on loading. Screen should be swept, scraped and flushed with hose. Total maintenance time is approximately 15-20 minutes per basin.



July 13, 2017

Mr. Leo Cosentini
California State Water Resources Control Board
Division of Water Quality
P.O. Box 100
Sacramento, CA 95812-100

**Re: Application for Trash Treatment Control Device,
Aqua-Swirl® Stormwater Treatment System**

Dear Mr. Cosentini,

AquaShield™, Inc. is pleased to submit this Application for the Aqua-Swirl® Stormwater Treatment System (Aqua-Swirl®) for use as a Trash Treatment Control Device. Supporting information for this application is submitted in accordance with the CSWRCB document *Trash Treatment Control Device Application Requirements* which includes the following seven elements:

1. Cover Letter
2. Table of Contents
3. Physical Description
4. Installation Information
5. Operation and Maintenance Information
6. Reliability
7. Field/Lab Testing Information and Analysis

Thank you for considering this application and please do not hesitate to contact us if additional information is needed.

Respectfully submitted,

AquaShield™, Inc.

Mark B. Miller, P.G.
Research Scientist

cc: John Santos, AquaShield™, Western Business Development Manager



1.0 COVER LETTER

1.A. General description of the device.

The Aqua-Swirl[®] is a custom engineered, post-construction flow-through stormwater treatment device designed to remove trash, suspended sediment, floating debris and free-floating oil by utilizing hydrodynamic vortex-enhanced separation. Water must pass through a screen affixed to the base of the inner arched baffle which traps trash particles of 5.0 mm or more before exiting the device behind the baffle.

1.B. The applicant's contact information and location.

The AquaShield[™] contact located in California is:

John Santos
Western Business Development Manager
AquaShield[™], Inc.
9580 Oak Avenue
Suite 7-203
Folsom, CA 95630
916-850-9879
jsantos@aquashieldinc.com

The AquaShield[™] contact at corporate headquarters in Chattanooga, Tennessee is:

Mark B. Miller, P.G.
Research Scientist
AquaShield[™], Inc.
2733 Kanasita Drive
Suite 111
Chattanooga, TN 37343
888-344-9044
mmiller@aquashieldinc.com

1.C. The Device's manufacturing location.

AquaShield[™] currently utilizes eight independent fabrication facilities strategically located across the United States in order to provide timely and cost-effective service and delivery to our customers. California projects will most likely rely on any of three facilities located in Kingman, Arizona, Billings, Montana or Greeley, Colorado. Other facilities may be used as needed.

1.D. A brief summary of any field/lab testing results that demonstrate the Device functions as described within the Application.

A laboratory test of a full scale, commercially available Aqua-Swirl® Model AS-3s has been performed in the presence of an independent observer to document 100% trash retention. The test unit has a 3.5 foot diameter swirl chamber and a 4.6 ft² trash retention screen with 4.76 mm absolute diameter perforations to prevent trash particles of 5.0 mm and greater in size from escaping the device. Three trash retention runs used a simulated trash composition that was progressively added to existing material for each run. Surface area loading rates ranged from 21 to 98 gpm/ft². No trash was observed in the effluent stream, in netting at the end of the discharge pipe, or in the reserve water tank. Per Element 7 of this application, refer to Appendix F for the supporting report titled *Laboratory Testing of the Aqua-Swirl® Stormwater Treatment System Model AS-3s for Trash Retention*, March 28, 2017.

1.E. A brief summary of the Device limitations, and operational, sizing, and maintenance considerations.

The Aqua-Swirl® is an engineered stormwater quality system designed to meet site-specific flow conditions. Unstable native soils or excessively steep hill slopes may require engineered solutions to allow for proper installation and operation. Slope of the drainage pipe is important to ensure proper water conveyance through a facility. No driving head is needed for operation other than that associated with the slope of the drainage pipes.

Aqua-Swirl® systems are sized according to the water quality treatment flow rate (WQTFR) for a site design. Undersized facilities can create undesirable flow conditions (flooding) while oversized units may unnecessarily increase a facility's footprint and project costs. AquaShield™ agents and staff collaborate with specifying engineers to better ensure proper sizing.

Aqua-Swirl® systems can be installed in either offline or online configurations. Offline facilities require an upstream divergence structure and a downstream convergence structure. These structures are typically designed and supplied by others and are not provided by AquaShield™ unless done so on a project-specific basis. An offline design will only treat flows up to the WQTFR and flows in excess will bypass the device via piping that connects the two external structures.

The online Aqua-Swirl® "BYP" models are designed to convey both the WQTFR and the peak flow. An internal weir of the Aqua-Swirl® BYP models directs the WQTFR flow to the swirl chamber while bypass flows occur above the weir such that the two flow path never mix within the treatment area of the swirl chamber. Pipe sizing should be considered for either offline or online installations to meet a facility's flow volume conveyance requirement. Refer to Subsection 3J for additional information about online systems.

AquaShield™ recommends that any stormwater treatment installation should be designed with maintenance in mind. For example, if a facility is located such that maintenance equipment (e.g., vacuum truck) cannot access the device for any reason, then performance and long term functionally will eventually not meet the intended goals.

Aqua-Swirl® systems should be inspected and maintained following the recommendations and guidelines included in the Aqua-Swirl® Inspection & Maintenance Manual that is provided for

all site installations. AquaShield™ recommends quarterly inspections for the first year of operation to establish an anticipated maintenance frequency. AquaShield™ also recommends annual maintenance events. The single treatment/storage chamber facilitates inspection and maintenance since there is full access to the swirl chamber with no hidden or blind access chambers within the device. All maintenance-related activities are performed from the surface and no confined space entry is needed.

1.F. A description or list of locations, if any, where the Device has been installed. Include the name and contact information of as many as three municipality(s) purchasing the Device.

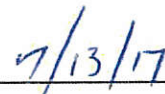
Pre-specified Aqua-Swirl® installations are pending Certification of this device.

1.G. Certification Statement.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons that manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



Eric B. Rominger, General Manager



Date

2.0 TABLE of CONTENTS

	<u>Page Number</u>
1. Cover Letter	2
Subsection 1.A	2
Subsection 1.B	2
Subsection 1.C	2
Subsection 1.D	3
Subsection 1.E	3
Subsection 1.F	4
Subsection 1.G	4
3. Physical Description	7
Subsection 3.A	7
Subsection 3.B	7
Subsection 3.C	8
Subsection 3.D	8
Subsection 3.E	8
Subsection 3.F	8
Subsection 3.G	9
Subsection 3.H	9
Subsection 3.I	9
Subsection 3.J	9
4. Installation Information	9
Subsection 4.A	9
Subsection 4.B	10
5. Operation and Maintenance Information	10
Subsection 5.A	10
Subsection 5.B	11
Subsection 5.C	12
Subsection 5.D	12
6. Reliability	13
Subsection 6.A	13
Subsection 6.B	13
Subsection 6.C	13
7. Field/Lab Testing Information and Analysis	13

List of Tables

Table 1. Aqua-Swirl [®] Sizing Chart	8
Table 2. Aqua-Swirl [®] Water Storage Volumes	12

Appendices

Appendix A.	Aqua-Swirl [®] Design Drawings
Appendix B.	Aqua-Swirl [®] Specifications for PCS and HDPE Material, Installation and Backfill
Appendix C.	Example Site Plans Showing Aqua-Swirl [®] Layout
Appendix D.	Aqua-Swirl [®] Inspection & Maintenance Manual
Appendix E.	AquaShield [™] Limited Warranty
Appendix F	<i>Laboratory Testing of the Aqua-Swirl[®] Stormwater Treatment System Model AS-3s for Trash Retention</i>

3.0 PHYSICAL DESCRIPTION

3.A. Design drawings for all standard Device sizes including dimensions, and alternative configurations.

Design drawings are included in **Appendix A**. Examples of standard offline Aqua-Swirl[®] and online Aqua-Swirl[®] BYP drawings for Models AS-2s through AS-13s are provided. Three examples of facility configurations using the cited offline models are included in **Appendix C**.

3.B. Description on how the Device works to trap all particles that are 5 mm or greater in size and how it is sized for varying flow volumes.

The Aqua-Swirl[®] Stormwater Treatment System (Aqua-Swirl[®]) is a custom engineered, post-construction flow-through structure designed to remove trash, suspended sediment, floating debris and free-floating oil. Aqua-Swirl[®] technology is a rapid or high flow rate device that relies on hydrodynamic vortex-enhanced separation. The Aqua-Swirl[®] has no moving parts and operates on gravity flow or movement of the stormwater runoff entering the structure. For use in California, the Aqua-Swirl[®] includes a built-in screen to capture trash particles of 5.0 mm or more. Refer to Figure 1 in the report attached in Appendix F for an illustration of the Aqua-Swirl[®] design, screen and water flow path through the device.

Operation begins when stormwater enters the single chamber Aqua-Swirl[®] by means of its tangential inlet pipe thereby inducing a circular (swirl or vortex) flow pattern. The diameter of the swirl chamber represents the effective treatment area of the device. Both material capture and storage is accomplished within the swirl chamber. A combination of dynamic gravitational and hydrodynamic drag forces results in solids dropping out of the flow and migrating to the center of the swirl chamber where velocities are the lowest. Flow circulates downward where water flows through the trash screen at the base of the arched inner baffle then exits upward behind the baffle. Quiescent settling occurs between flow events. The top of the baffle is sealed across the treatment channel to eliminate floatable pollutants from escaping the swirl chamber. A vent pipe is extended up the riser to expose the backside of the baffle to atmospheric conditions, thus preventing a siphon from forming at the bottom of the baffle.

All water must pass through the trash screen in order to exit the device. Trash is captured using a screen attached to the base of the inner arched baffle to prevent material 5.0 mm and greater in size from escaping the device. Screen perforations have an absolute diameter of 4.76 mm. The vortex flow sweeps material from the trash capture screen. Sediment and settleable solids are stored at the base of the swirl chamber while floatables remain captured within the treatment area on the upstream side of the arched baffle.

An Aqua-Swirl[®] sizing chart is shown below in **Table 1**. Models are identified by their diameters with sequential model designations of AS-2s through AS-13s. Note that models AS-2s, AS-3s and AS-4s have diameters of 2.5, 3.5 and 4.5 feet, respectively, while all other model designations represent the actual device diameters. Corresponding water quality treatment flow rates (WQTFR) are listed for each model. Trash capture capacity is also listed in the table (see Subsection 3.F). Multiple, or twin units can be custom designed for site-specific WQTFRs that exceed the AS-13s treatment capacity.

Table 1. Aqua-Swirl® Sizing Chart for California Trash Capture

Aqua-Swirl® Model	Diameter (ft)	Water Quality Treatment Flow Rate (cfs)	Trash Capture Capacity (ft ³)
AS-2s	2.5	1.1	1.0
AS-3s	3.5	2.1	2.1
AS-4s	4.5	3.5	3.4
AS-5s	5	4.4	4.3
AS-6s	6	6.3	6.3
AS-7s	7	8.6	8.6
AS-8s	8	11.2	11.4
AS-9s	9	14.2	14.5
AS-10s	10	17.5	17.9
AS-11s	11	21.2	21.8
AS-12s	12	25.2	26.0
AS-13s	13	29.6	30.6
AS-Xs*	Custom*	>29.6	Custom*
* Custom designs to meet site-specific WQTFR and can include multiple (twin) units.			

3.C. The Device maximum trash capture capacity.

Table 1 lists the trash volume retained by Aqua-Swirl® models. Trash capture capacity is based on laboratory testing. Refer also to Element 7 and Appendix F for the trash retention report.

3.D. The Device hydraulic capacity (flow in cfs) at its maximum trash capture capacity for all standard Device sizes.

This parameter is listed in Table 1 as the WQTFR.

3.E. Conditions under which the Device re-introduces previously trapped trash.

The trash retention screen in the Aqua-Swirl® uses 4.76 mm absolute diameter perforations to eliminate larger particles from escaping the swirl chamber. Although unlikely, a broken screen could potentially re-introduce previously trapped trash to the effluent.

3.F. Each material and material grade used to construct the Device (stainless steel, plastic, etc.).

Aqua-Swirl® systems are constructed of polymer coated steel (PCS) or high density polyethylene (HDPE). The modular design allows for units to be delivered without the need for on-site assembly. Appendix B includes Aqua-Swirl® Specifications for PCS and HDPE that includes descriptions of Materials, Performance, Treatment Chamber Construction, Installation, Division of Responsibility, Submittals and Quality Control Inspection.

3.G. Estimated design life of the Device.

The estimated design life for systems is 75+ years. According to the National Corrugated Steel Pipe Association, PCS can achieve a 100-year service life (NCSPA, *Pipe Selection Guide*, page 6, Figure 3).

3.H. Engineering plans/diagrams for a typical installation.

Appendix C includes three examples of offline diversion layouts that illustrate the customization aspect of Aqua-Swirl® facility designs. A common layout is labeled in the illustration as “Off-Line Layout” that includes separate divergence and convergence structures. The angle between the influent and effluent stubout pipes can vary to accommodate a site design. A 90° angle between the stubouts is a common practice. The two examples at the top of the illustration show a single diversion structure in both a “Tight” and “Horseshoe” layout. In all cases the vortex hydrodynamic separation is initiated by the tangential inlet and all flow must exit through the trash capture screen.

3.I. Photographs, if any, of pre- and post-installation examples.

None available.

3.J. If the Device is designed with an internal bypass, explain how the bypass only operates with flows greater than the design storm.

Aqua-Swirl® “BYP” systems are available for online configurations. These models are designed with an internal bypass weir positioned within the inlet pipe to allow for flows up to the WQTFR to enter the treatment chamber while any flow in excess of the WQTFR is bypassed without treatment. The cross sectional area of the inlet below the weir is computed using the orifice equation:

$$A = Q / KV$$

Where:

$$Q = \text{WQTFR}$$

$$K = \text{dimensionless constant (0.62)}$$

$$V = (2gh)^{0.5}$$

Once the orifice area is computed, the elevation of the bypass weir can be derived based on the pipe diameter.

4.0 INSTALLATION INFORMATION

4.A. Device installation procedures and considerations.

Installation and backfill procedures are described in the Aqua-Swirl® Specifications document attached in **Appendix C**.

Installation is generally a straightforward process. A backhoe or trackhoe can be used in lieu of a crane given the system's lightweight and modular design. There is no need for onsite assembly. Mar-Mac, Fernco®, Mission™ or equal type flexible boots with stainless steel tension bands are used for pipe couplings. Such pipe couplings are commonly used by contractors which minimizes the potential for faulty pipe connections.

AquaShield™ performs buoyancy calculations for installations that have a shallow groundwater table. If required, concrete should be poured across the base plate for anti-floatation security.

PCS systems are constructed for HS-25 loading.

Our engineers can assist stakeholders with unique site-specific installation considerations.

4.B. Methods for diagnosing and correcting installation errors.

The modular design of the system minimizes installation errors since there are no moving parts and no need for on-site assembly. The installation process is a relatively simple process.

As a precaution for leakage, all units are hydraulically tested at the fabrication facility to ensure that there are no leaks prior to shipment. Units are filled with water and observed such that any needed repairs can be made at that time.

To prevent systems from being installed backwards, both the inlet and outlet pipe stubouts on all units are clearly labeled prior to shipment from the fabrication facility. Riser pipes are capped for shipping.

It is envisioned that any installation error for any trash capture device would manifest itself via adverse flow conditions and/or diminished functionality for a variety of reasons. Examples could include, but not be limited to (a) facility undersizing, (b) inaccurate design and/or installation of conveyance piping and associated slope elevations, (c) obstruction(s) in influent and/or effluent conveyance piping, or (d) lack of maintenance. Should ruling these factors out fail to diagnose an installation error, then a site-specific condition would need to be assessed to solve the problem(s).

5.0 OPERATION and MAINTENANCE INFORMATION

5.A. Device inspection procedures and inspection frequency considerations.

An Aqua-Swirl® Inspection and Maintenance Manual is included as **Appendix D**. This manual is provided for every site delivery for stakeholders to understand system operations and track and document system inspection and maintenance cycles. AquaShield™ recommends that periodic system inspections be performed to determine whether the disposal of captured material is needed to ensure proper operation of the treatment system.

Upon installation and during construction, AquaShield™ recommends that an Aqua-Swirl® treatment system be inspected every three months and the system be cleaned as needed. A typical maintenance event for the cleaning of the swirl chamber can be accomplished with a vacuum truck without the need to enter the chamber. A unit should be inspected and cleaned at the end of construction regardless of whether it has reached its material (including trash) storage capacity.

During the first year post-construction, the unit should again be inspected every three months and cleaned as needed. We recommend that the system be inspected and cleaned once annually regardless of whether it has reached its pollutant storage capacity. For the second and subsequent years post-construction, the system can be inspected and cleaned once annually if the system did not reach full pollutant capacity in the first year post-construction. If the device reached full pollutant capacity in less than 12 months in the first year post-construction, it should be inspected once every six months and cleaned as needed. We further recommend that all external bypass structures (divergent and convergent) should be inspected whenever an inspection and maintenance event is performed. These structures can adversely affect performance and functionality if left unchecked.

Essential elements of a swirl chamber inspection include observing floating materials, trash and measuring the accumulated sediment at the base of the swirl chamber. These activities can be performed at the ground surface for a typical subsurface installation and there is no need to enter the device. Provided that there are no significant access restrictions to the facility, it is considered that a system inspection should not exceed one half hour. A typical maintenance event includes vacuuming and disposal of captured material from the swirl concentrator. Cleaning of the swirl chamber is often accomplished by use of a vacuum truck. It is estimated that on-site activities for maintenance should not exceed one hour. No special training is needed for technicians to inspect or maintain a unit. We recommend that if entry to the swirl chamber is necessary for any reason, then confined space entry techniques should be followed after water is removed from the structure.

Proper health and safety protocols should be followed during all inspection and maintenance events. We recommend that all materials removed during the maintenance process be handled and disposed in accordance with all applicable federal, state and local guidelines. Depending on the influent pollutant characteristics of the system drainage area, it may be appropriate to perform Toxicity Characteristics Leaching Procedure (TCLP) analyses on representative samples of the removed material to ensure that the handling and disposition of materials comply with all applicable regulations.

5.B. Maintenance procedures, including a description of necessary equipment and materials).

Refer to the Inspection & Maintenance Manual in **Appendix D** for a description of the procedures and equipment that is needed. A stadia rod, sludge judge, weighted tape measure or other suitable method can be used to measure the sediment/trash pile at the base of the unit. AquaShield™ recommends at least three measurements be taken across the base of the unit since a conical sediment pile may be present given the flow pattern within the swirl chamber. A flashlight or mirror reflection may be helpful to view material(s) in the water-laden swirl chamber. Typically a vacuum truck is the only equipment needed to clean a unit and any bypass structures.

Aqua-Swirl® systems are designed to hold water between storms. The top of the water column within the swirl chamber coincides with the invert (bottom) of the visible inlet pipe. Note that the outlet pipe invert elevation is the same as the inlet pipe invert elevation but is not visible behind the arched baffle. **Table 2** below lists the water storage volumes for the Aqua-Swirl® models which can be used to assist with water management for a maintenance event.

Table 2. Aqua-Swirl® Water Storage Volumes

Aqua-Swirl® Model	Water Volume (gal)
AS-2s	110
AS-3s	350
AS-4s	580
AS-5s	810
AS-6s	1,165
AS-7s	1,585
AS-8s	2,070
AS-9s	2,620
AS-10s	3,230
AS-11s	3,910
AS-12s	4,655
AS-13s	5,460

5.C. Maintenance frequency considerations, including effects of delay.

As stated above in Subsection 5.A., maintenance cycles are ultimately dependent on site-specific pollutant loading conditions. The recommended inspection cycles should assist with establishing a likely maintenance cycle.

Delayed maintenance could diminish performance in terms of flow conveyance or effluent water quality if the trash and/or sediment retention capacity is exceeded.

5.D. Device maintenance and vector control accessibility.

The Aqua-Swirl® design facilitates maintenance since there is full access to the single swirl chamber to remove all water and materials during a maintenance event. There are no hidden or “blind” access areas within the chamber to allow for complete cleaning and prevent vector breeding. Models AS-2s through AS-11s utilize a single access manhole while models AS-12s and AS-13s utilize two manholes to facilitate full accessibility to the swirl chamber.

Measurable rain events will most likely result in an exchange of water volume within the swirl chamber which minimizes the potential for vector breeding.

Steel manhole covers with blind pick holes are used to secure access to the swirl chamber. These covers block sunlight and prevent “fresh” water from flowing into the swirl chamber. It is our understanding that the lack of sunlight combined with a water depth being over five feet does not provide conducive conditions for vector breeding.

Oil that may be present in a unit via dynamic flow and dry period storage would likely prevent vector breeding as well.

6.0 RELIABILITY

6.A. Device sensitivity to loadings other than trash (leaves, sediment).

An independent TARP Tier II field test of an Aqua-Swirl[®] Model AS-5 has been verified by the New Jersey Corporation for Advanced Technology (NJCAT) to remove 86% of suspended sediment on an annual basis. This test unit did not utilize the trash screen as cited herein. The NJCAT verification report dated November 2012 is available at www.njcat.org. Influent sediment from 18 qualifying storms (≥ 0.1 inch) and over 15 inches of rainfall was characterized as clay loam whereby 72% of the particulate was less than 63 μm in size (silt). The average influent and effluent TSS concentrations were 132 mg/L and 12 mg/L, respectively. Total volatile suspended solids as organic material (TVSS) averaged 33% of the influent sediment.

6.B. Warranty Information

AquaShield[™] provides a one year limited warranty for each device (**Appendix E**).

6.C. Applicant's customer support.

AquaShield[™] strives to provide customer support in a timely and efficient manner in order to serve the diverse needs of design engineers, contractors, those in the regulatory community and others involved with a project. Local agents actively collaborate with stakeholders to provide site-specific assistance for the design, quotation, delivery, installation and maintenance of our systems. It is not necessary for an AquaShield[™] representative to be on-site for installations or maintenance events; however, a representative can be present on request. AquaShield[™] does not provide site design engineering or contractor services but our staff can provide assistance to those parties as warranted. AquaShield[™] does not operate a maintenance service but can assist stakeholders to make those arrangements with local service providers.

7.0 FIELD/LAB TESTING INFORMATION and ANALYSIS

Provide any available field or lab testing information that demonstrates the Device functionality. If Device does not include a 5 mm mesh within its design, the applicant must provide adequate testing that demonstrates it traps trash particles of 5 mm or more.

Appendix F includes the AquaShield[™] report titled *Laboratory Testing of the Aqua-Swirl[®] Stormwater Treatment System Model AS-3s for Trash Retention*. A full scale, commercially available Aqua-Swirl[®] Model AS-3s, which included a trash capture screen to trap particles 5.0 mm and greater, was tested in the presence of an independent observer to assess its capability of retaining trash commonly found in stormwater runoff. The trash composition was based on a specification cited in the report titled *Laboratory Testing of Gross Solids Removal Devices* prepared for CALTRANS by Dr. Bassam A. Young, Professor, Department of Civil and Environmental Engineering, UC Davis, May 2005, Report #CTSW-RT-05-73-18.1. Table 1 in the attached report lists the trash composition to include cardboard, cigarette butts, cloth, aluminum foil, plastic, Styrofoam, popsicle sticks and paper.

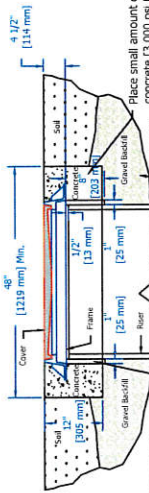
This testing program demonstrated 100% trash retention for three test runs at surface area loading rates of 21, 52 and 98 gpm/ft². Photographs are included in the attached report to document the testing program and the trash inventory.

AquaShield™ considers that the Aqua-Swirl® as designed and tested meets the requirements of the CSWRCB's requirements for a Trash Treatment Control Device and can accordingly be listed as a Certified Trash Treatment Control Device.

APPENDIX A

Aqua-Swirl Polymer Coated Steel (PCS) Stormwater Treatment System

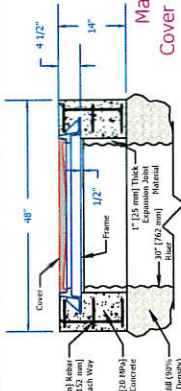
Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



Wrap Compressible Expansion Joint Material to a minimum 1-inch (25 mm) thickness around top of riser to allow transfer of inadvertent loading from manhole cover to concrete slab.

Manhole Frame & Cover Detail For Non-Traffic Areas Only
NTS

If traffic loading (HS-25) is required or anticipated, a 4-foot (1.22 m) diameter, 14-inch (356 mm) thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch (25 mm) thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch (25 mm). Top of manhole cover and concrete slab shall be level with finish grade.

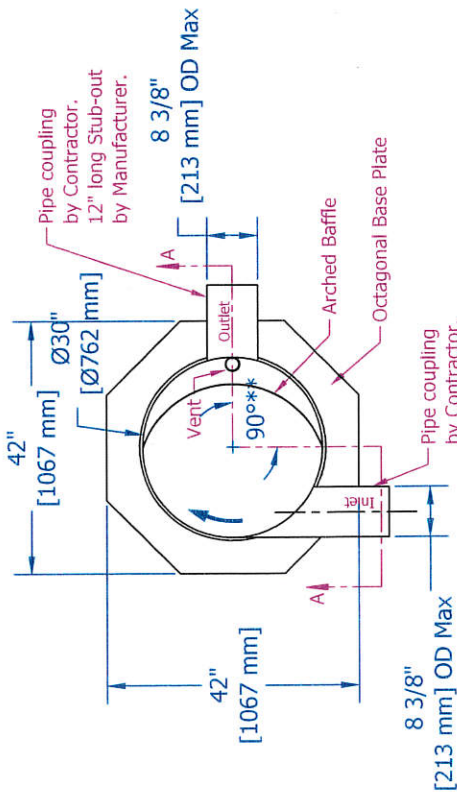


Manhole Frame & Cover Detail For Traffic Loading Areas
NTS

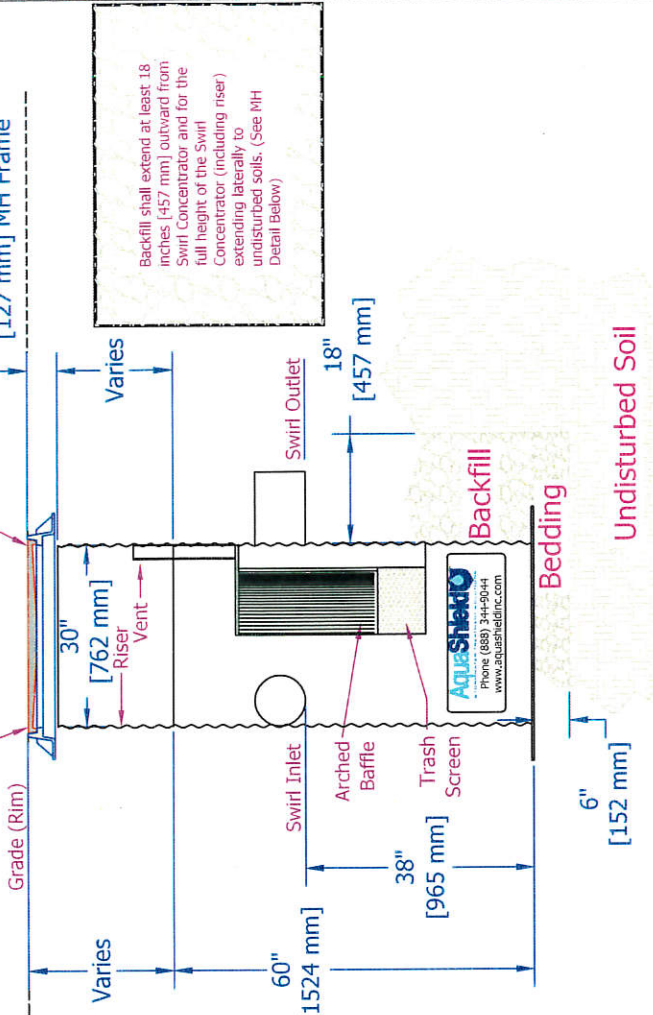
Note: As an alternative, 42-inch OD, HS-25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.

Rim elevations to match finished grade. PCS risers should NOT be field cut by Contractor.



Plan View



Section A-A

Aqua-Swirl Concentrator Model AS-2s PCS Standard Detail

AquaShield	Document: AS-2 PCS STD
2733 Kananda Drive, Suite 111, Chattanooga, TN 37343 Phone (888) 344-9044 Fax (423) 626-2112 www.aquashieldinc.com	Drawn By: JCW Scale: 1:20 Date: 02/05/15 U.S. Patent No. 6524473 and other Patent Pending

Aqua-Swirl Polymer Coated Steel (PCS) Stormwater Treatment System

Note: AS an alternative, 42-inch OD, HS-25 rated precast concrete rings may be substituted. 1.4-inch thickness must be maintained.

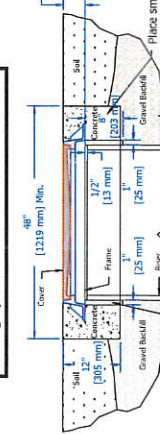
* Please see accompanied Aqua-Swirl specification notes.

** See Site Plan for actual system orientation.

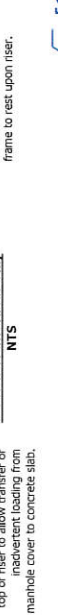
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.

Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.

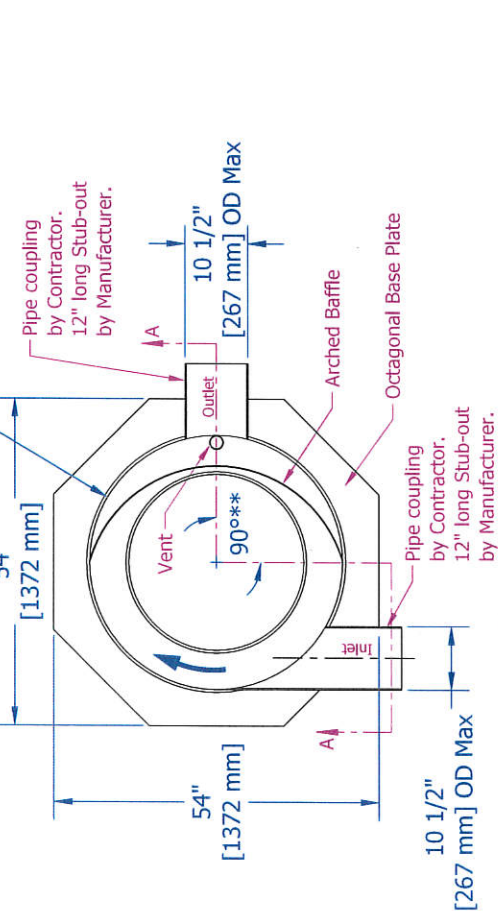
Manhole Frame and Cover Detail For Non-Traffic Areas Only



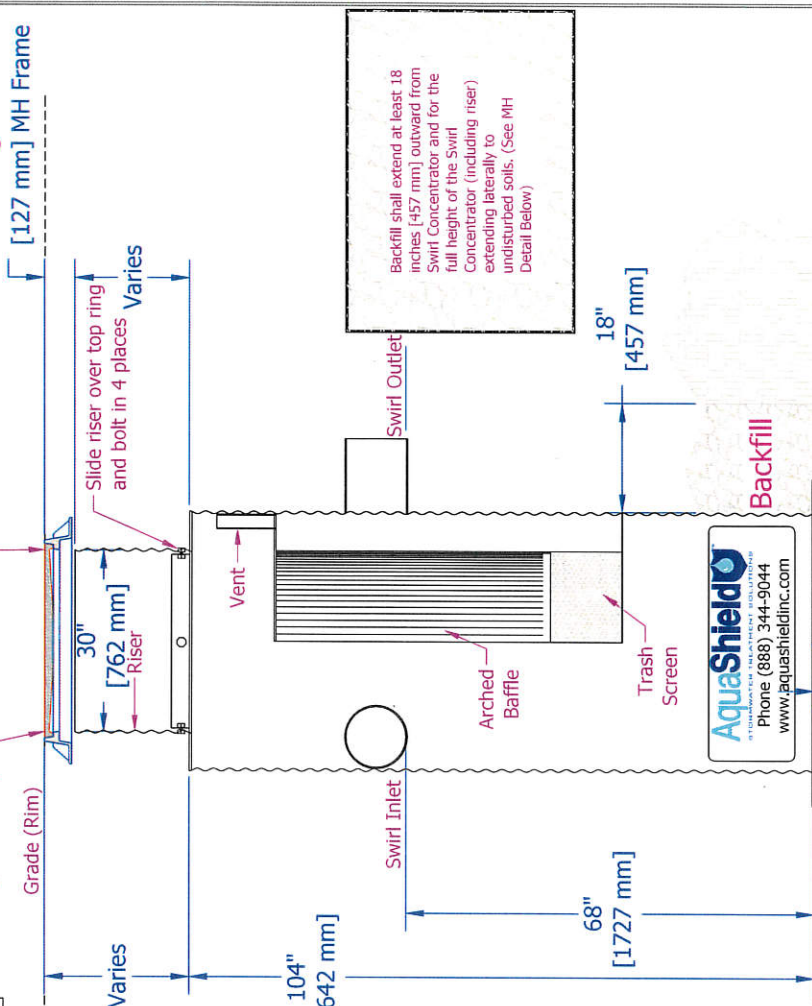
Manhole Frame and Cover Detail For Traffic Loading Areas



NTS



Plan View



6" [152 mm]

Bedding

Undisturbed Soil

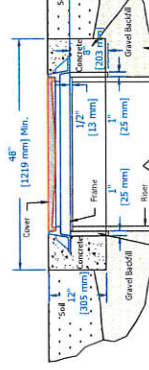
Section A-A
Aqua-Swirl Concentrator Model AS-3s PCS Standard Detail

Document: AS-3 PCS STD
Drawn By: JCW
Scale: 1:20
Date: 10/05/15
U.S. Patent No. 6524473 and other Patent Pending

AquaShield
2731 Koppers Drive, Suite 111, Chamopoa, TN, 37348
Phone (888) 344-9044 Fax (423) 826-2112
www.aquashieldinc.com

**Aqua-Swirl Polymer Coated Steel (PCS)
Stormwater Treatment System**

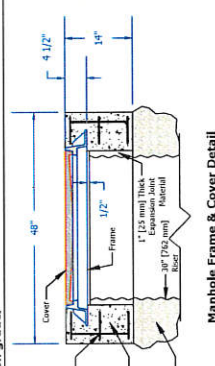
Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



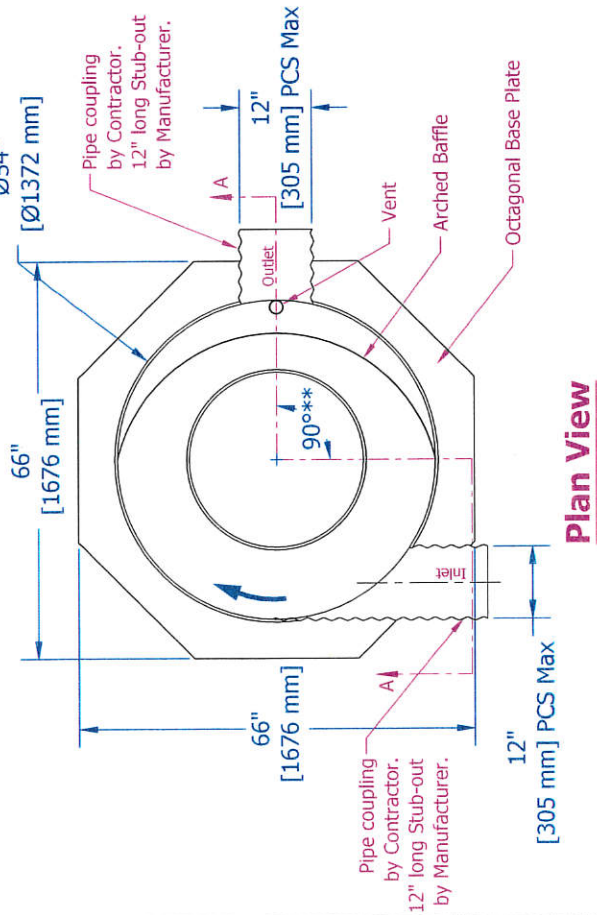
**Manhole Frame & Cover Detail
For Non-Traffic Areas Only
NTS**

Wrap Compressible Expansion Joint with 1-inch [25 mm] thick concrete around top of riser to allow transfer of inadvertent loading from manhole cover to concrete slab.

If traffic loading (HS-25) is required or anticipated, a 4-foot [1,22 mm] diameter, 14-inch [356 mm] thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch [25 mm] thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch [25 mm]. Top of manhole cover and concrete slab shall be level with finish grade.



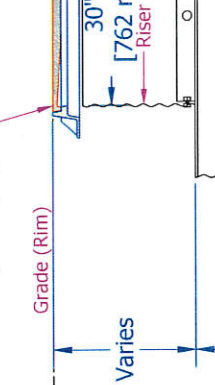
**Manhole Frame & Cover Detail
For Traffic Loading Areas
NTS**



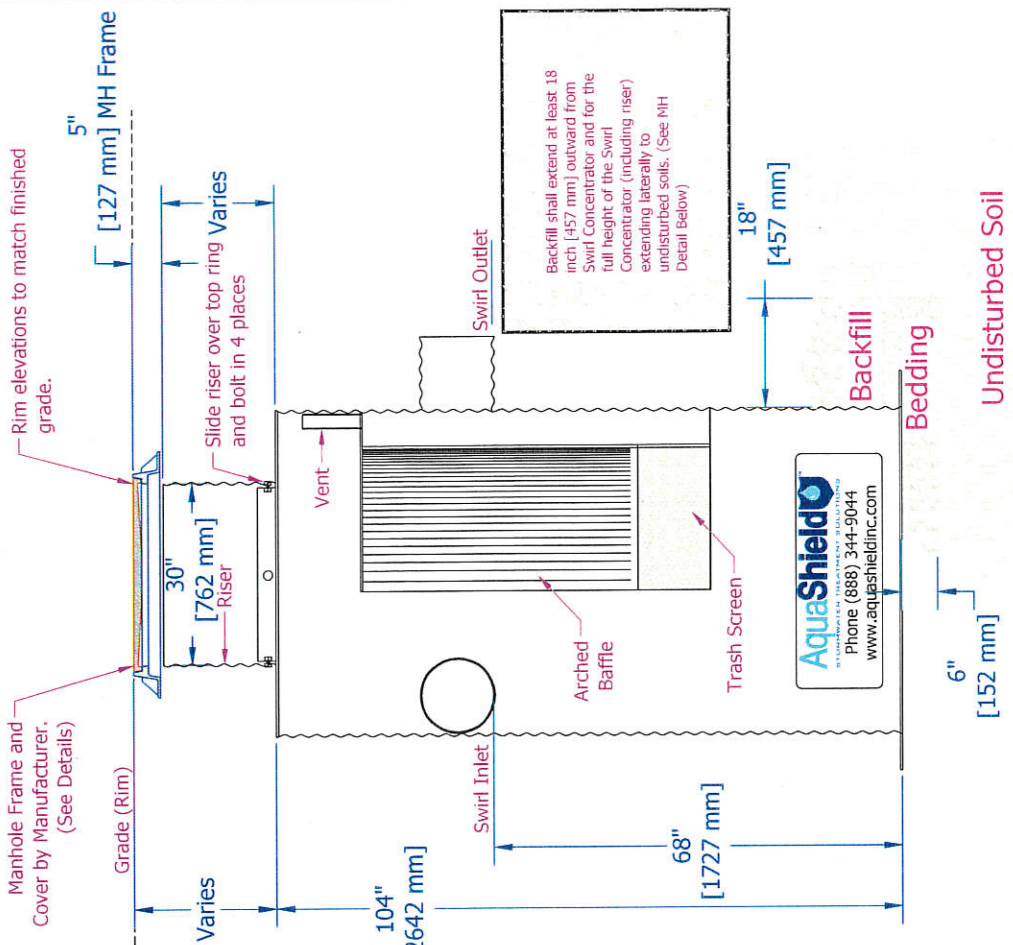
Plan View

Note: AS an alternative, 42-inch OD, HS-25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

Manhole Frame and Cover by Manufacturer. (See Details)



* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.



Section A-A

Aqua-Swirl Concentrator Model AS-4s PCS Standard Detail

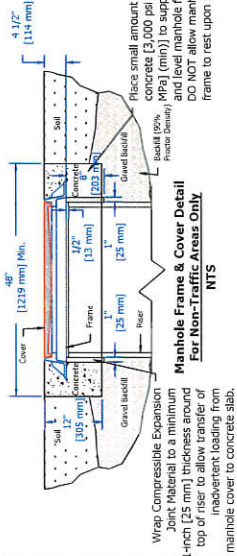
AquaShield
 Document: AS-4 PCS STD
 Drawn By: JCW
 Scale: 1/2"=1'-0"
 Date: 10/06/15
 2733 Kanata Drive, Suite 111, Chattanooga, TN 37414
 Phone (888) 344-9044 Fax (423) 846-2117
 www.aquashieldinc.com

U.S. Patent No. 6,524,473 and other Patent Pending

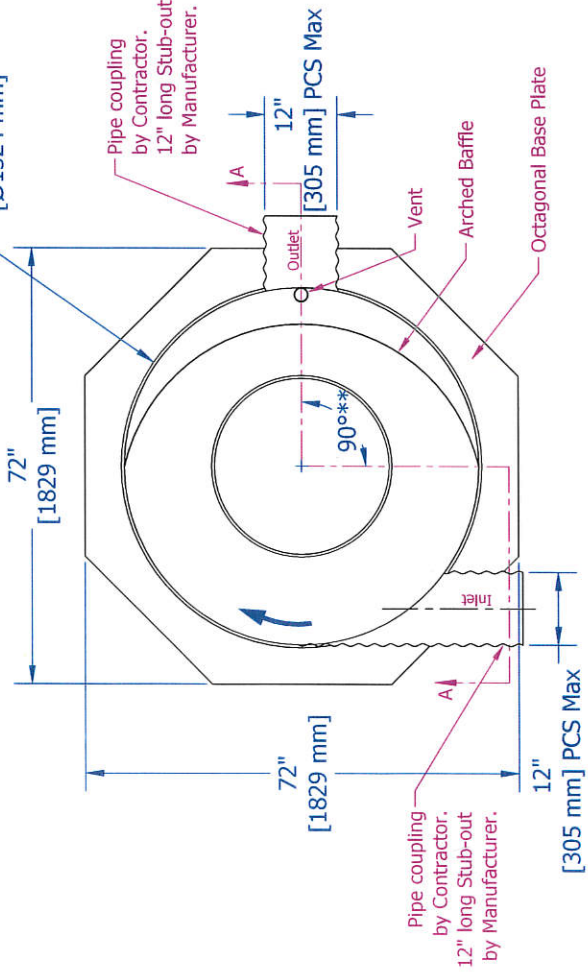
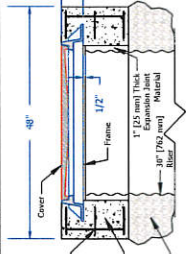
**Aqua-Swirl Polymer Coated Steel (PCS)
Stormwater Treatment System**

If traffic loading (HS-25) is required or anticipated, a 4-foot [1.22 m] diameter, 14-inch [356 mm] thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser pipe support and level the manhole frame as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch [25 mm] thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch [25 mm]. Top of manhole cover and concrete slab shall be level with finish grade.

Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.

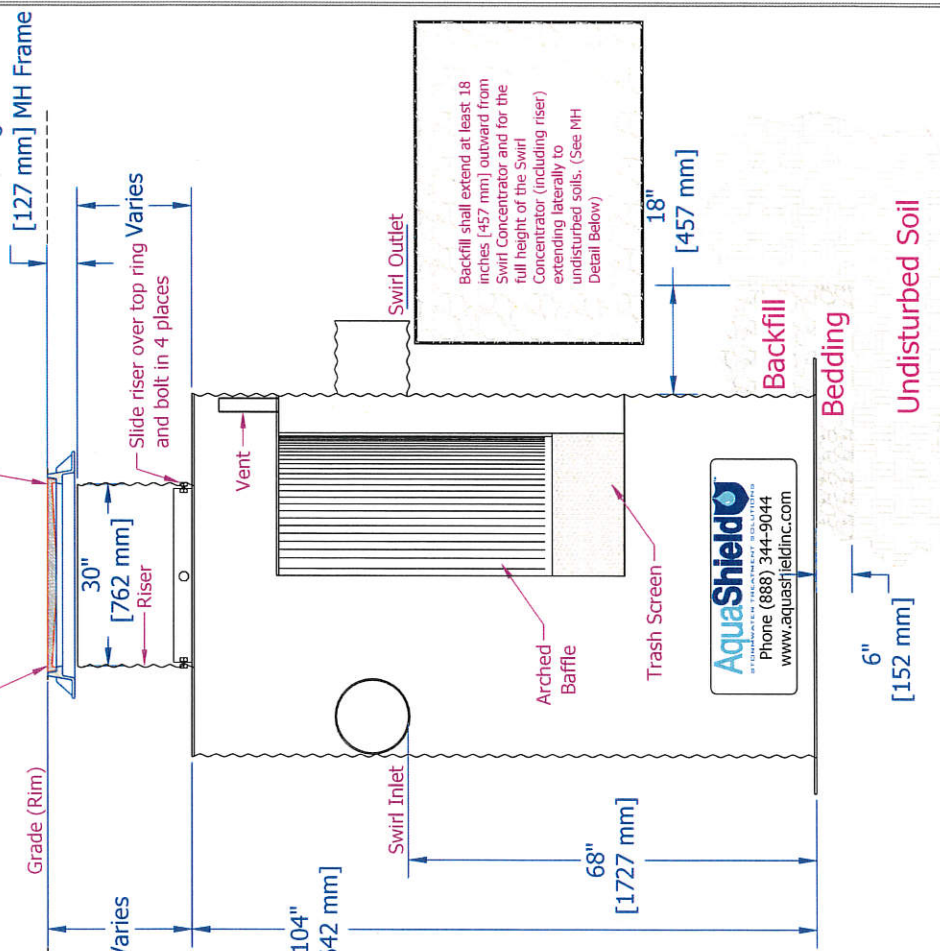


Wrap Compressible Expansion Joint Material to a minimum 1-inch [25 mm] thickness around top of riser to allow transfer of wheel loads from manhole cover to concrete slab.



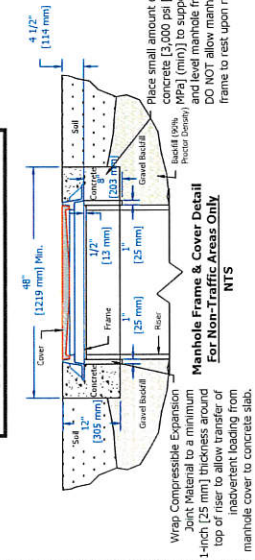
Note: AS an alternative, 42-inch OD, HS-25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.



Aqua-Swirl Polymer Coated Steel (PCS) Stormwater Treatment System

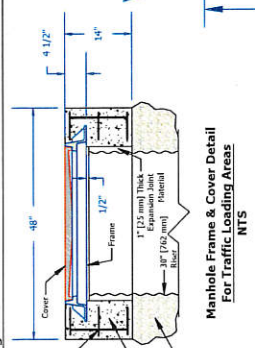
Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



Manhole Frame & Cover Detail For Non-Traffic Areas Only

NTS

If traffic loading (HS-25) is required or anticipated, a 4-foot [1.22 m] diameter, 14-inch [356 mm] thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch [25 mm] thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch [25 mm]. Top of manhole cover and concrete slab shall be level with finish grade.



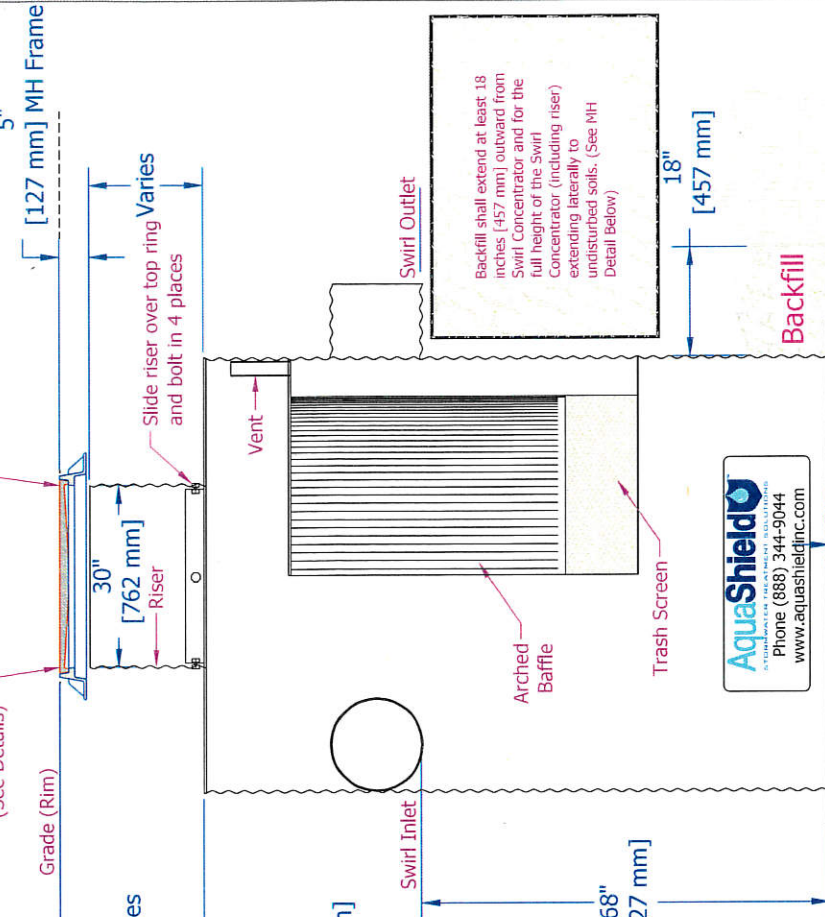
Manhole Frame & Cover Detail For Traffic Loading Areas

NTS

Note: AS an alternative, 42-inch OD, HS-25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.

Manhole Frame and Cover by Manufacturer. (See Details)



Plan View

AquaShield
 ESTABLISHED 1988
 2733 Kanawha Drive, Suite 111, Chattanooga, TN 37343
 Phone (888) 344-9044 Fax (423) 826-2112
 www.aquashieldinc.com

Document:	AS-6 PCS STD
Drawn By:	JCW
Scale:	1:20
Date:	02/05/15
U.S. Patent No. 6524473 and other Patent Pending	

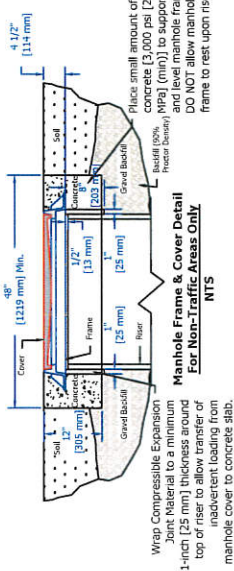
Section A-A

Aqua-Swirl Concentrator Model AS-6s PCS Standard Detail

AquaShield
 ESTABLISHED 1988
 Phone (888) 344-9044
 www.aquashieldinc.com

Aqua-Swirl Polymer Coated Steel (PCS) Stormwater Treatment System

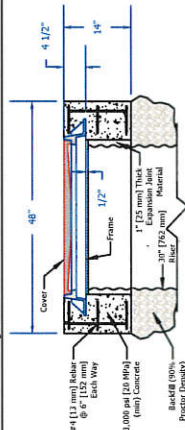
Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



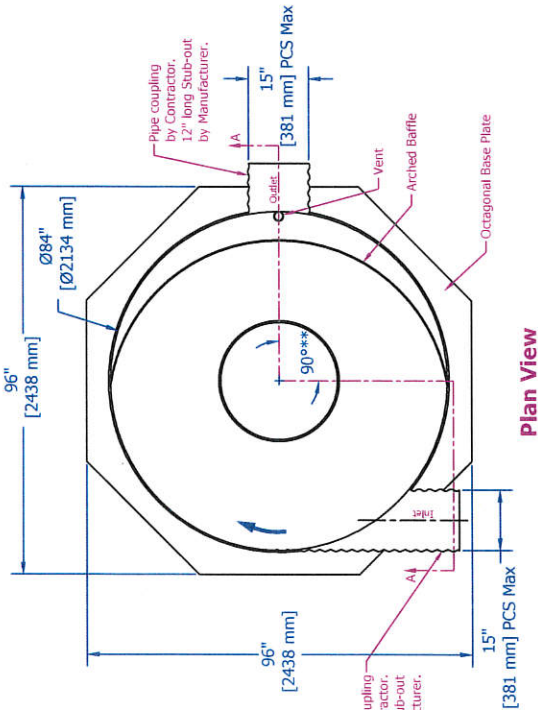
Wrap Compressible Expansion Joint Material to a minimum 1-inch (25 mm) thickness around top of riser to allow transfer of inadvertent loading from manhole cover to concrete slab.

Place a small amount of concrete (3,000 psi [20 MPa] (min)) to support and level manhole frame. DO NOT allow manhole frame to rest upon riser.

If traffic loading (HS-25) is required or anticipated, a 4-foot [1.22 m] diameter, 14-inch [356 mm] thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch [25 mm] thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch [25 mm]. Top of manhole cover and concrete slab shall be level with finish grade.



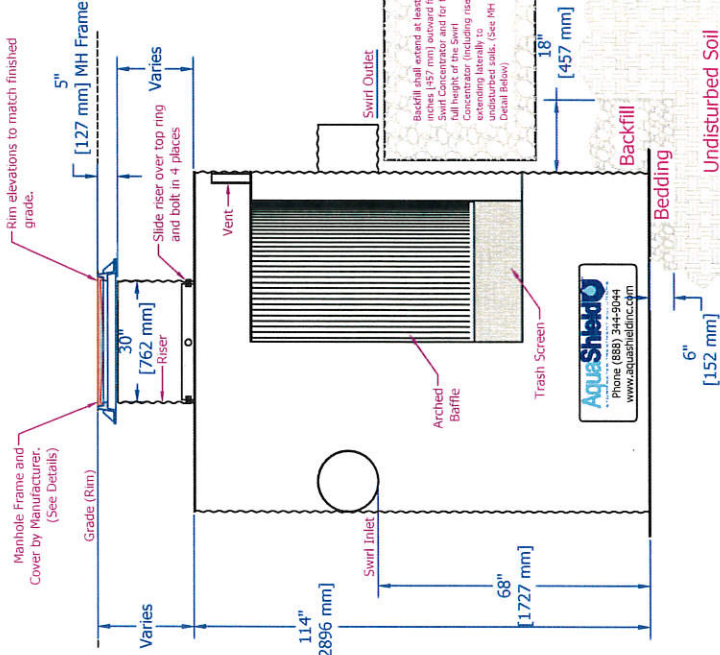
Manhole Frame & Cover Detail For Traffic Loading Areas
NTS



Plan View

Note: AS an alternative, 42-inch OD, HS-25 rated precast concrete rings may be substituted, 14-inch thickness must be maintained.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.



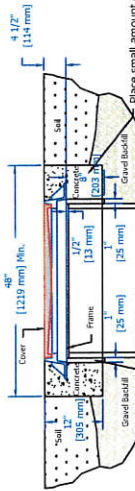
Section A-A

AquaShield STORMWATER TREATMENT SYSTEMS	Document: AS-7 PCS STD
2733 Kanasko Drive, Suite 111, Chattanooga, TN 37343 Phone: (888) 344-9044 Fax: (423) 876-1112 www.aquashieldinc.com	Drawn By: JCW
	Scale: 1:30
	Date: 10/20/15
	U.S. Patent No. 6,524,473 and other Patent Pending

Aqua-Swirl Concentrator Model AS-7s PCS Standard Detail

**Aqua-Swirl Polymer Coated Steel (PCS)
Stormwater Treatment System**

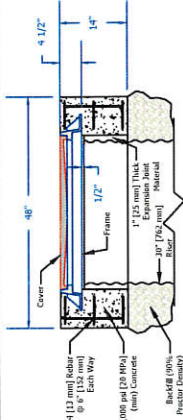
Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



Wrap, Compressible Expansion Joint material to a minimum 1-inch (25 mm) thickness. 100% of framing shall be reinforced with #4 (13 mm) reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch (25 mm). Top of manhole cover and concrete slab shall be level with finish grade.

**Manhole Frame & Cover Detail
For Non-Traffic Areas Only**
NTS

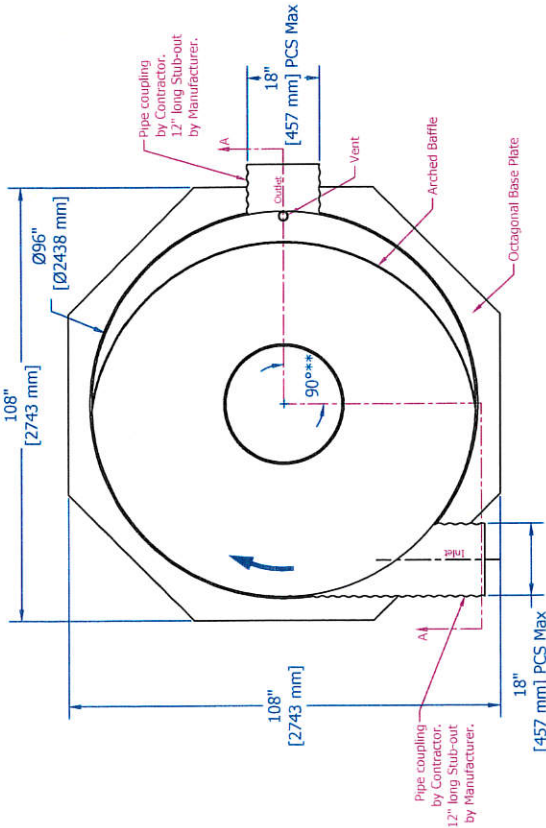
If traffic loading (HS-25) is required or anticipated, a 4-foot (1.22 m) diameter, 14-inch (356 mm) thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch (25 mm) thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi (20 MPa) and be reinforced with #4 (13 mm) reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch (25 mm). Top of manhole cover and concrete slab shall be level with finish grade.



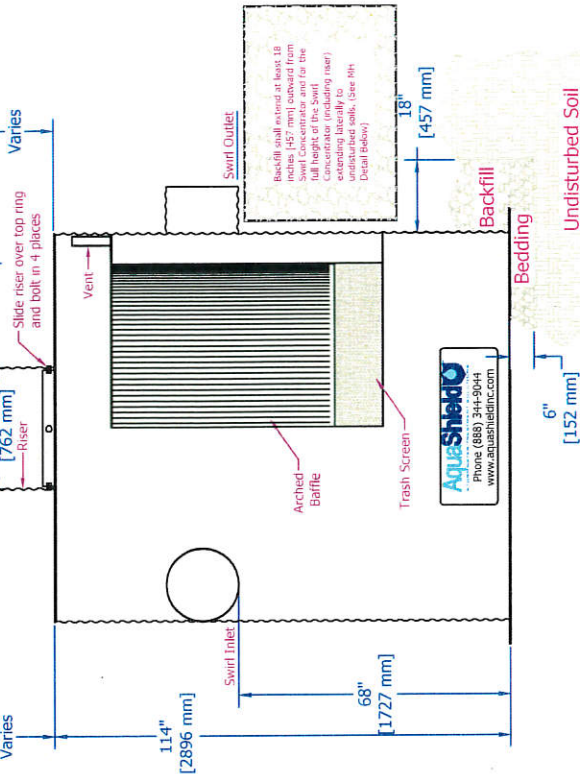
**Manhole Frame & Cover Detail
For Traffic Loading Areas**
NTS

Note: AS an alternative, 42-inch OD, HS-25 rated precast concrete rings may be substituted, 14-inch thickness must be maintained.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.



Plan View



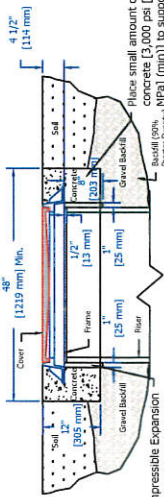
Section A-A

AquaShield www.aquashieldinc.com	Document: AS-8 PCS STD
2733 Karasoka Drive, Suite 111, Chattanooga, TN 37345 Phone (888) 344-9044 Fax (423) 826-2117	Drawn By: JOW
	Scale: 1:30
	Date: 10/05/15
	U.S. Patent No. 652-4473 and other Patent Pending

Aqua-Swirl Concentrator Model AS-8s PCS Standard Detail

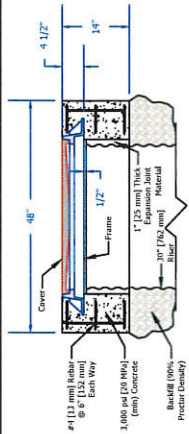
Aqua-Swirl Polymer Coated Steel (PCS) Stormwater Treatment System

Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



Manhole Frame & Cover Detail For Non-Traffic Areas Only
NTS

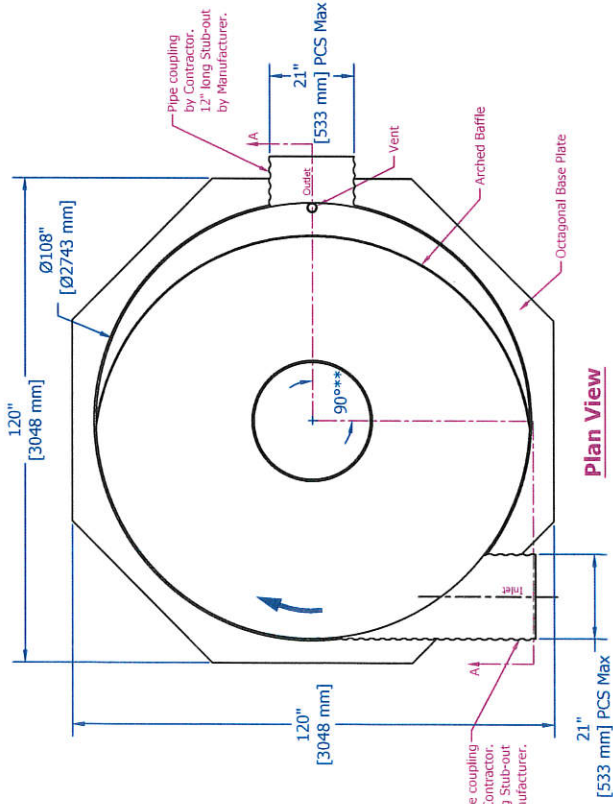
If traffic loading (HS-25) is required or anticipated, a 4-foot [1.22 m] diameter, 14-inch [356 mm] thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch [25 mm] thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch [25 mm]. Top of manhole cover and concrete slab shall be level with finish grade.



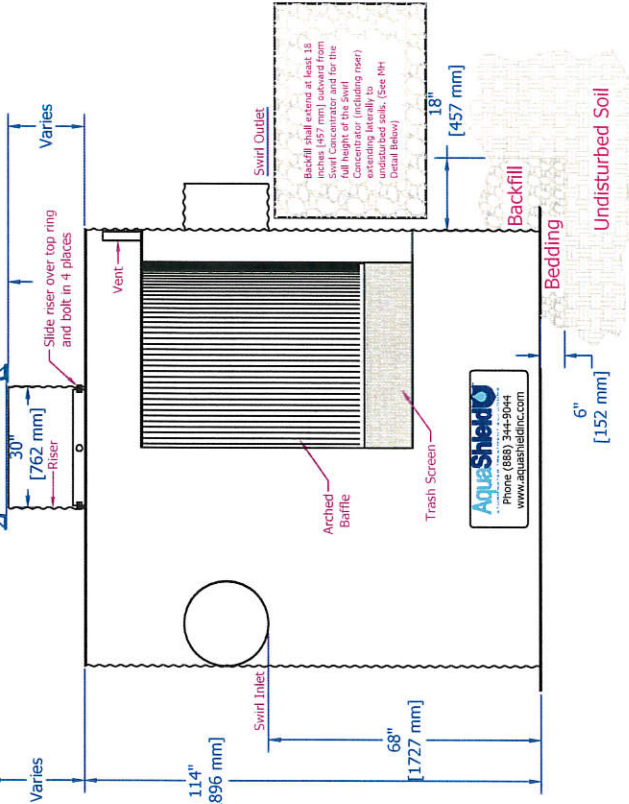
Manhole Frame & Cover Detail For Traffic Loading Areas
NTS

Note: AS an alternative, 42-inch OD, HS-25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.



Plan View



Section A-A

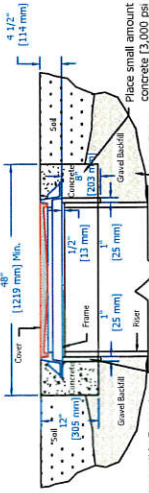
Document:	AS-9 PCS STD
Drawn By:	JCW
Scale:	1:30
Date:	02/05/15
U.S. Patent No.:	6524773 and other Patent Pending

Aqua-Swirl Concentrator Model AS-9s PCS Standard Detail

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Phone (888) 344-9044 Fax (423) 876-1112
www.aquashieldinc.com

Aqua-Swirl Polymer Coated Steel (PCS) Stormwater Treatment System

Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



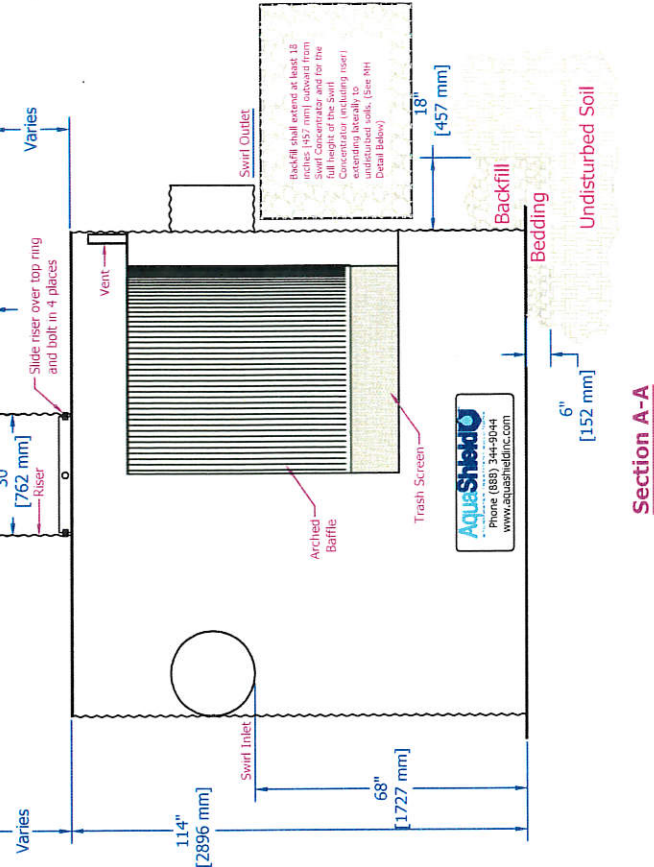
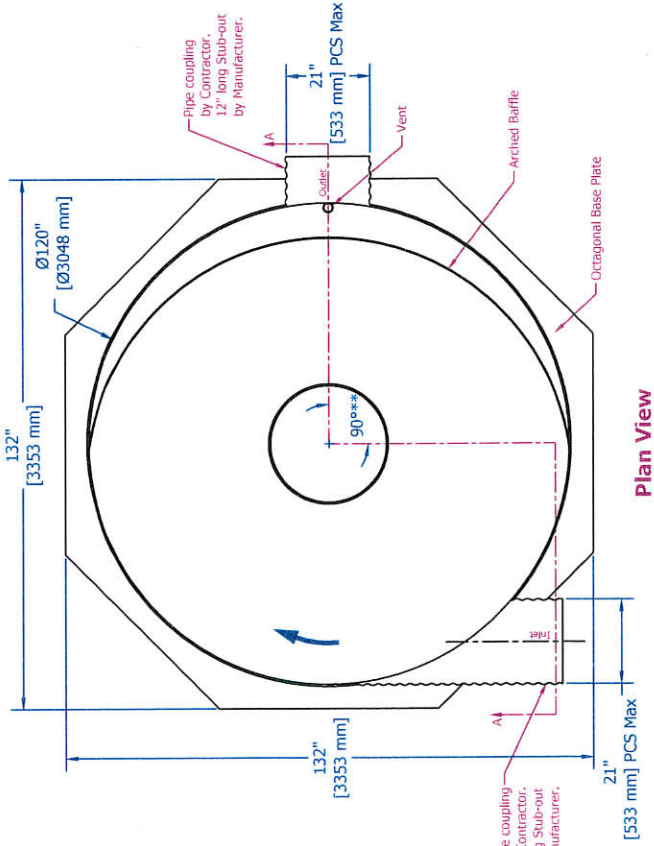
Wrap Compressible Expansion Joint Material to a minimum 1-inch (25 mm) thickness around top of riser to allow transfer of inadvertent loading from manhole cover to concrete slab.



If traffic loading (HS-25) is required or anticipated, a 4-foot (1.22 m) diameter, 14-inch (356 mm) thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch (25 mm) thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi (20 MPa) and be reinforced with #4 (13 mm) reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch (25 mm). Top of manhole cover and concrete slab shall be level with finish grade.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.

Note: AS an alternative, 42-inch OD, HS-25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.



AquaShield CONCRETE PRODUCTS CORPORATION 2733 Karasik Drive, Suite 111, Chattanooga, TN 37347 Phone (888) 344-9044 Fax (423) 826-2112 www.aquashieldcorp.com	Document: AS-10 PCS STD Drawn By: JCW Scale: 1:30 Date: 02/05/15 U.S. Patent No. 6524473 and other Patent Pending
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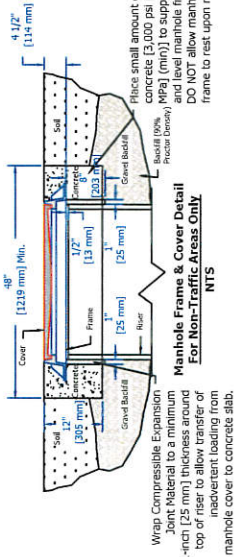
Aqua-Swirl Concentrator Model AS-10s PCS Standard Detail

Section A-A

Plan View

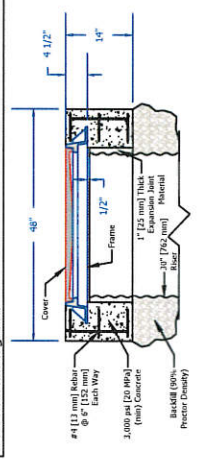
**Aqua-Swirl Polymer Coated Steel (PCS)
Stormwater Treatment System**

Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



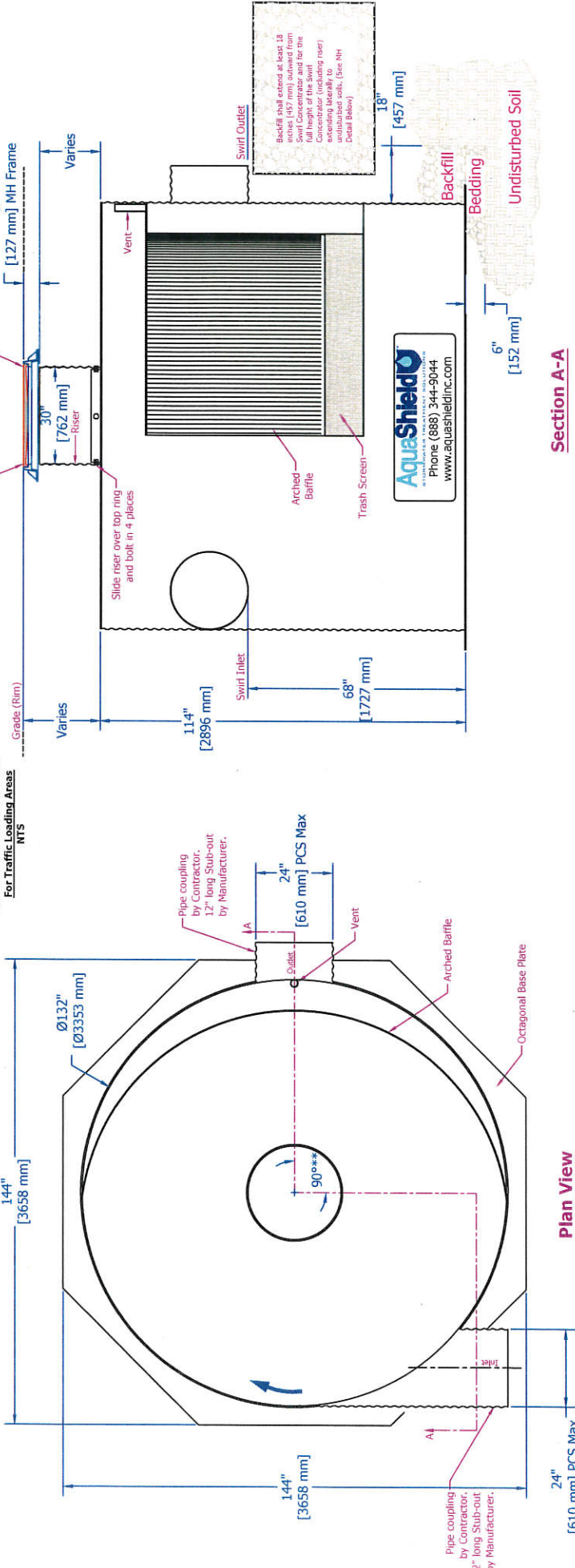
**Manhole Frame & Cover Detail
For Non-Traffic Areas Only**
NTS

If traffic loading (HS-25) is required or anticipated, a 4-foot [1.22 m] diameter, 14-inch [356 mm] thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch [25 mm] thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch [25 mm]. Top of manhole cover and concrete slab shall be level with finish grade.



**Manhole Frame & Cover Detail
For Traffic Loading Areas**
NTS

Note: AS an alternative, 42-inch OD, HS-25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.
* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.



Section A-A

Plan View

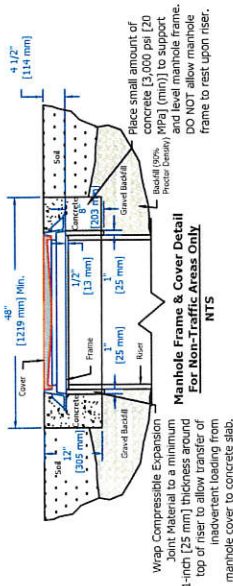
AquaShield
2733 Lakeside Drive, Suite 110, Columbus, OH 43244
Phone: (888) 344-9044 Fax: (614) 876-2112
www.aquashieldinc.com

Document: AS-11 PCS STD
Drawn By: SCE
Scale: 1:30
Date: 02/05/15
U.S. Patent No. 652,4473 and other Patent Pending

Aqua-Swirl Concentrator Model AS-11s PCS Standard Detail

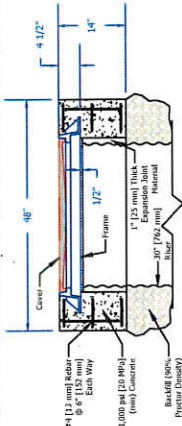
Aqua-Swirl Polymer Coated Steel (PCS) Stormwater Treatment System

Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



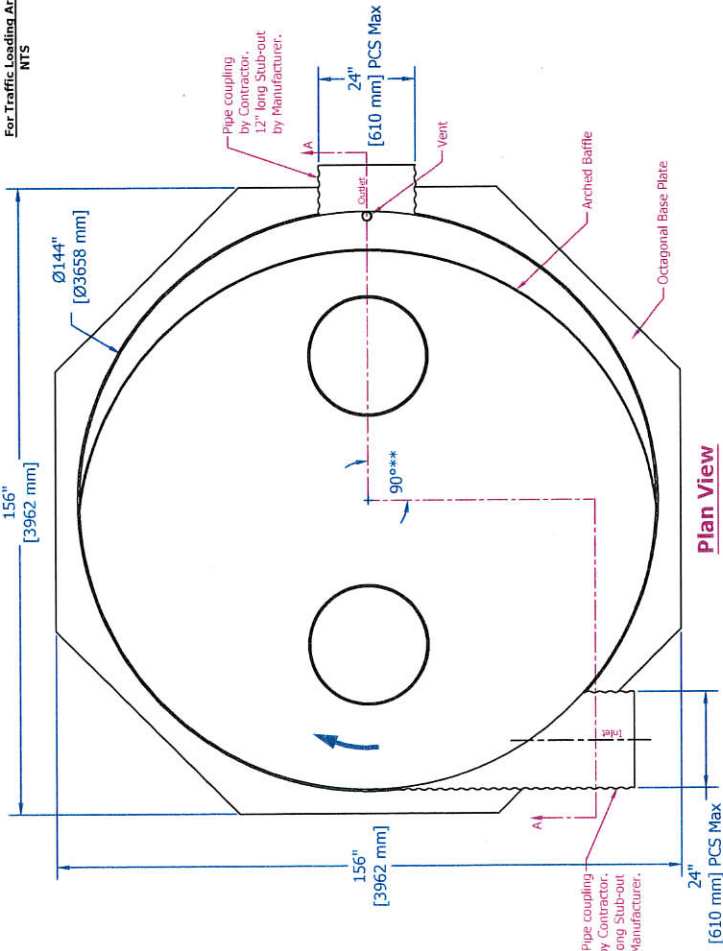
Manhole Frame & Cover Detail For Non-Traffic Areas Only
NTS

If traffic loading (HS-25) is required or anticipated, a 4-foot [1.22 m] diameter, 14-inch [356 mm] thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch [25 mm] thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch [25 mm]. Top of manhole cover and concrete slab shall be level with finish grade.



Manhole Frame & Cover Detail For Traffic Loading Areas
NTS

Note: AS an alternative, 42-inch OD, HS-25 * Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.



Plan View

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Section A-A

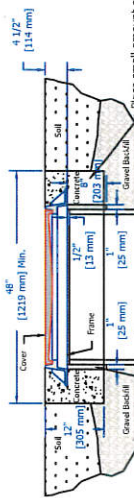
Aqua-Swirl Concentrator Model AS-12s PCS Standard Detail

Document: AS-12 PCS STD
Drawn By: JCW
Scale: 1:30
Date: 10/05/15
U.S. Patent No. 6,524,473 and other Patent Pending

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2733 Karsbach Drive, Suite 111, Chattanooga, TN 37347
Phone (888) 344-9044 Fax (423) 826-2117
www.aquashieldinc.com

**Aqua-Swirl Polymer Coated Steel (PCS)
Stormwater Treatment System**

Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.

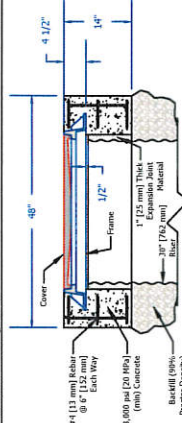


Wrap Compressible Expansion Joint Material around top of riser to allow transfer of inadvertent loading from manhole cover to concrete slab.

Place small amount of concrete (3,000 psi [20 MPa]) and level manhole frame.

DO NOT allow manhole frame to rest upon riser.

If traffic loading (HS-25) is required or anticipated, a 4-foot [1.22 m] diameter, 14-inch [356 mm] thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch [25 mm] thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch [25 mm]. Top of manhole cover and concrete slab shall be level with finish grade.

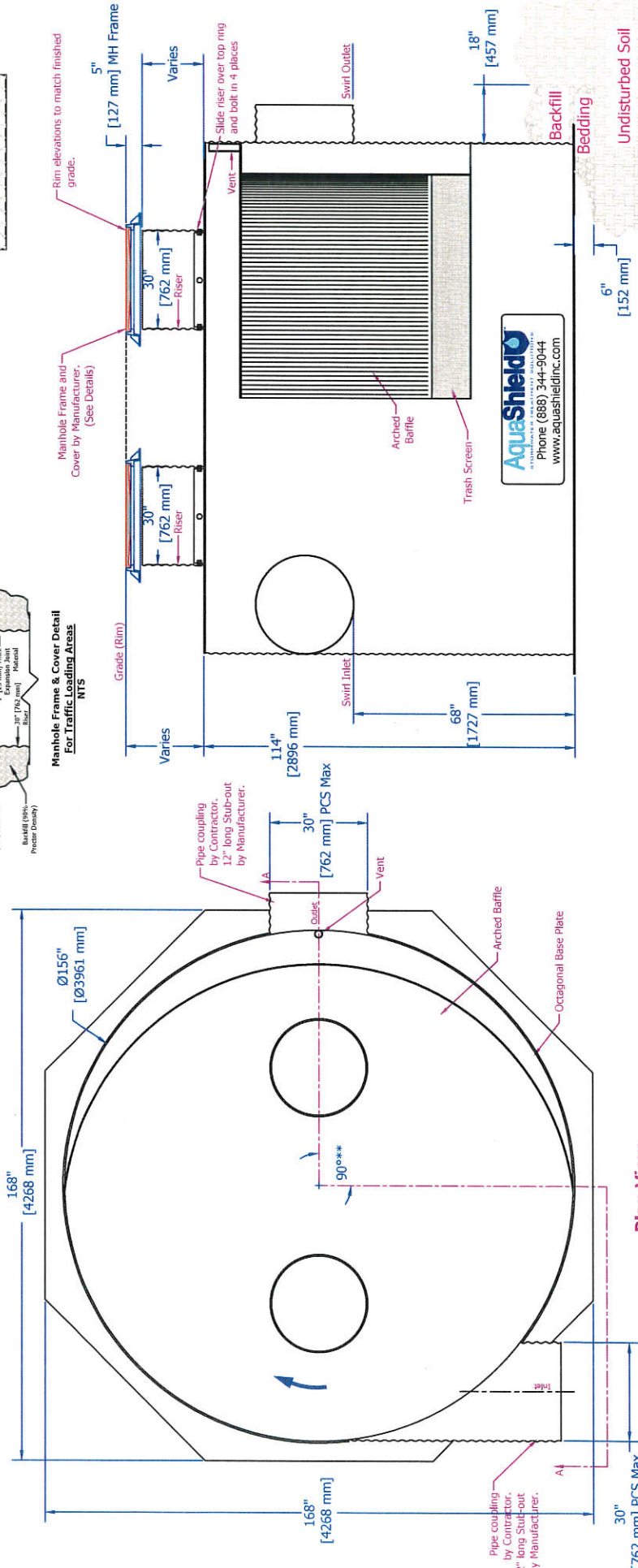


**Manhole Frame & Cover Detail
For Traffic Loading Areas**
NTS

- * Please see accompanied Aqua-Swirl specification notes.
- * See Site Plan for actual system orientation.
- ** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.

Note: AS an alternative, 42-inch OD, HS-25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

Backfill shall extend at least 18 inches (457 mm) outward from the riser and be compacted to the full height of the Swirl Concentrator (including riser) extending laterally to undisturbed soils. (See MH Detail Below)



Plan View

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Document:	AS-13 PCS STD
Drawn By:	SCC
Scale:	1:30
Date:	02/05/15
U.S. Patent No. 6524473 and other Patent Pending	

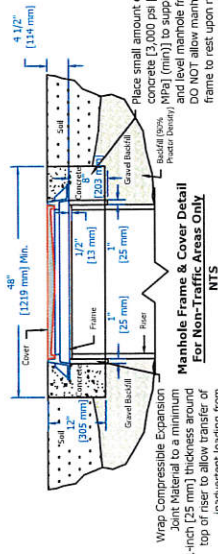
Section A-A

Aqua-Swirl Concentrator Model AS-13s PCS Standard Detail

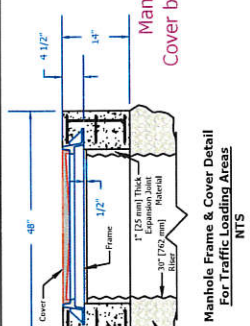
AquaShield
 Phone (888) 344-9044
 www.aquashieldinc.com

Aqua-Swirl Polymer Coated Steel (PCS) Stormwater Treatment System

Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.

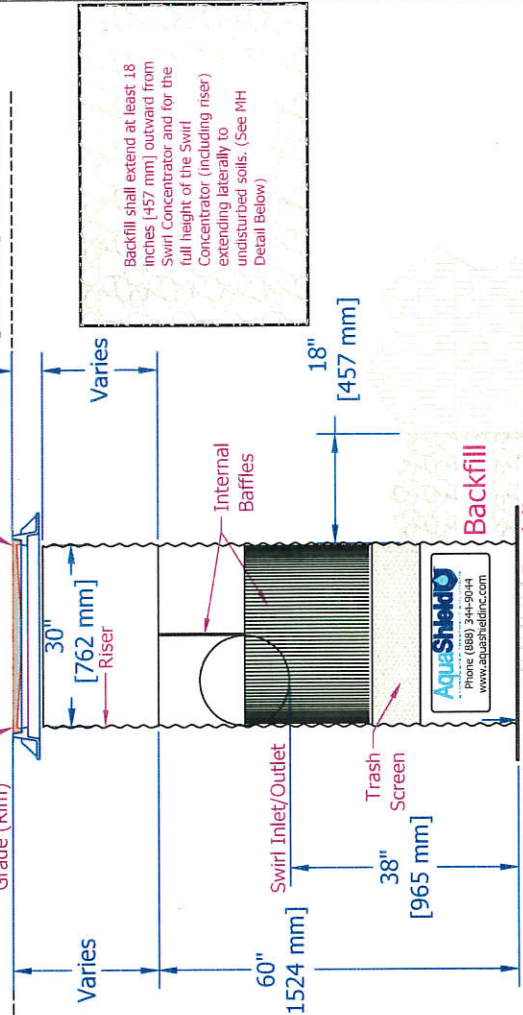
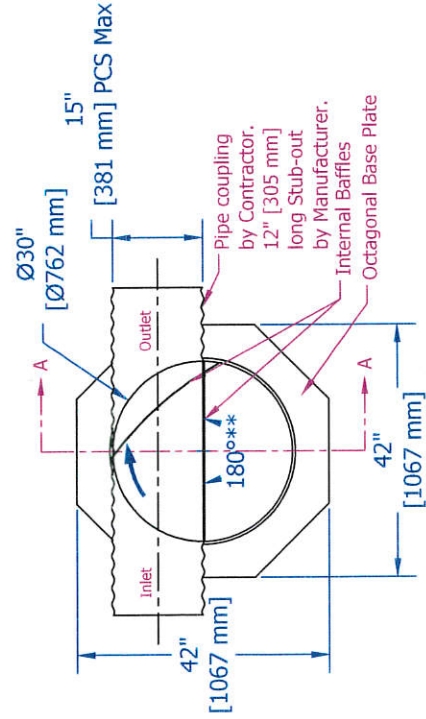


If traffic loading (HS-25) is required or anticipated, a 4-foot [1.22 m] diameter, 14-inch [356 mm] thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch [25 mm] thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch [25 mm]. Top of manhole cover and concrete slab shall be level with finish grade.



Note: As an alternative, 42-inch OD, HS-20/25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.



Section A-A

Aqua-Swirl Concentrator Model AS-2s BYP PCS Standard Detail

Document:	AS-2 PCS STD
Drawn By:	JCW
Scale:	1"=20'
Date:	01/06/15

2733 Karnauba Drive, Suite 111, Chattanooga, TN 37342
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U.S. Patent No. 6,524,473 and other Patent Pending

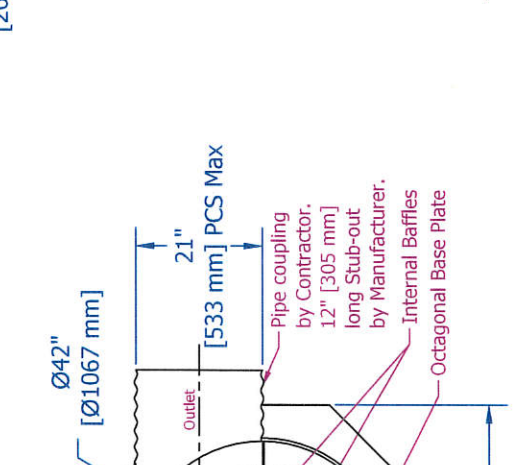
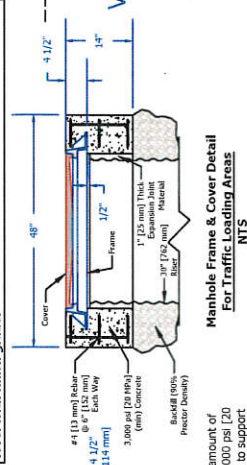
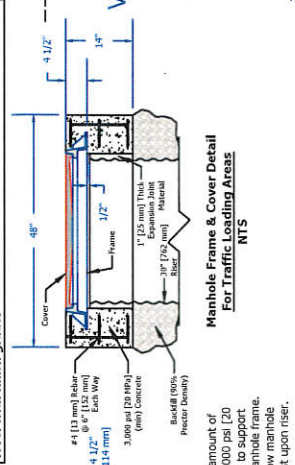
**Aqua-Swirl Polymer Coated Steel (PCS)
Stormwater Treatment System**

Note: As an alternative, 42-inch OD, HS-20/25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

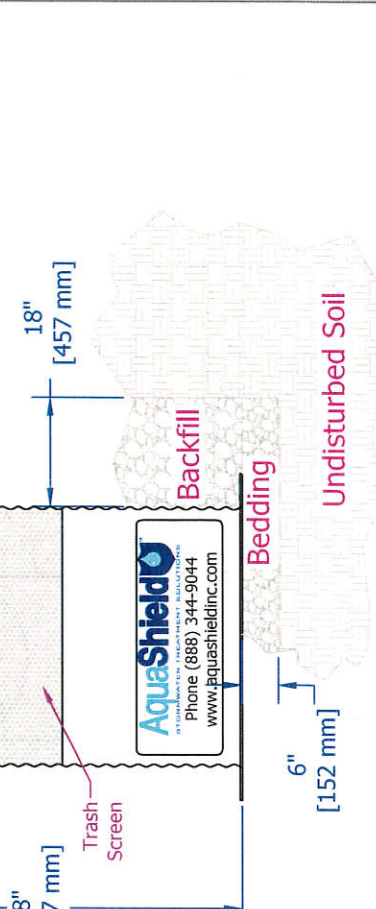
* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.

Manhole Frame and Cover by Manufacturer. (See Details)
Rim elevations to match finished grade.
Slide riser over top ring and bolt in 4 places. Varies

Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



Backfill shall extend at least 18 inches (457 mm) outward from Swirl Concentrator and for the full height of the Swirl Concentrator (including riser) extending laterally to undisturbed soils. (See MH Detail Below)



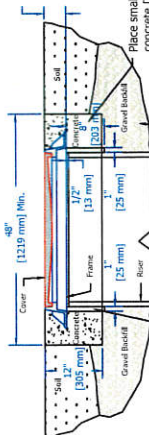
AquaShield	Document: AS-3 PCS STD
Stormwater Treatment Systems Division	Drawn By: JCW
2715 West 130th Street, Suite 111, Clayton, OH 42438	Scale: 1/20
Phone (888) 344-9044 Fax (423) 826-2112	Date: 01/06/15
www.aquashieldinc.com	U.S. Patent No. 6,524,473 and other Patent Pending

Section A-A
Aqua-Swirl Concentrator Model AS-3s BY PCS Standard Detail

**Aqua-Swirl Polymer Coated Steel (PCS)
Stormwater Treatment System**

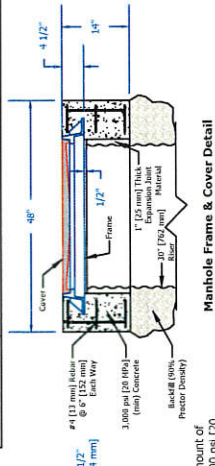
If traffic loading (HS-25) is required or anticipated, a 4-foot [1.22 m] diameter, 14-inch [356 mm] thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch [25 mm] thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch [25 mm]. Top of manhole cover and concrete slab shall be level with finish grade.

Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



Manhole Frame & Cover Detail For Non-Traffic Areas Only
NTS

Wrap Compressible Expansion Joint Material to a minimum 1-inch [25 mm] thickness around top of riser to allow transfer of inadvertent loading from manhole cover to concrete slab.

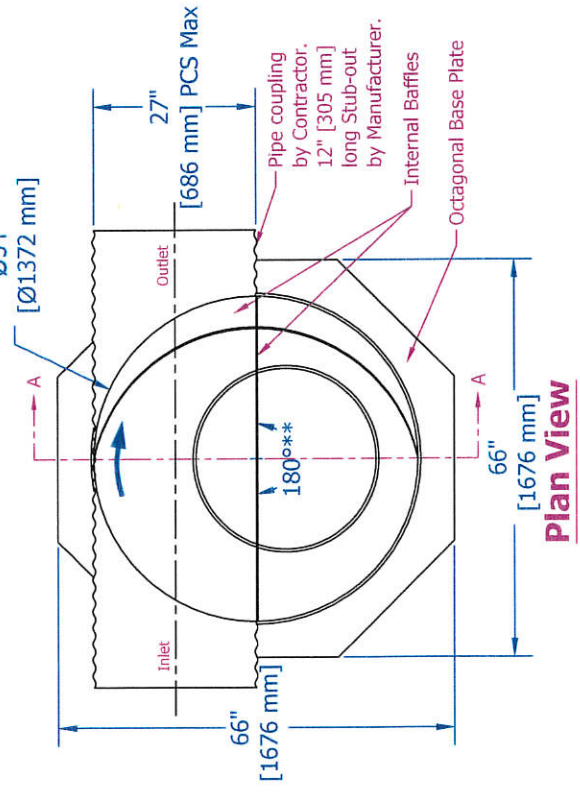
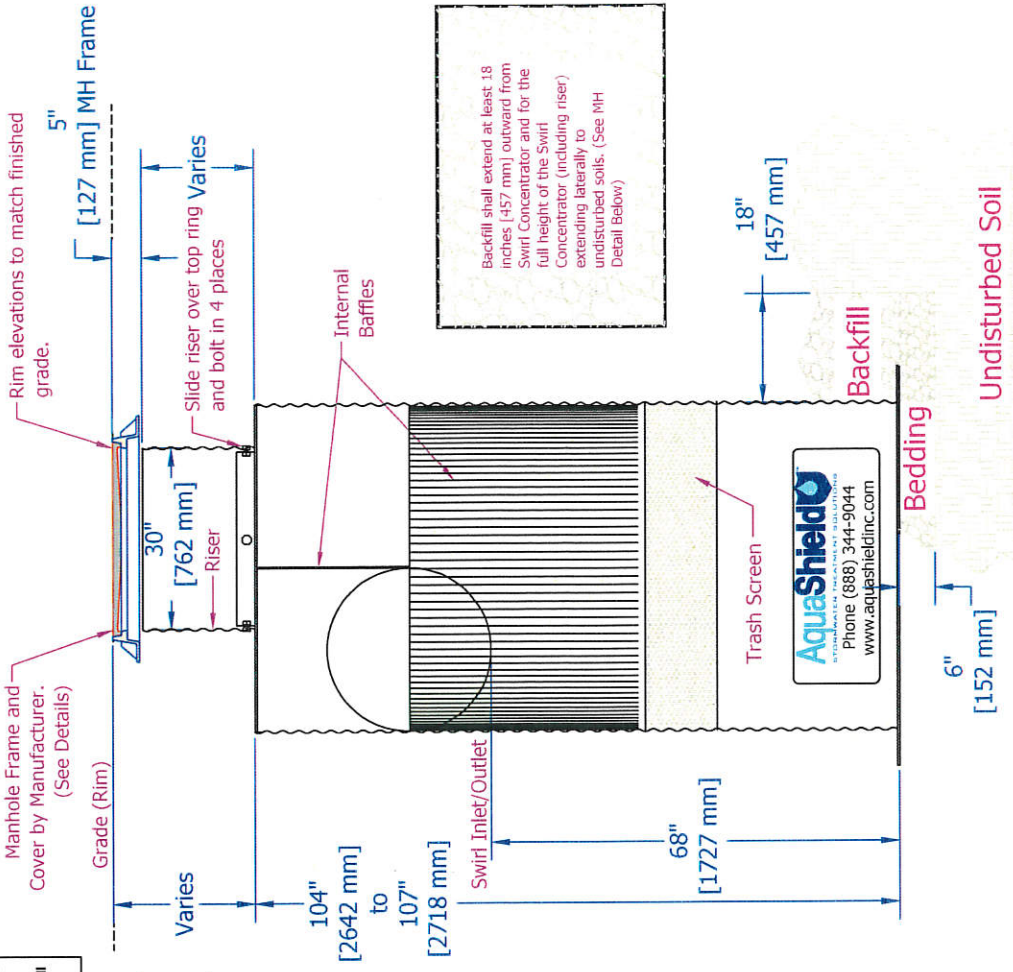


Manhole Frame & Cover Detail For Traffic Loading Areas
NTS

Place small amount of concrete [3,000 psi [20 MPa] (min) strength] to support frame. Use 1/2\"/>

Note: As an alternative, 42-inch OD, HS-20/25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.



Backfill shall extend at least 18 inches [457 mm] outward from Swirl Concentrator and for the full height of the Swirl Concentrator (including riser) extending laterally to undisturbed soils. (See MH Detail Below)

AquaShield
STORMWATER TREATMENT SOLUTIONS
9733 Kenesta Drive, Suite 111, Chattanooga, TN 37419
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Document:	AS-4 PCS STD
Drawn By:	JCW
Scale:	1:20
Date:	01/06/15

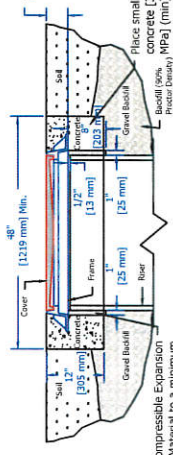
U.S. Patent No. 6,524,473 and other Patent Pending

Section A-A
Aqua-Swirl Concentrator Model AS-4s BYP PCS Standard Detail

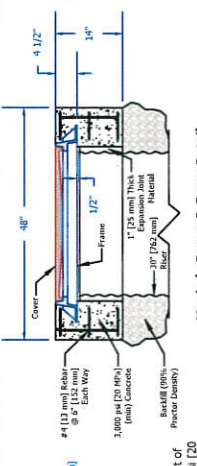
Aqua-Swirl Polymer Coated Steel (PCS) Stormwater Treatment System

If traffic loading (HS-25) is required or anticipated, a 4-foot [1.22 m] diameter, 14-inch [356 mm] thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch [25 mm] thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall be a minimum strength of 5,000 psi [20 MPa] and be reinforced with #4 [13 mm] steel bars spaced at 18 inches [457 mm]. Minimum cover over reinforcement shall be 1-inch [25 mm]. Top of manhole cover and concrete slab shall be level with finish grade.

Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



Manhole Frame & Cover Detail For Non-Traffic Areas Only
NTS

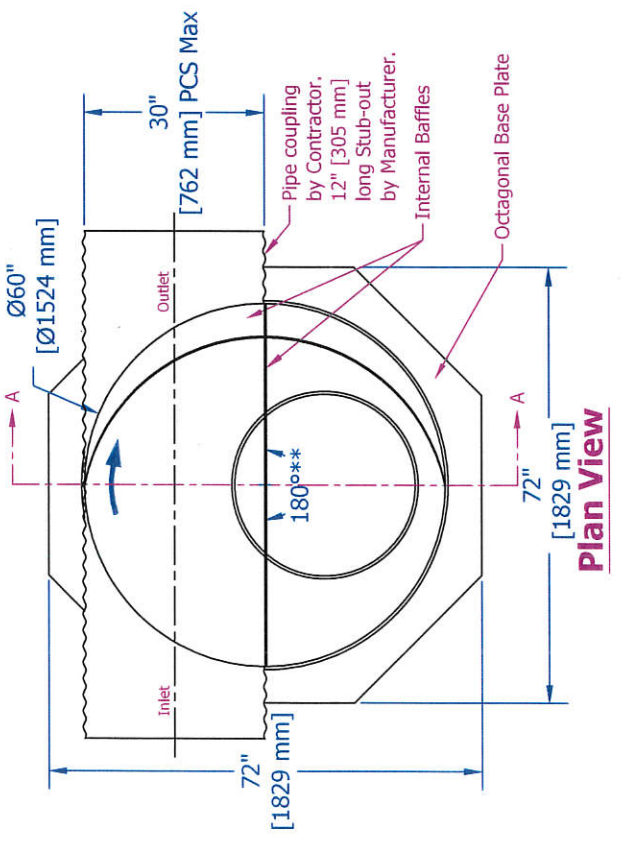
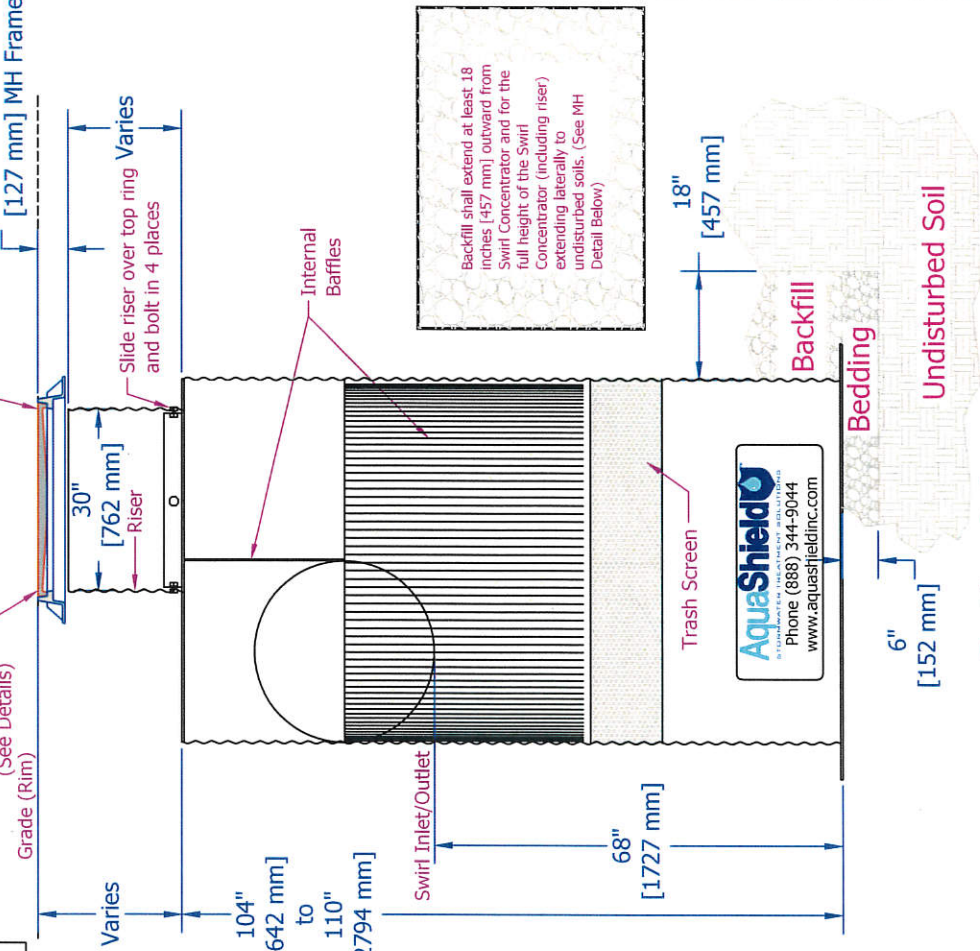


Manhole Frame & Cover Detail For Traffic Loading Areas
NTS

Note: As an alternative, 42-inch OD, HS-20/25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.

Manhole Frame and Cover by Manufacturer. (See Details)
Grade (Rim)
Rim elevations to match finished grade.
5" [127 mm] MH Frame

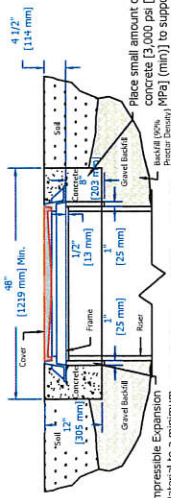


Plan View

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Phone (888) 344-9044

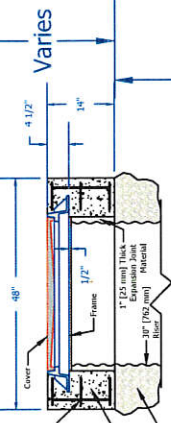
**Aqua-Swirl Polymer Coated Steel (PCS)
Stormwater Treatment System**

Unless other traffic barriers are present, bollards shall be placed around riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



Wrap Compressible Expansion Joint Material to a minimum 1-inch (25 mm) thickness around top or base of riser. Do not allow manhole frame to rest upon riser.

If traffic loading (HS-25) is required or anticipated, a 4-foot (1.22 m) diameter, 14-inch (356 mm) thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch (25 mm) thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi (20 MPa) and be reinforced with #4 (13 mm) reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch (25 mm). Top of manhole cover and concrete slab shall be level with finish grade.



Manhole Frame & Cover Detail For Traffic Loading Areas
NTS

Note: As an alternative, 42-inch OD, HS-20/25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

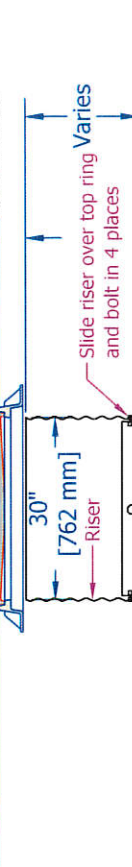
Manhole Frame and Cover by Manufacturer. (See Details)

* Please see accompanied Aqua-Swirl specification notes.

* See Site Plan for actual system orientation.

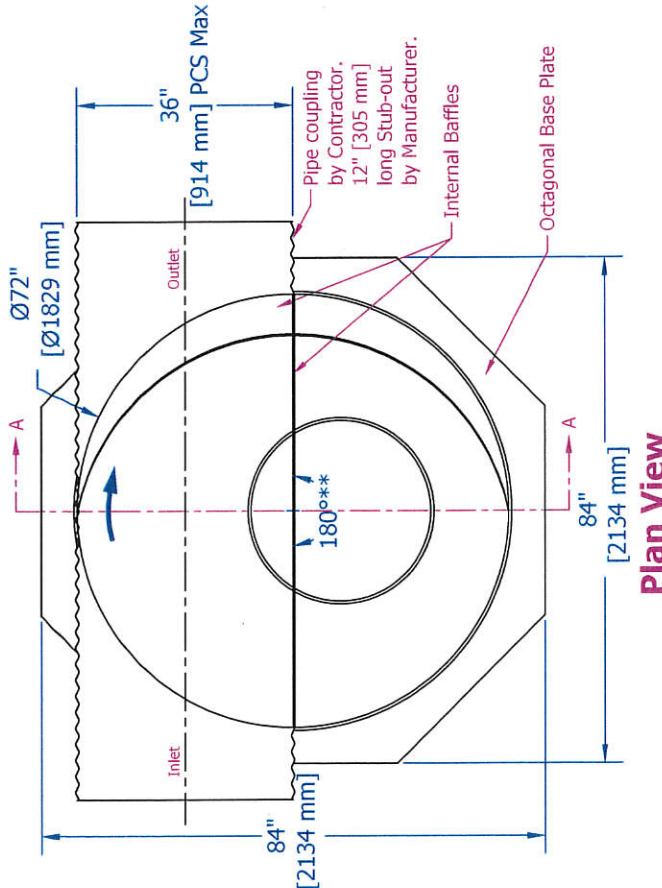
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.

Rim elevations to match finished 5" grade.



Slide riser over top ring and bolt in 4 places

104" [2896 mm] to 116" [2946 mm]



Plan View

Backfill shall extend at least 18 inches (457 mm) outward from Swirl Concentrator and for the full height of the Swirl Concentrator (including riser) extending laterally to undisturbed soils. (See MH Detail Below)

18" [457 mm]

Backfill

Bedding

Undisturbed Soil

6" [152 mm]

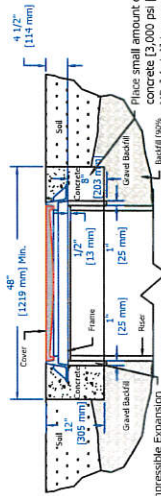
AquaShield
INTERNATIONAL
2723 Kearsade Drive, Suite 111, Chattanooga, TN, 37514
Phone: (888) 344-9044 Fax: (423) 826-2112
www.aquashieldinc.com

Document: AS-6 PCS STD
Drawn By: JCW
Scale: 1:20
Date: 01/06/15
U.S. Patent No. 6524473 and other Patent Pending

Section A-A
Aqua-Swirl Concentrator Model AS-6s BYP PCS Standard Detail

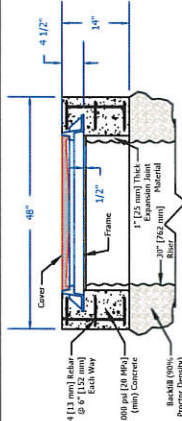
**Aqua-Swirl Polymer Coated Steel (PCS)
Stormwater Treatment System**

Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.

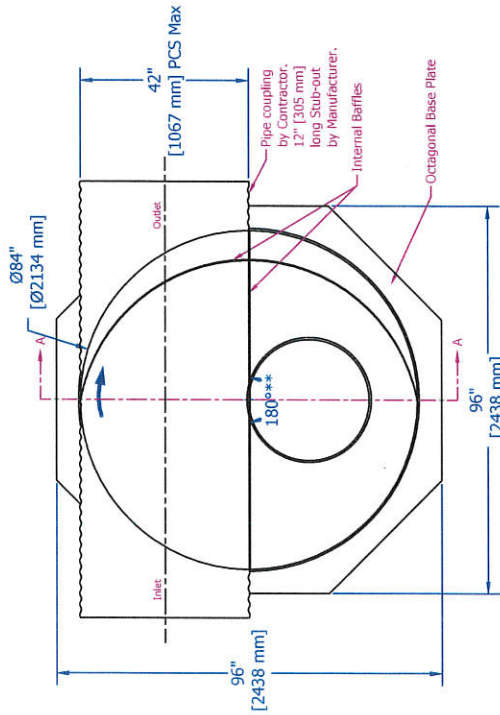


Wrap Compressible Expansion Joint Material to a minimum 1-inch [25 mm] thickness around top of riser to allow transfer of inadvertent loading from manhole cover to concrete slab.

If traffic loading (HS-25) is required or anticipated, a 4-foot [1.22 m] diameter, 14-inch [356 mm] thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch [25 mm] thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch [25 mm]. Top of manhole cover and concrete slab shall be level with finish grade.



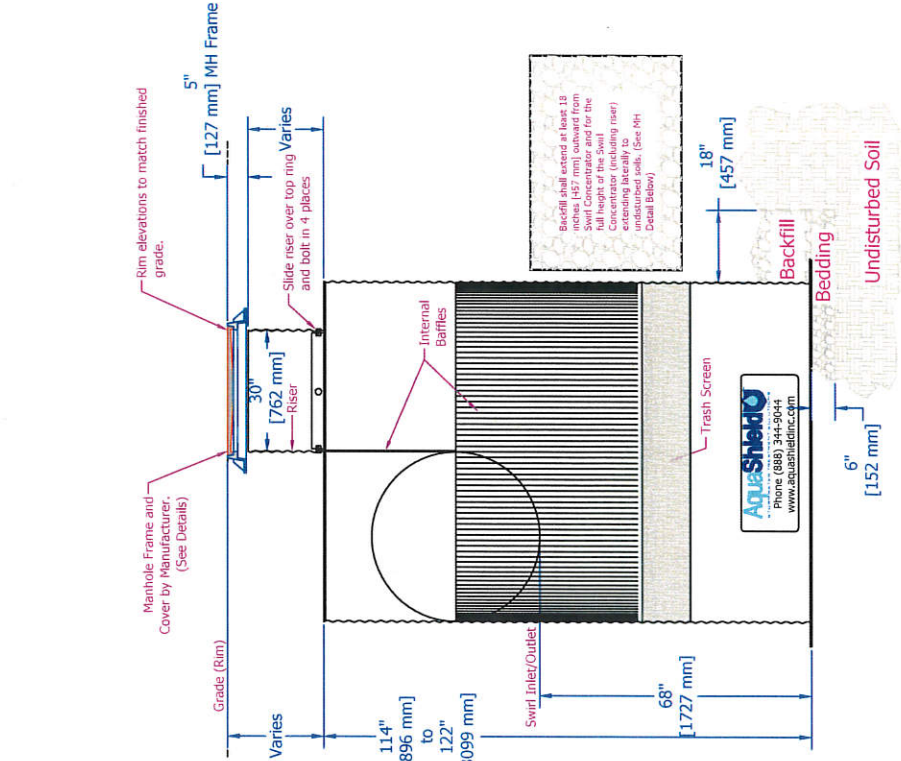
**Manhole Frame & Cover Detail
For Traffic Loading Areas**
NTS



Plan View

Note: As an alternative, 42-inch OD, HS-20/25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.



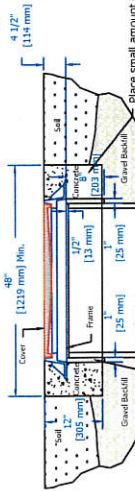
Section A-A

Aqua-Swirl Concentrator Model AS-7s BYP PCS Standard Detail

AquaShield STORMWATER TREATMENT SOLUTIONS	Document: AS-7 PCS STD
2733 Kananda Drive, Suite 111, Chattanooga, TN 37413 Phone (888) 344-9044 Fax (423) 826-2112 www.aquashieldinc.com	Drawn By: JCW
	Scale: 1:30
	Date: 10/10/15
	U.S. Patent No. 9,524,473 and other Patent Pending

**Aqua-Swirl Polymer Coated Steel (PCS)
Stormwater Treatment System**

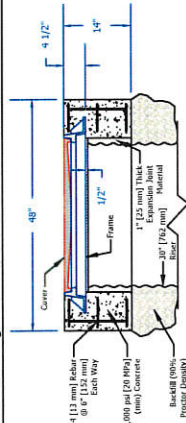
Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



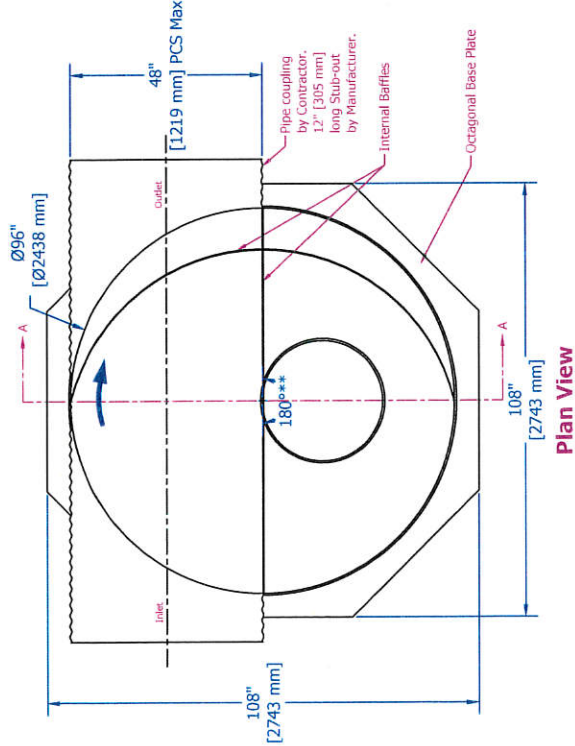
Wrap Compressible Expansion Joint Material to a minimum 1-inch [25 mm] thickness to allow transfer of movement loading from manhole cover to concrete slab.

**Manhole Frame & Cover Detail
For Non-Traffic Areas Only**
NTS

If traffic loading (HS-25) is required or anticipated, a 4-foot [1,220 mm] diameter, 1.4-inch [356 mm] thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch [25 mm] thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch [25 mm]. Top of manhole cover and concrete slab shall be level with finish grade.



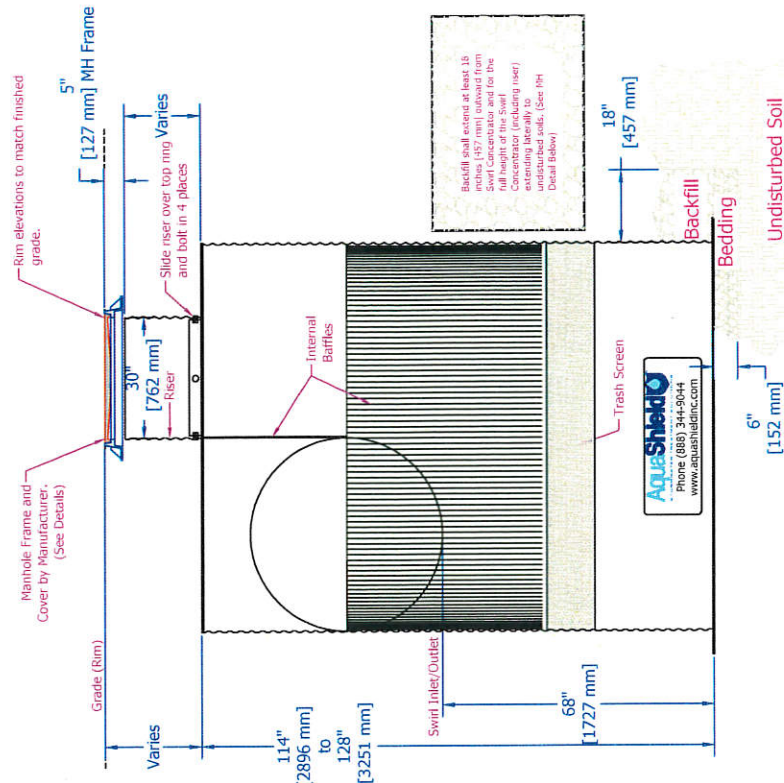
**Manhole Frame & Cover Detail
For Traffic Loading Areas**
NTS



Plan View

Note: As an alternative, 42-inch OD, HS-20/25 rated precast concrete rings may be substituted. 1.4-inch thickness must be maintained.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.



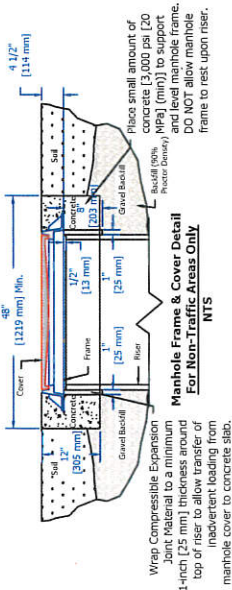
Section A-A

AquaShield STORMWATER TREATMENT SYSTEMS	Document: AS-8 PCS STD
2723 Kanaskie Drive, Suite 111, Chattanooga, TN 37343 Phone (888) 344-9044 Fax (423) 826-2117 www.aquashieldinc.com	Drawn By: JCW
	Scale: 1:30
	Date: 01/06/15
	U.S. Patent No. 6,524,473 and other Patent Pending

Aqua-Swirl Concentrator Model AS-8s BYP PCS Standard Detail

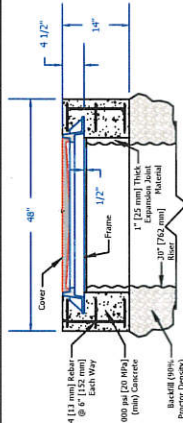
Aqua-Swirl Polymer Coated Steel (PCS) Stormwater Treatment System

Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.

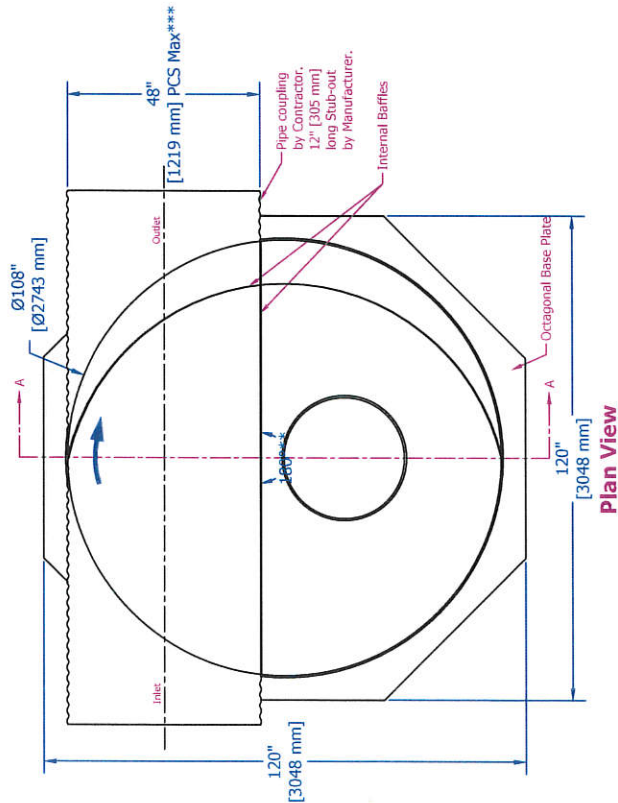


Wrap Compressible Expansion Joint Material to a minimum 1-inch [25 mm] thickness around top of riser to allow transfer of inadvertent loading from manhole cover to concrete slab.

If traffic loading (HS-25) is required or anticipated, a 4-foot [1.22 m] diameter, 14-inch [356 mm] thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch [25 mm] thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch [25 mm]. Top of manhole cover and concrete slab shall be level with finish grade.

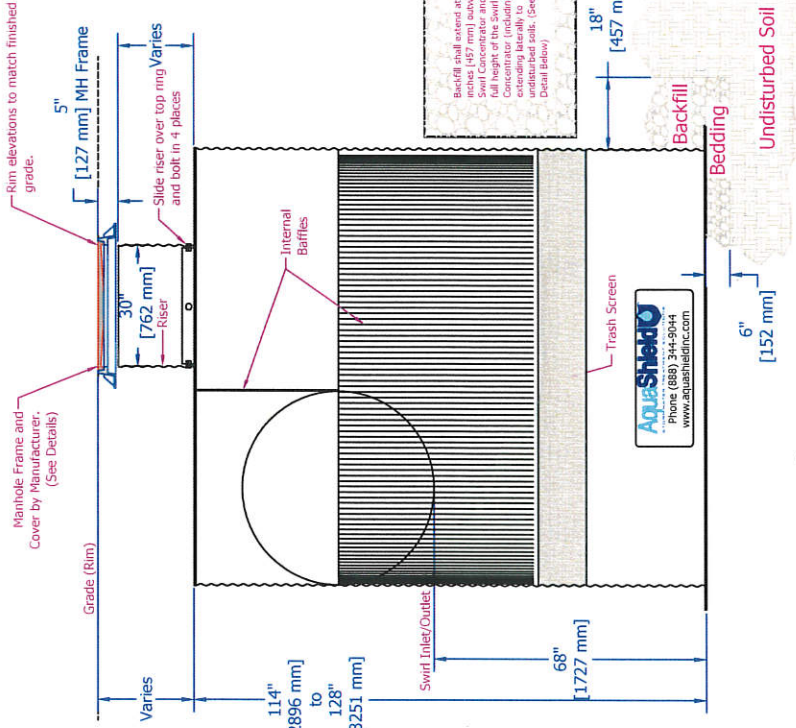


Manhole Frame & Cover Detail For Traffic Loading Areas
NTS



Note: As an alternative, 42-inch OD, HS-20/25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.
*** See Representative for larger pipe diameters available.



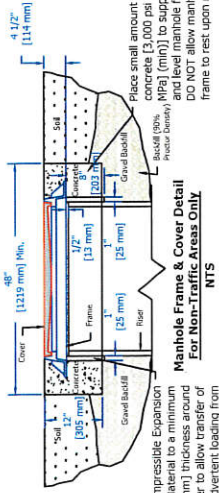
Backfill shall extend at least 18 inches (457 mm) beyond from Swirl Concentrator and for the Concentrator (including riser) extending laterally to undisturbed soils. (See MH Detail Below)

AquaShield www.aquashieldinc.com	Document: AS-9 PCS STD
273 Kanawha Drive, Suite 111, Chattanooga, TN 37343 Phone (888) 344-9044 Fax (423) 826-2112	Drawn By: JCW
	Scale: 1"=30'
	Date: 01/20/15
	U.S. Patent No. 6,924,473 and other Patent Pending

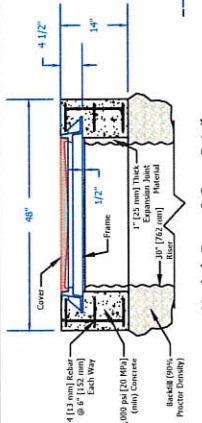
Aqua-Swirl Concentrator Model AS-9s BYP PCS Standard Detail

Aqua-Swirl Polymer Coated Steel (PCS) Stormwater Treatment System

Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.

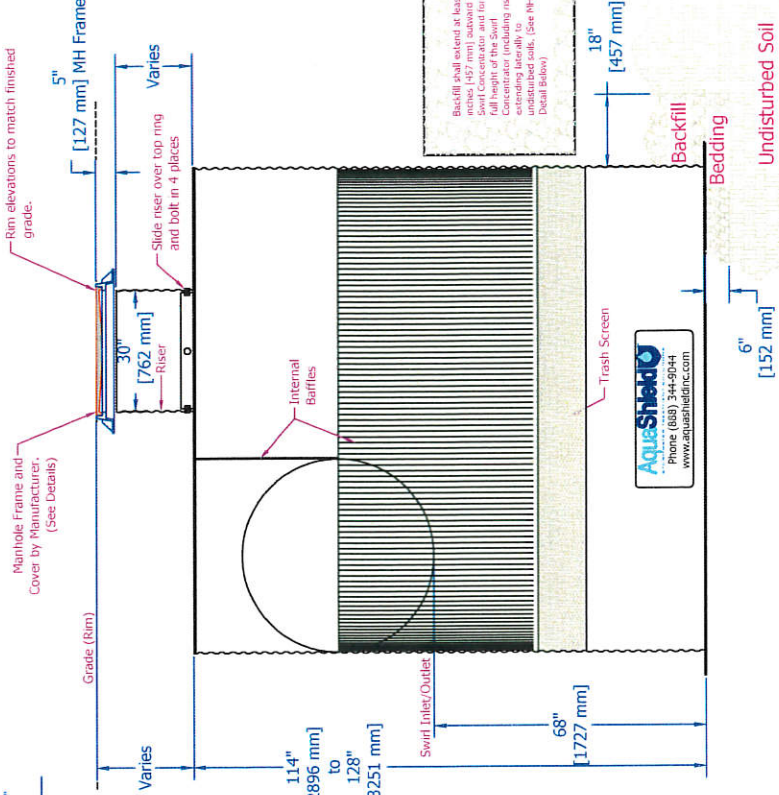
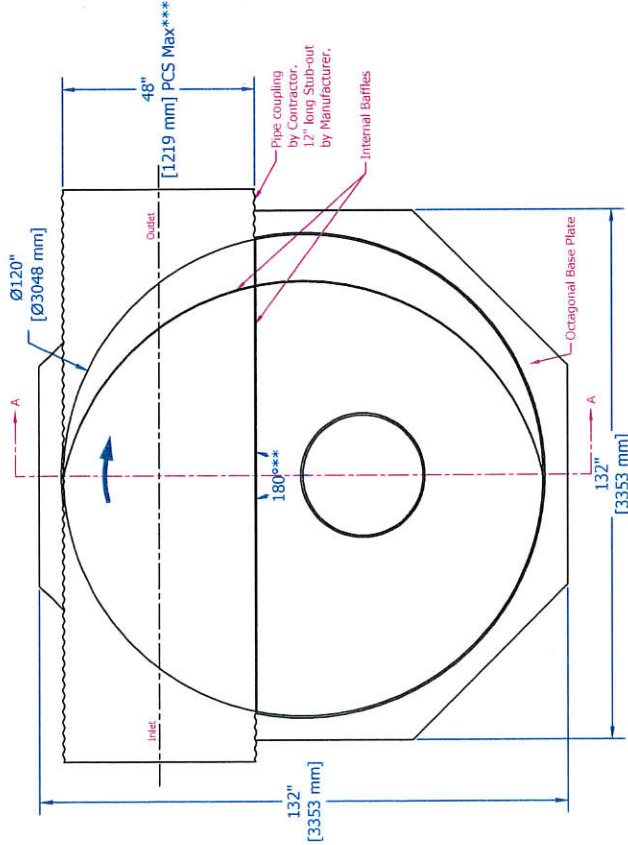


If traffic loading (HS-25) is required or anticipated, a 4-foot [1.22 m] diameter, 14-inch [356 mm] thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch [25 mm] thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch [25 mm]. Top of manhole cover and concrete slab shall be level with finish grade.



Note: As an alternative, 42-inch OD, HS-20/25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.
*** See Representative for larger pipe diameters available.



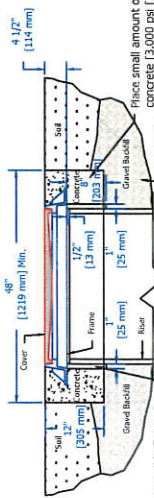
Aqua-Swirl Concentrator Model AS-10s BYP PCS Standard Detail

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Document: AS-10 PCS STD
Drawn By: JCW
Scale: 1:30
Date: 01/20/15
U.S. Patent Nos. 6524473 and other Patent Pending

Aqua-Swirl Polymer Coated Steel (PCS) Stormwater Treatment System

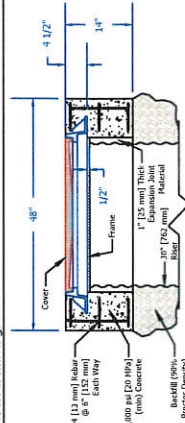
Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



Wrap Compressible Expansion Bolts around access riser(s) 1-inch (25 mm) thickness around top of riser to allow transfer of inadvertent loading from manhole cover to concrete slab.

Manhole Frame & Cover Detail For Non-Traffic Areas Only
NTS

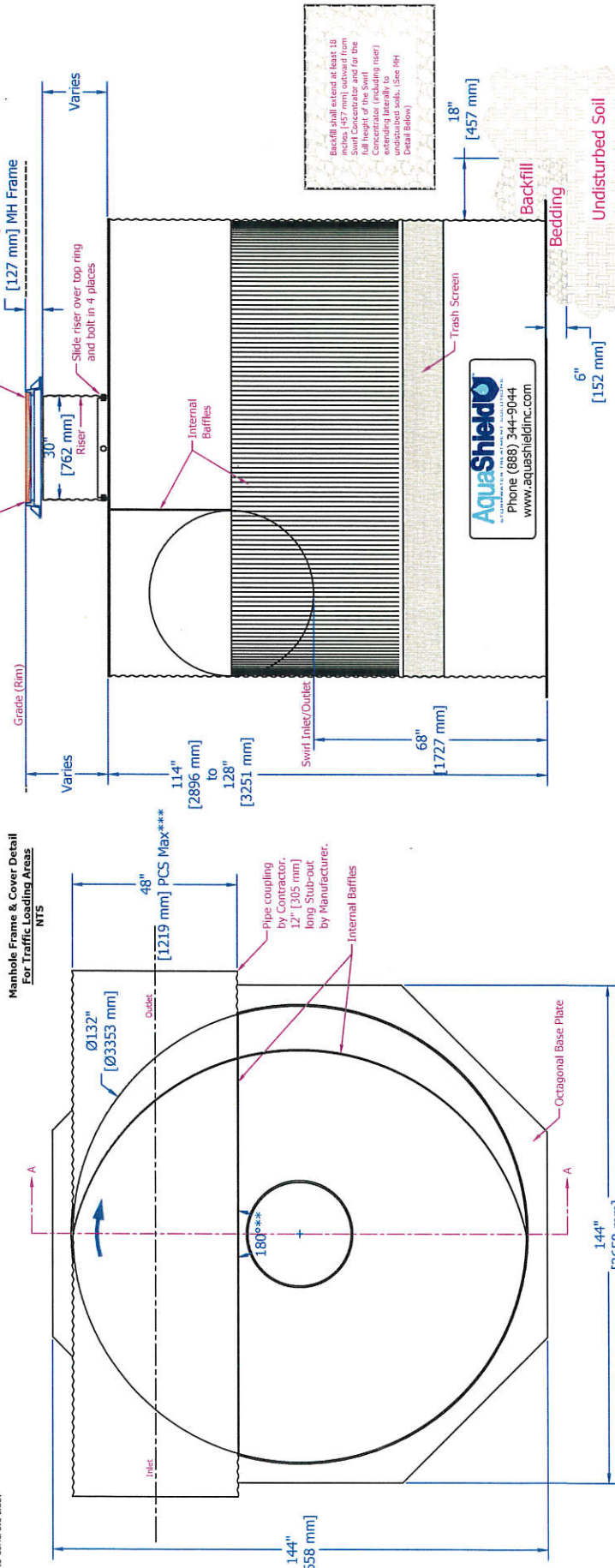
If traffic loading (HS-25) is required or anticipated, a 4-foot (1.22 m) diameter, 14-inch (356 mm) thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch (25 mm) thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi [20 MPa] and be reinforced with #4 [13 mm] reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch (25 mm). Top of manhole cover and concrete slab shall be level with finish grade.



Manhole Frame & Cover Detail For Traffic Loading Areas
NTS

Note: As an alternative, 42-inch OD, HS-20/25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.
***See Representative for larger pipe diameters available.



Plan View

Document:	AS-11 PCS STD
Drawn By:	KCW
Scale:	1:30
Date:	10/12/2015
U.S. Patent No. 6524473 and other Patent Pending	

AquaShield
AquaShield Inc. 2733 Kanawha Drive, Suite 111, Chattanooga, TN 37443
Phone (888) 344-9044 Fax (423) 826-2112
www.aquashieldinc.com

Section A-A

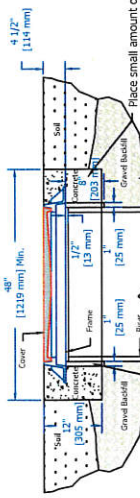
Aqua-Swirl Concentrator Model AS-11s BYP PCS Standard Detail

Backfill shall extend at least 18 inches (457 mm) outward from Swirl Concentrator and for the full height of the Swirl Concentrator (including riser) undisturbed soils. (See RH Detail Below)

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Phone (888) 344-9044
www.aquashieldinc.com

**Aqua-Swirl Polymer Coated Steel (PCS)
Stormwater Treatment System**

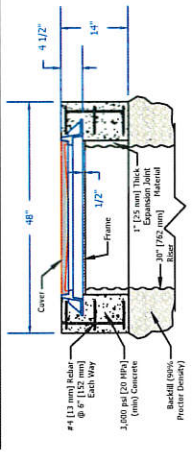
Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



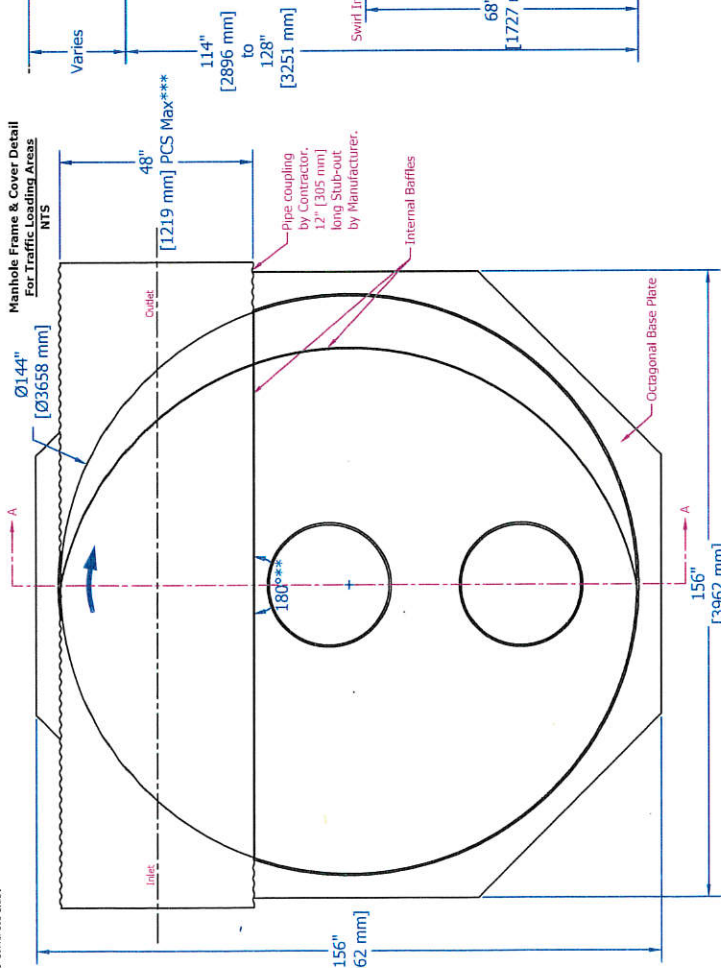
Wrap Compressible Expansion Joint Material to a minimum 1-inch (25 mm) thickness around top of riser to allow transfer of inadvertent loading from manhole cover to concrete slab.

**Manhole Frame & Cover Detail
For Non-Traffic Areas Only
NTS**

If traffic loading (HS-20) is required or anticipated, a 4-foot (1.22 m) diameter, 14-inch (355 mm) thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch (25 mm) thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi (20 MPa) and be reinforced with #4 (13 mm) reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch (25 mm). Top of manhole cover and concrete slab shall be level with finish grade.



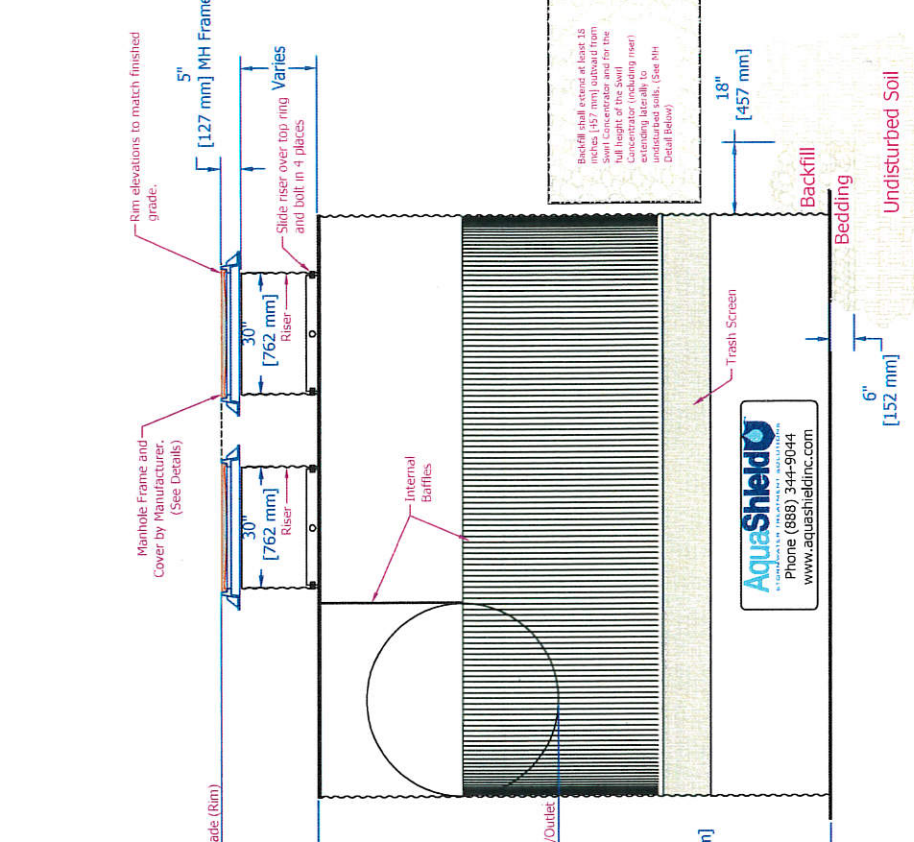
**Manhole Frame & Cover Detail
For Traffic Loading Areas
NTS**



Plan View

Note: As an alternative, 42-inch OD, HS-20/25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.
*** See Representative for larger pipe diameters available.



Section A-A

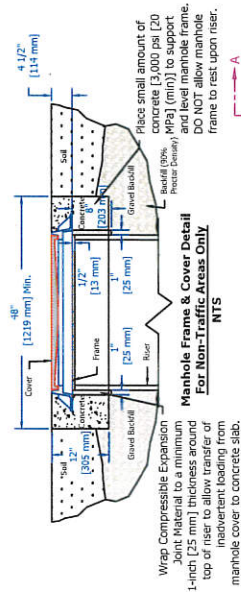
AquaShield
INTERNATIONAL THE STORMWATER SOLUTIONS
2733 Karasida Drive, Suite 111, Chattanooga, TN 37343
Phone (888) 344-9044 Fax (423) 826-2112
www.aquashieldinc.com

Document: AS-12 PCS STD
Drawn By: JCW
Scale: 1:30
Date: 01/20/15
U.S. Patent No. 6,924,473 and other Patent Pending

Aqua-Swirl Concentrator Model AS-12s BYP PCS Standard Detail

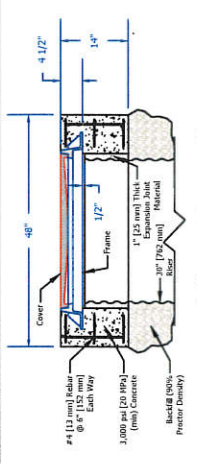
**Aqua-Swirl Polymer Coated Steel (PCS)
Stormwater Treatment System**

Unless other traffic barriers are present, bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.



Wrap Compressible Expansion Joint Material to a minimum 1-inch (25 mm) thickness around top of riser pipe. The riser pipe shall be reinforced with #4 (13 mm) reinforcing steel. Top of manhole cover and concrete slab shall be level with finish grade.

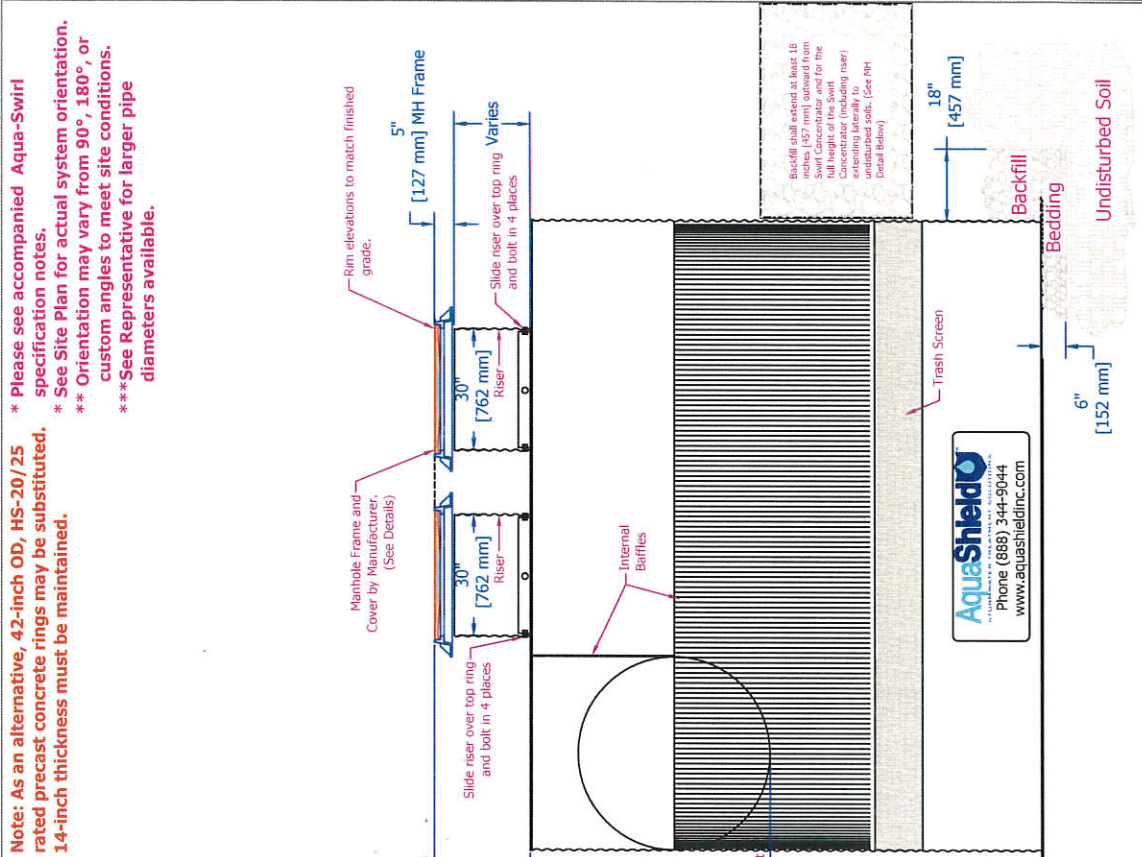
If traffic loading (HS-25) is required or anticipated, a 4-foot (1.22 m) diameter, 14-inch (356 mm) thick reinforced concrete pad must be placed over the Stormwater Treatment System Riser to support and level the manhole frame, as shown. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch (25 mm) thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi (20 MPa) and be reinforced with #4 (13 mm) reinforcing steel as shown. Minimum cover over reinforcing steel shall be 1-inch (25 mm). Top of manhole cover and concrete slab shall be level with finish grade.



Manhole Frame and Cover Detail For Traffic Loading Areas. NTS. Place small amount of concrete (3,000 psi [20 MPa] (min)) to support and level manhole frame. DO NOT allow manhole frame to rest upon riser.

Note: As an alternative, 42-inch OD, HS-20/25 rated precast concrete rings may be substituted. 14-inch thickness must be maintained.

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.
** Orientation may vary from 90°, 180°, or custom angles to meet site conditions.
*** See Representative for larger pipe diameters available.



Backfill shall extend at least 18 inches (457 mm) outward from full height of the Swirl Concentrator (including riser) extending laterally to existing materials. (See MH Detail Below)

18" (457 mm)

Backfill

Bedding

Undisturbed Soil

6" (152 mm)

Trash Screen

Internal Baffles

Swirl Inlet/Outlet 128" (3251 mm)

68" (1727 mm)

PCS Max***

48" (1219 mm)

Ø156" (3962 mm)

Ø23962 mm

Outlet

Inlet

180°***

168" (4267 mm)

168" (4267 mm)

Octagonal Base Plate

AquaShield
Phone (888) 344-9044
www.aquashieldinc.com

Section A-A

Aqua-Swirl Concentrator Model AS-13s BYP PCS Standard Detail

AquaShield
2733 Kinross Drive, Suite 111, Charlotte, NC 27243
Phone (888) 344-9044 Fax (423) 826-2112
www.aquashieldinc.com

Document: AS-13 PCS STD
Drawn By: JCW
Scale: 1:30
Date: 01/20/15
U.S. Patent No. 05244173 and other Patent Pending

Plan View

APPENDIX B



Aqua-Swirl™ Specifications

GENERAL

This specification shall govern the performance, materials, and fabrication of the Stormwater Treatment System.

SCOPE OF WORK

The Aqua-Swirl® shall be provided by AquaShield™, Inc., 2733 Kanasita Drive, Suite 111, Chattanooga, TN (888-344-9044), and shall adhere to the following material and performance specifications at the specified design flows and storage capacities.

MATERIALS

- A. Stormwater Treatment System shall be made from Polymer Coated Steel (PCS) corrugated pipe meeting the following requirements:
 - 1) Steel shall be zinc-coated (galvanized) and conform to ASTM A929 with a coating weight of 2 oz/ft² of surface (total both sides) to provide zinc coating thickness of 43µm (0.0017 in.) on each surface. Corrugations shall conform to the requirements stated in Specification A929/A 929M.
 - 2) The polymer coating shall conform to ASTM A742. Polymer coating shall be a film coating comprised of at least 85% ethylene acrylic acid copolymer and be capable of being applied to the galvanized steel sheet. After application, the polymer coating shall be free of holes, tears, and discontinuities, and shall be sufficiently flexible so that it will withstand corrugating, forming, lockseaming operations, and punching of holes.
 - 3) REQUIREMENTS FOR POLYMER COATING
 - a) Adhesion – There shall be no spalling or cracking of the coating or disbanding of the coating at the cut, when

AquaShield™ Stormwater Treatment Solutions

tested in accordance with ASTM A742/A 742M-03 Section 9.1.

- b) Impact – There shall be no break in the polymer coating when tested in accordance with ASTM A742/A 742M-03 Section 9.2.
- c) Thickness of Coating – The thickness of the polymer coating shall meet the requirements of ASTM A742/A 742M-03 Section 4 when tested in accordance with Section 9.3. The thicknesses indicated are minimum values at any point not less than 3/8 in. (10mm) from an edge.
- d) Holidays – The polymer coating on the steel shall be substantially free of holidays when tested in accordance with ASTM A742/A 742M-03 Section 9.4. An average of two holidays per square foot (22 holidays per square meter) of actual surface area on the test specimen shall be permitted.
- e) Abrasion Resistance – The average abrasion coefficient when tested in accordance with ASTM A742/A 742M-03 Section 9.5, shall be a minimum of 100 (expressed in g/mil of thickness) or 3.9 (expressed in g/μm of thickness).
- f) Imperviousness – There shall be no loosening or separation of the polymer coating from the galvanized steel substrate when tested in accordance with ASTM A742/A 742M-03 Section 9.6.
- g) Freeze-Thaw Resistance – The specimen shall withstand 100 freeze-thaw cycles, per ASTM A742/A 742M-03 Section 9.7, without spalling, disbanding, or other detrimental effects.
- h) Weatherability – The specimens shall withstand 100 hours of weathering with no observable delamination or cracking, when tested in accordance with ASTM A742/A 742M-03 Section 9.8.
- i) Resistance to Microbial Attack – There shall be no effect of microbial attack of the polymer coating when tested in accordance with ASTM A742A 742M-03 Section 9.9.

AquaShield™ Stormwater Treatment Solutions

- B. REJECTION – The Stormwater Treatment System may be rejected for failure to meet any of the requirements of this specification.

PERFORMANCE

- A. The Stormwater Treatment System shall include a ___-inch inner diameter (ID) circular hydrodynamic flow-through treatment chamber to treat the incoming water. A tangential inlet shall be provided to induce a swirling flow pattern that will cause sedimentary solids to accumulate in the bottom center of the chamber in such a way as to prevent re-suspension of captured particles. An arched baffle wall shall be provided in such a way as to prevent floatable liquid oils and solids from exiting the treatment chamber while enhancing the swirling action of the stormwater.
- B. The Stormwater Treatment System shall have a sediment storage capacity of ___ cubic feet and be capable of capturing ___ gallons of petroleum hydrocarbons. The Stormwater Treatment System shall have a treatment capacity of _____ cubic feet per second (cfs). The Stormwater Treatment System shall be capable of removing floating trash and debris, floatable oils, and 80% of total suspended solids from stormwater entering the treatment chamber.
- C. Service access to the Stormwater Treatment System shall be provided via 30-inch inner diameter (ID) access riser(s) over the treatment chamber such that no confined space entry is required to perform routine inspection and maintenance functions.

TREATMENT CHAMBER CONSTRUCTION

- A. The treatment chamber shall be constructed from Polymer Coated Steel (PCS), 16 gauge thickness, with 2.67" x 1/2" corrugation. For sized above 84" ID, the treatment chamber shall be constructed from PCS, 14 gauge thickness, with 2.67" x 1/2" corrugation. For sizes above 120" ID the treatment chamber shall be constructed from PCS, 10 gauge thickness, with 3.00" x 1" corrugation.
- B. Top and bottom plate thickness and reinforcement shall be suitable to withstand H-25 surface loading up to 8 feet of cover depth. Calculations must be provided to justify the thickness of the top

AquaShield™ Stormwater Treatment Solutions

and bottom plates and associated reinforcement. Top and bottom plates shall be Metal Inert Gas (MIG) welded to the treatment chamber structure. All welds shall be free of porosity, pinholes, and obvious defects. Welded areas shall be thoroughly cleaned and coated with two coats of TPC-515-7 black synthetic coating.

- C. The inlets and outlets shall be MIG welded to the treatment chamber structure. All welds shall be free of pinholes, porosity and obvious defects. Welded areas shall be thoroughly cleaned and coated with two coats of TPC-515-7 black synthetic coating.
- D. The arched baffle wall shall be fabricated from PCS and shall be MIG welded to the inside of the treatment chamber with connections made at 180 degrees of each end. Welds shall be coated with two coats of TPC-515-7 black synthetic coating.
- E. Lifting supports may be provided on the exterior of the Stormwater Treatment System in such a way as to allow the prevention of undue stress to critical components of the Stormwater Treatment System during loading, off-loading, and moving operations. The lifting supports shall be constructed as an integral part of the treatment chamber.
- F. A concrete pad shall be required to support the manhole frame and cover. When used in a traffic area the pad design shall be approved by a professional engineer and the calculations must be included in the submittal.
- G. The manufacturer, upon request, can supply anti-floatation/buoyancy calculations. In addition, typical drawings of the AquaShield™ Stormwater Treatment System with concrete anti-floatation structures can also be provided. Anti-floatation structure design and approval are ultimately the responsibility of the specifying engineer. The contractor shall provide the anti-floatation structures.

INSTALLATION

A. Excavation and Bedding

The trench and trench bottom shall be constructed in accordance with ASTM A 798 Section 5, Trench Excavation, Section 6, Foundation, and Section 7, Bedding. The PCS Swirl Concentrator shall be installed on a stable base consisting of at least 6-inches of fine, readily compacted soil or granular fill material, and compacted to 95% proctor density. Bedding shall not contain stones retained on a 3-inch ring, frozen lumps, highly plastic clay, organic material, corrosive material, or other deleterious foreign materials. All required safety precautions for Swirl Concentrator installation are the responsibility of the contractor and shall be per OSHA approved methods.

B. Contractor

The contractor shall be responsible for preparing the site for the system installation including, but not limited to, temporary shoring, excavation, cutting and removing pipe, new pipe, bedding, and compaction. The contractor shall be responsible for furnishing the means to lift the system components off the delivery trucks. The contractor shall be responsible for providing any concrete anti-floatation/anti-creep restraints, anchors, collars, etc. with any straps or connection devices required. The contractor shall be responsible for sealing the pipe connections to the Stormwater Treatment System, backfilling and furnishing all labor, tools, and materials needed.

SUBMITTALS

The contractor shall be provided with dimensional drawings; and when specified, utilize these drawings as the basis for preparation of shop drawings showing details for construction and reinforcing. Shop drawings shall be annotated to indicate all materials to be used and all applicable standards for materials, required tests of materials, and design assumptions for structural analysis. Shop drawings shall be prepared at a scale of not less than ¼ inch per foot. One (1) hard copy of said shop drawings shall be submitted to the specifying engineer for review and approval.

QUALITY CONTROL INSPECTION

A. Materials

The quality of materials, the process of manufacturing, and the finished sections shall be subject to inspection by the specifying engineer. Such inspection may be made at the place of construction, on the work site after delivery, or at both places. The sections shall be subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once. All sections, which are damaged beyond repair after delivery will be rejected; and, if already installed, shall be repaired to the specifying engineer's acceptance level, if permitted, or removed and replaced entirely at the contractor's expense.

B. Inspection

All sections shall be inspected for general appearance, dimensions, soundness, etc.

C. Defects

Structural defects may be repaired (subject to the acceptance of the specifying engineer) after demonstration by the manufacturer that strong and permanent repairs will be made. The specifying engineer, before final acceptance of the components, shall carefully inspect repairs.



Aqua-Swirl™ Specifications

GENERAL

This specification shall govern the performance, materials, and fabrication of the Stormwater Treatment Systems.

SCOPE OF WORK

The Aqua-Swirl™ Concentrator Stormwater Treatment System shall be provided by AquaShield™, Inc. 2733 Kanasita Drive, Suite 111, Chattanooga, TN 37343 (423-870-8888) and shall adhere to the following material and performance specifications at the specified design flows and storage capacities.

MATERIALS

- A. The Stormwater Treatment System shall be made from high-density polyethylene (HDPE) resins meeting the following requirements:
- 1) HDPE Material – The HDPE material supplied under this specification shall be high density, high molecular weight as supplied by manufacturer. The HDPE material shall conform to ASTM D 3350 with minimum cell classification values of 345464C.
 - 2) PHYSICAL PROPERTIES OF HDPE COMPOUND
 - a) Density - the density shall be no less than 0.955 g/cm³ as referenced in ASTM D 1505.
 - b) Melt Index - the melt index shall be no greater than 0.15 g/10 minutes when tested in accordance with ASTM D 1238- Condition 190/2.16.
 - c) Flex Modulus - flexural modulus shall be 110,000 to less than 160,000 psi as referenced in ASTM D 790.
 - d) Tensile Strength at Yield - tensile strength shall be 3,000 to less than 3,500 psi as referenced in ASTM D 638.
 - e) Slow Crack Growth Resistance shall be greater than 100 hours (PENT Test) as referenced in ASTM F 1473 or

greater than 5000 hours (ESCR) as referenced in ASTM D 1693 (condition C).

- f) Hydrostatic Design Basis shall be 1,600 psi at 23 degrees C when tested in accordance with ASTM D 2837.
- g) Color – black with minimum 2% carbon black.

- B. REJECTION - The Stormwater Treatment System may be rejected for failure to meet any of the requirements of this specification.

PERFORMANCE

- A. The Stormwater Treatment System shall include a _____ inch inner diameter (ID) circular hydrodynamic flow-through treatment chamber to treat the incoming water. A tangential inlet shall be provided to induce a swirling flow pattern that will cause sedimentary solids to accumulate in the bottom center of the chamber in such a way as to prevent re-suspension of captured particles. An arched baffle wall shall be provided in such a way as to prevent floatable liquid oils and solids from exiting the treatment chamber while enhancing the swirling action of the stormwater.
- B. The Stormwater Treatment System shall have a sediment storage capacity of _____ cubic feet and be capable of capturing _____ gallons of petroleum hydrocarbons. The Stormwater Treatment System shall have a treatment capacity of _____ cubic feet per second (cfs). The Stormwater Treatment System shall be capable of removing floating trash and debris, floatable oils, and 80% of total suspended solids from stormwater entering the treatment chamber.
- C. Service access to the Stormwater Treatment System shall be provided via 30-inch ID access riser(s) over the treatment chamber such that no confined space entry is required to perform routine inspection and maintenance functions.

TREATMENT CHAMBER CONSTRUCTION

- A. The treatment chamber shall be constructed from solid wall high-density polyethylene (HDPE) ASTM F 714 cell class 345464C. For sizes above 63-inch OD, the treatment chamber shall be constructed from profile wall HDPE ASTM F 894 RSC 250 pipe or solid wall HDPE.

- B. The bottom thickness of the treatment chamber will be determined in accordance with ASTM F 1759. Calculations must be provided to justify the thickness of the bottom.
- C. The inlets and outlets shall be extrusion welded on the inside and outside of the structure using accepted welding methods.
- D. The arched baffle wall shall be constructed from HDPE and shall be extrusion welded to the interior of the treatment chamber using accepted welding methods.
- E. HDPE lifting supports may be provided on the exterior of the Stormwater Treatment System in such a way as to allow the prevention of undue stress to critical components of the Stormwater Treatment System during loading, off-loading and moving operations. The lifting supports shall be constructed as an integral part of the treatment chamber and extrusion welded using accepted welding methods.
- F. Top of the treatment chamber shall be built to the requirements of the drawings. Deep burial applications shall require a reinforced HDPE top.
- G. Reinforced concrete pads spanning the treatment chamber will be required with traffic rated frames and covers when the Stormwater Treatment System is used in traffic areas. A professional engineer shall approve the design of the concrete pad and the calculations must be included in the submittal.
- H. The manufacturer upon request can supply anti-floatation/ buoyancy calculations. In addition, typical drawings of the AquaShield™ Stormwater Treatment System with concrete anti-floatation structures can also be provided. Anti-floatation structure design and approval are ultimately the responsibility of the specifying engineer. The contractor shall provide the anti-floatation structures.

INSTALLATION

- A. **Excavation and Bedding**
The trench and trench bottom shall be constructed in accordance with ASTM D 2321, Section 6, Trench Excavation, and Section 7, Installation. The HDPE Stormwater Treatment System shall be installed on a stable base consisting of 12-inches of Class I stone

materials (angular, crushed stone or rock, crushed gravel; large void content, containing little or no fines) as defined by ASTM D 2321, Section 5, Materials, and compacted to 95% proctor density. All required safety precautions for Stormwater Treatment System installation are the responsibility of the Contractor.

B. Backfill Requirements

Backfill materials shall be Class I or II stone materials (well graded gravels, gravelly sands; containing little or no fines) as defined by ASTM D 2321, Section 5, Materials and compacted to 90% proctor density. Class I materials are preferred. Backfill and bedding materials shall be free of debris. Backfilling shall conform to ASTM F 1759, Section 4.2, "Design Assumptions". Backfill shall extend at least 2 feet beyond the edge of the Swirl Concentrator for the full height to sub-grade and extend laterally to undisturbed soils.

C. Pipe Couplings

Pipe couplings to and from the Stormwater Treatment System shall be Mar-Mac, Fernco®, Mission™, or equal type flexible boot with stainless steel tension bands. A metal shear guard shall be used to protect the flexible boot when available.

DIVISION OF RESPONSIBILITY

A. Stormwater Treatment System Manufacturer

The Manufacturer shall be responsible for delivering the Stormwater Treatment System to the site. The system includes the treatment chamber with debris baffle, inlet and outlet stub-outs, lifting supports, 30-inch ID service access riser(s) to grade with temporary cover, and manhole frame(s) and cover(s).

B. Contractor

The Contractor shall be responsible for preparing the site for the system installation including, but not limited to, temporary shoring, excavation, cutting and removing pipe, new pipe, bedding, and compaction. The Contractor shall be responsible for furnishing the means to lift the system components off the delivery trucks. The Contractor shall be responsible for providing any concrete anti-floatation/anti-creep restraints, anchors, collars, etc. with any straps or connection devices required. The Contractor shall be responsible for field cutting, if necessary, HDPE service access risers to grade. The Contractor shall be responsible for sealing the pipe connections to the Stormwater Treatment System, backfilling and furnishing all labor, tools, and materials needed.

SUBMITTALS

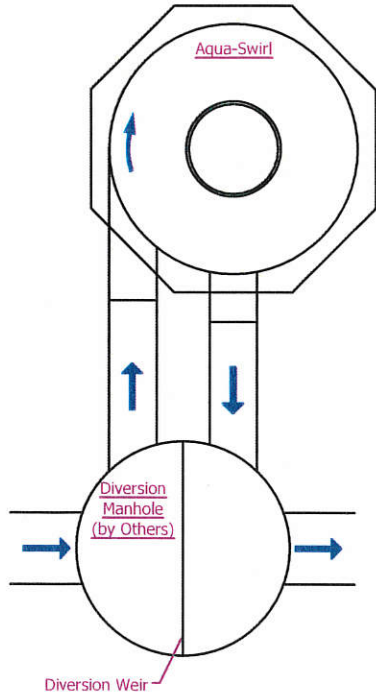
The Contractor shall be provided with dimensional drawings and, when specified, utilize these drawings as the basis for preparation of shop drawings showing details for construction and reinforcing. Shop drawings shall be annotated to indicate all materials to be used and all applicable standards for materials, required tests of materials and design assumptions for structural analysis. Shop drawings shall be prepared at a scale of not less than 1/4 inch per foot. One (1) hard copy of said shop drawings shall be submitted to the Specifying Engineer for review and approval.

QUALITY CONTROL INSPECTION

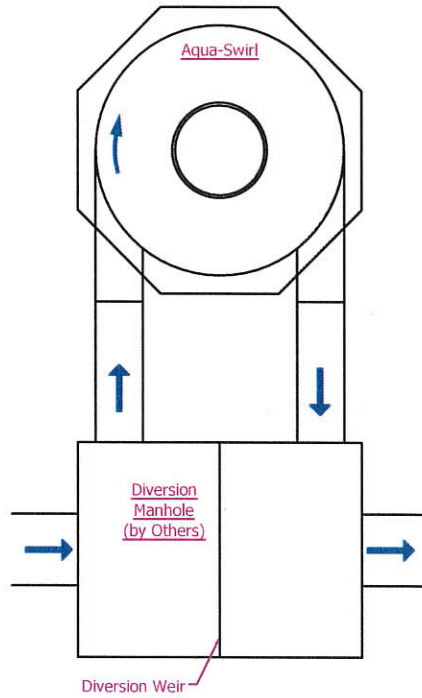
- A. **Materials**
The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection by the Specifying Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places. The sections shall be subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once. All sections, which are damaged beyond repair after delivery will be rejected and, if already installed, shall be repaired to the Specifying Engineer's acceptance level, if permitted, or removed and replaced, entirely at the Contractor's expense.
- B. **Inspection**
All sections shall be inspected for general appearance, dimensions, soundness, etc.
- C. **Defects**
Structural defects may be repaired, subject to the acceptance of the Specifying Engineer, after demonstration by the manufacturer that strong and permanent repairs will be made. The Specifying Engineer before final acceptance of the components shall carefully inspect repairs.

APPENDIX C

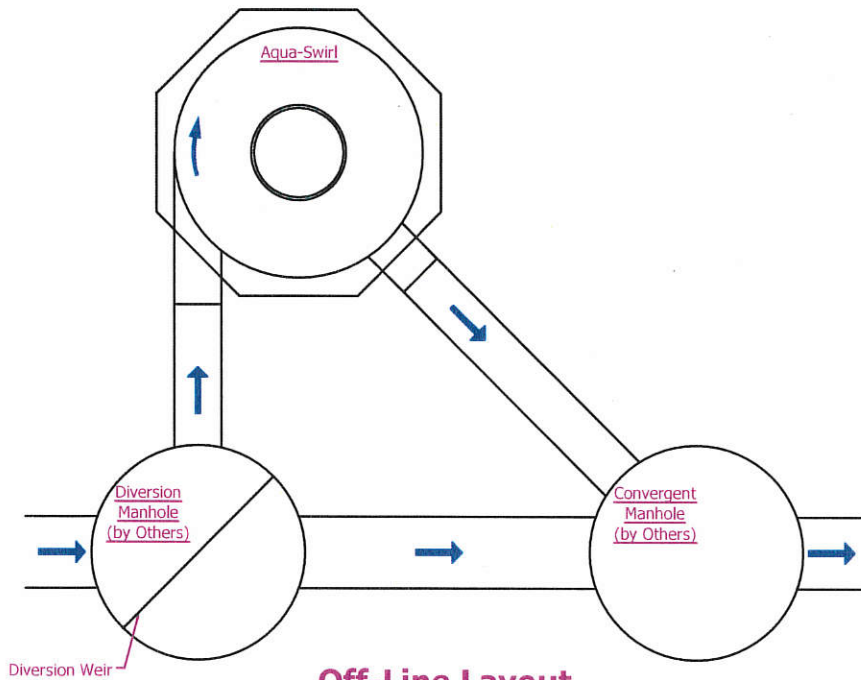
Note: Flow direction and orientation may vary based on site specific conditions.



Tight Off-Line Layout



Horseshoe Layout



Off-Line Layout



2705 Kanasita Drive, Chattanooga, TN 37343
 Phone (888) 344-9044 Fax (423) 826-2112
 www.aquashieldinc.com

Off-Line Aqua-Swirl
 Diverion Layouts

Document:	Swirl Layouts	
Drawn By:	JCW	
Scale:	NTS	
Date:	03/01/13	
U.S. Patent No. 6524473 and other Patent Pending		

APPENDIX D



Aqua-Swirl[®]
Stormwater Treatment System
Inspection and Maintenance Manual



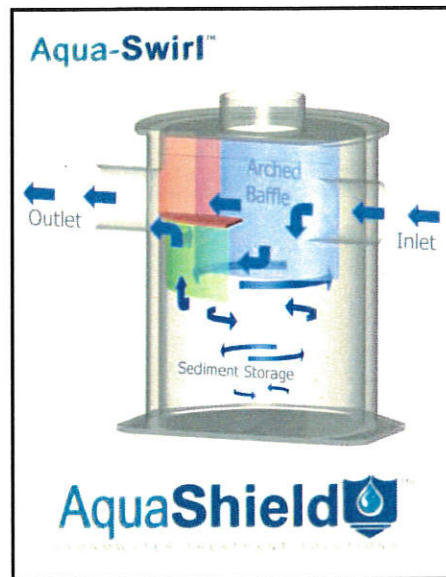
AquaShield[™], Inc.
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www.aquashieldinc.com

November 2016



Aqua-Swirl[®] Stormwater Treatment System

The Aqua-Swirl[®] Stormwater Treatment System (Aqua-Swirl[®]) is a vortex-type hydrodynamic separator designed and supplied by AquaShield[™], Inc. (AquaShield[™]). Aqua-Swirl[®] technology removes pollutants including suspended solids, debris, floatables and free-floating oil from stormwater runoff. Both treatment and storage are accomplished in the single swirl chamber without the use of multiple or hidden, blind access chambers.



Aqua-Swirl[®] Stormwater Treatment System



Floatable debris in the Aqua-Swirl[®]



System Operation

The treatment operation begins when stormwater enters the Aqua-Swirl[®] through a tangential inlet pipe that produces a circular (or vortex) flow pattern that causes contaminants to settle to the base of the unit. Since stormwater flow is intermittent by nature, the Aqua-Swirl[®] retains water between storm events providing both dynamic and quiescent settling of solids. The dynamic settling occurs during each storm event while the quiescent settling takes place between successive storms. A combination of gravitational and hydrodynamic drag forces encourages the solids to drop out of the flow and migrate to the center of the chamber where velocities are the lowest.

The treated flow then exits the Aqua-Swirl[®] behind the arched outer baffle. The top of the baffle is sealed across the treatment channel, thereby eliminating floatable pollutants from escaping the system. A vent pipe is extended up the riser to expose the backside of the baffle to atmospheric conditions, preventing a siphon from forming at the bottom of the baffle.



Custom Applications

The Aqua-Swirl[®] system can be modified to fit a variety of purposes in the field, and the angles for inlet and outlet lines can be modified to fit most applications. The photo below demonstrates the flexibility of Aqua-Swirl[®] installations using a “twin” configuration in order to double the water quality treatment capacity. Two Aqua-Swirl[®] units were placed side by side in order to treat a high volume of water while occupying a small amount of space.



Custom designed AS-9 Twin Aqua-Swirl[®]



Retrofit Applications

The Aqua-Swirl[®] system is designed so that it can easily be used for retrofit applications. With the invert of the inlet and outlet pipe at the same elevation, the Aqua-Swirl[®] can easily be connected directly to the existing storm conveyance drainage system. Furthermore, because of the lightweight nature and small footprint of the Aqua-Swirl[®], existing infrastructure utilities (i.e., wires, poles, trees) would be unaffected by installation.



Aqua-Swirl[®] System Maintenance

The long term performance of any stormwater treatment structure, including manufactured or land based systems, depends on a consistent maintenance plan. Inspection and maintenance functions are simple and easy for the Aqua-Swirl[®] allowing all inspections to be performed from the surface.

It is important that a routine inspection and maintenance program be established for each unit based on: (a) the volume or load of the contaminants of concern, (b) the frequency of releases of contaminants at the facility or location, and (c) the nature of the area being drained.

In order to ensure that our systems are being maintained properly, AquaShield[™] offers a maintenance solution to all of our customers. We will arrange to have maintenance performed.



Aqua-Swirl[®] manhole cover



Inspection

The Aqua-Swirl[®] can be inspected from the surface, eliminating the need to enter the system to determine when cleanout should be performed. In most cases, AquaShield[™] recommends a quarterly inspection for the first year of operation to develop an appropriate schedule of maintenance. Based on experience of the system's first year in operation, we recommend that the inspection schedule be revised to reflect the site-specific conditions encountered. Typically, the inspection schedule for subsequent years is reduced to semi-annual inspection.



Maintenance

The Aqua-Swirl[®] has been designed to minimize and simplify the inspection and maintenance process. The single chamber system can be inspected and maintained entirely from the surface thereby eliminating the need for confined space entry. Furthermore, the entire structure (specifically, the floor) is accessible for visual inspection from the surface. There are no areas of the structure that are blocked from visual inspection or periodic cleaning. Inspection of any free-floating oil and floatable debris can be directly observed and maintained through the manhole access provided directly over the swirl chamber.

Aqua-Swirl[®] Inspection Procedure

To inspect the Aqua-Swirl[®], a hook is typically needed to remove the manhole cover. AquaShield[™] provides a customized manhole cover with our distinctive logo to make it easy for maintenance crews to locate the system in the field. We also provide a permanent metal information plate affixed inside the access riser which provides our contact information, the Aqua-Swirl[®] model size, and serial number.

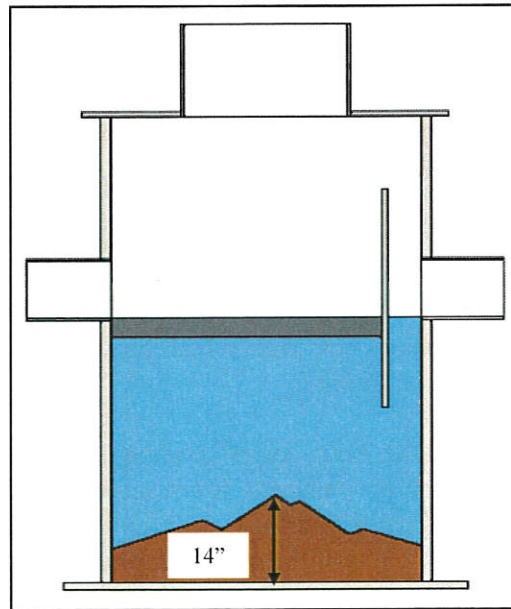
The only tools needed to inspect the Aqua-Swirl[®] system are a flashlight and a measuring device such as a stadia rod or pole. Given the easy and direct accessibility provided, floating oil and debris can be observed directly from the surface. Sediment depths can easily be determined by lowering a measuring device to the top of the sediment pile and to the surface of the water.

It should be noted that in order to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the *top* of the sediment pile. Keep in mind that the finer sediment at the top of the pile may offer less resistance to the measuring device than the larger particles which typically occur deeper within the sediment pile.

The Aqua-Swirl[®] design allows for the sediment to accumulate in a semi-conical fashion as illustrated below. That is, the depth to sediment as measured below the water surface may be less in the center of the swirl chamber; and likewise, may be greater at the edges of the swirl chamber.



Sediment inspection using a stadia rod



Maximum recommended sediment depth prior to cleanout is 14 inches for all Aqua-Swirl[®] models

Aqua-Swirl[®] Cleanout Procedure

Cleaning the Aqua-Swirl[®] is simple and quick. Free-floating oil and floatable debris can be observed and removed directly through the 30-inch service access riser provided. A vacuum truck is typically used to remove the accumulated sediment and debris. An advantage of the Aqua-Swirl[®] design is that the entire sediment storage area can be reached with a vacuum hose

from the surface reaching all the sides. Since there are no multiple or limited (blind) access chambers in the Aqua-Swirl[®], there are no restrictions to impede on-site maintenance tasks.

Disposal of Recovered Materials

AquaShield[™] recommends that all maintenance activities be performed in accordance with appropriate health and safety practices for the tasks and equipment being used. AquaShield[™] also recommends that all materials removed from the Aqua-Swirl[®] and any external structures (e.g, bypass features) be handled and disposed in full accordance with any applicable local and state requirements.



Vacuum (vactor) truck quickly cleans the single open access swirl chamber

***Aqua-Swirl[®] Inspection and Maintenance Work Sheets
on following pages***

Aqua-Swirl[®] Inspection and Maintenance Manual

Work Sheets

SITE and OWNER INFORMATION

Site Name: _____

Site Location: _____

Date: _____ Time: _____

Inspector Name: _____

Inspector Company: _____ Phone #: _____

Owner Name: _____

Owner Address: _____

Owner Phone #: _____ Emergency Phone #: _____

INSPECTIONS

I. Floatable Debris and Oil

1. Remove manhole lid to expose liquid surface of the Aqua-Swirl[®].
2. Remove floatable debris with basket or net if any present.
3. If oil is present, measure its depth. Clean liquids from system if one half (½) inch or more oil is present.

Note: Water in Aqua-Swirl[®] can appear black and similar to oil due to the dark body of the surrounding structure. Oil may appear darker than water in the system and is usually accompanied by oil stained debris (e.g. Styrofoam, etc.). The depth of oil can be measured with an oil/water interface probe, a stadia rod with water finding paste, a coliwasa, or collect a representative sample with a jar attached to a rod.

II. Sediment Accumulation

1. Lower measuring device (e.g. stadia rod) into swirl chamber through service access provided until top of sediment pile is reached.
2. Record distance to top of sediment pile from top of standing water: _____ inches.
3. Maximum recommended sediment depth prior to cleanout is 14 inches for all models. Consult system shop drawing for treatment chamber depth as measured from the inlet pipe invert to base of the unit.

III. Diversion Structures (External Bypass Features)

If a diversion (external bypass) configuration is present, it should be inspected as follows:

1. Inspect weir or other bypass feature for structural decay or damage. Weirs are more susceptible to damage than off-set piping and should be checked to confirm that they are not crumbling (concrete or brick) or decaying (steel).
2. Inspect diversion structure and bypass piping for signs of structural damage or blockage from debris or sediment accumulation.
3. When feasible, measure elevations on diversion weir or piping to ensure it is consistent with site plan designs.
4. Inspect downstream (convergence) structure(s) for sign of blockage or structural failure as noted above.

CLEANING

Schedule cleaning with local vacor company or AquaShield™ to remove sediment, oil and other floatable pollutants. The captured material generally does not require special treatment or handling for disposal. Site-specific conditions or the presence of known contaminants may necessitate that appropriate actions be taken to clean and dispose of materials captured and retained by the Aqua-Swirl®. All cleaning activities should be performed in accordance with property health and safety procedures.

AquaShield™ always recommends that all materials removed from the Aqua-Swirl® during the maintenance process be handled and disposed in accordance with local and state environmental or other regulatory requirements.

MAINTENANCE SCHEDULE

I. During Construction

Inspect the Aqua-Swirl® every three (3) months and clean the system as needed. The Aqua-Swirl® should be inspected and cleaned at the end of construction regardless of whether it has reached its maintenance trigger.

II. First Year Post-Construction

Inspect the Aqua-Swirl® every three (3) months and clean the system as needed.

Inspect and clean the system once annually regardless of whether it has reached its sediment or floatable pollutant storage capacity.

III. Second and Subsequent Years Post-Construction

If the Aqua-Swirl® did not reach full sediment or floatable pollutant capacity in the First Year Post-Construction period, the system can be inspected and cleaned once annually.

If the Aqua-Swirl® reached full sediment or floatable pollutant capacity in less than 12 months in the First Year Post-Construction period, the system should be inspected once every six (6) months and cleaned as needed. The Aqua-Swirl® should be cleaned annually regardless of whether it reaches its sediment or floatable pollutant capacity.

IV. Bypass Structures

Bypass structures should be inspected whenever the Aqua-Swirl® is inspected. Maintenance should be performed on bypass structures as needed.

MAINTENANCE COMPANY INFORMATION

Company Name: _____

Street Address: _____

City: _____ State/Prov.: _____ Zip/Postal Code: _____

Contact: _____ Title: _____

Office Phone: _____ Cell Phone: _____

ACTIVITY LOG

Date of Cleaning: _____ (Next inspection should be 3 months from this data for first year).

Time of Cleaning: Start: _____ End: _____

Date of Next Inspection: _____

Floatable debris present: Yes No

Notes: _____

Oil present: Yes No Oil depth (inches): _____

Measurement method and notes: _____

STRUCTURAL CONDITIONS and OBSERVATIONS

Structural damage: Yes No Where: _____

Structural wear: Yes No Where: _____

Odors present: Yes No Describe: _____

Clogging: Yes No Describe: _____

Other Observations: _____

NOTES

Additional Comments and/or Actions To Be Taken	Time Frame

ATTACHMENTS

- Attach site plan showing Aqua-Swirl® location.
- Attach detail drawing showing Aqua-Swirl® dimensions and model number.
- If a diversion configuration is used, attach details showing basic design and elevations (where feasible).

Aqua-Swirl®

TABULAR MAINTENANCE SCHEDULE

Date Construction Started: _____

Date Construction Ended: _____

During Construction

Activity	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Inspect and Clean as needed			X			X			X			X
Inspect Bypass and maintain as needed			X			X			X			X
Clean System*												X*

* The Aqua-Swirl® should be cleaned **once a year** regardless of whether it has reached full pollutant storage capacity. In addition, the system should be cleaned at the **end of construction** regardless of whether it has reach full pollutant storage capacity.

First Year Post-Construction

Activity	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Inspect and Clean as needed			X			X			X			X
Inspect Bypass and maintain as needed			X			X			X			X
Clean System*												X*

* The Aqua-Swirl® should be cleaned **once a year** regardless of whether it has reached full pollutant storage capacity.

Second and Subsequent Years Post-Construction

Activity	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Inspect and Clean as needed												X*
Inspect Bypass, maintain as needed												X*
Clean System*												X*

* If the Aqua-Swirl® did **not** reach full sediment or floatable pollutant capacity in the First Year Post-Construction period, the system can be inspected and cleaned once annually.

If the Aqua-Swirl® **reached** full sediment or floatable pollutant capacity in less than 12 months in the First Year Post-Construction period, the system should be inspected once every six (6) months or more frequently if past history warrants, and cleaned as needed. The Aqua-Swirl® should be cleaned annually regardless of whether it reaches its full sediment or floatable pollutant capacity.

APPENDIX E



LIMITED WARRANTY

WARRANTY: AquaShield, Inc., warrants its products against failure due to improper workmanship or defective materials, for a period of twelve (12) months from delivery date; provided, however, that AquaShield, Inc.'s, liability shall be limited to the least of the following: (1) the cost to repair such product; (2) the cost to replace the product; or (3) the purchase price of the product. If the product is replaced, such replacement shall be F.O.B. point of manufacture with freight allowed. In no case shall the cost of dismantling or installation be covered. In no event shall AquaShield, Inc., be liable for any other damages, including, but not limited to, consequential or incidental damages or loss of income. AquaShield, Inc., makes no warranty express or implied as to the merchantability or fitness for any particular purpose of the property sold subject to this Limited Warranty.

Except as expressed in this section, AquaShield, Inc., makes no warranties, express or implied. AquaShield, Inc.'s liability shall be limited to the warranties expressed herein, and AquaShield, Inc., shall not be liable for any direct or consequential damages, including loss of use, which customers may suffer.

This Limited Warranty shall not apply to any products which are abused or misused.

Independent Sales Agent is not and cannot represent itself as an employee of AquaShield, Inc., and shall not make any representations or warranties on behalf of AquaShield, Inc. Independent Sales Agent will not assume or create any obligation on behalf of AquaShield, Inc., other than as evidenced by this Limited Warranty.

This Limited Warranty shall be construed and interpreted in accordance with the laws of the State of Tennessee, and any claim or cause of action relating to any of AquaShield's products or installations shall be brought in a state of federal court in Hamilton County, Tennessee, and the parties agree that the exclusive venue for any such action shall be in said courts.

APPENDIX F



Laboratory Testing of the Aqua-Swirl[®] Stormwater Treatment System Model AS-3s for Trash Retention



Prepared by:

AquaShieldTM, Inc.
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Chattanooga, Tennessee 37343
(888) 344-9044
Fax (423) 826-2112
www.aquashieldinc.com

March 28, 2017

Aqua-Swirl[®] Model AS-3 Trash Retention Testing

The purpose of this report is to provide documentation of laboratory testing methodologies and results of trash retention testing for the AquaShield[™], Inc. (AquaShield[™]) Aqua-Swirl[®] Stormwater Treatment System. A full scale, commercially available Aqua-Swirl[®] Model AS-3s was tested in the presence of an independent observer to assess its capability of retaining gross solids (trash) commonly found in stormwater runoff. Results of this testing program confirm that the Aqua-Swirl[®] qualifies as a full-capture device under the California Trash TMDL.

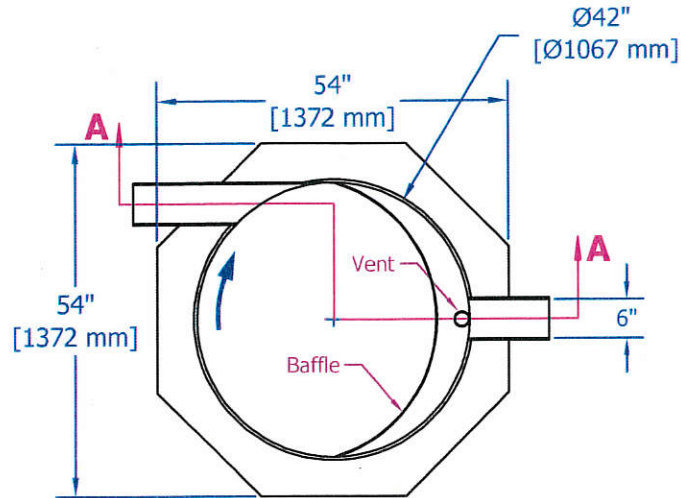
1.0 TEST UNIT DESCRIPTION

1.1 General Information

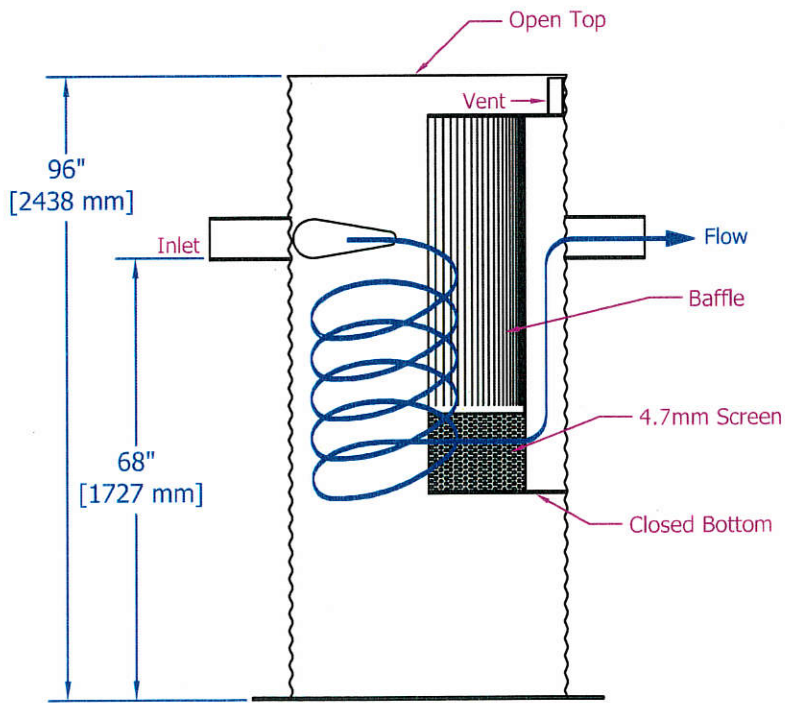
Aqua-Swirl[®] technology is well known in the stormwater community for its ability to remove suspended sediment. The prestigious New Jersey Corporation for Advanced Technology (NJCAT) has verified Aqua-Swirl[®] technology in both laboratory and field (TARP Tier II) testing programs. In addition, the Aqua-Swirl[®] has been issued both Laboratory Certification and Field Test Certification by the New Jersey Department of Environmental Protection (NJDEP).

The Aqua-Swirl[®] Model AS-3s system relies on a combination of vortex-type hydrodynamic separation processes and an internal screen. A drawing of the AS-3s test unit is shown below in **Figure 1** which includes a depiction of the flow path through the system. This test unit is constructed of polymer coated steel (PCS) that includes a 4.6 square foot trash retention screen to prevent material 5,000 microns (5.0 mm) and greater in size from escaping the device. The top of the AS-3s was open to facilitate testing.

Aqua-Swirl[®] models are based on vortex-type hydrodynamic separation technology that provides for the removal of suspended sediment, trash (including neutrally buoyant material) and free-floating oil using a single cylindrical chamber for both treatment and storage of captured material. The decreasing flow rate in the swirl chamber causes suspended non-buoyant material to fall out of suspension and settle to the bottom of the chamber. The tested Aqua-Swirl[®] design incorporated a 4.6 square foot, 4,700 micron (4.7 mm) mesh screen. The trash retention screen is affixed to the base of the arched baffle and extends vertically below the baffle. The base of the screen is capped horizontally and attaches to the wall of the swirl chamber to prevent trash material from escaping behind the baffle. Floatables are captured and retained on the inlet side of the arched baffle. Additional resources for the Aqua-Swirl[®] are available at <http://www.aquashieldinc.com/-aqua-swirl-resources.html>.



Plan View



Section A-A

Document:	AS-3 SHOP	Rvwed	Rvw.	Date	Rev.	Date	Description of Revision
Drawn By:	SCE						
Scale:	NTS						
Date:	01/05/16						
U.S. Patent No. 6524473 and other Patent Pending							

1.2 Mode of Operation

Operation begins when stormwater enters the Aqua-Swirl[®] through a tangential inlet pipe which produces a circular swirl (or vortex) flow pattern (**Figure 1**). Dynamic settling of material occurs within the swirl chamber during each storm event while quiescent settling takes place between storms. A combination of gravitational and hydrodynamic drag forces encourages the solids to drop out of the flow and migrate to the center of the swirl chamber where velocities are the lowest.

Water exits the Aqua-Swirl[®] by flowing through the trash screen perforations and then upward and behind the arched baffle. All water must flow through the trash screen in order to exit the device. The top of the baffle is sealed across the top of the area behind the baffle (effluent treatment channel). A vent pipe is extended up the riser to expose the back side of the baffle to atmospheric conditions thereby preventing a siphon from forming at the bottom of the baffle.

1.3 Inspection and Maintenance

Routine visual inspections are recommended to ensure that an Aqua-Swirl[®] facility provides effective functionality. Cleanout of accumulated material is necessary when trash and oil covers the majority of the water surface area such as that shown below in **Figure 2** taken from an active Aqua-Swirl[®] facility. Captured material contents may vary for each maintenance cycle which can include large polyethylene bottles, styrofoam cups and other large debris as depicted below.



Figure 2. Example of captured trash in an active Aqua-Swirl[®] site.

A vacuum truck is used to remove the accumulated materials through the open access manhole. Larger Aqua-Swirl[®] models utilize two manholes to ensure that the entire treatment and storage areas can be thoroughly cleaned. All maintenance activities can be performed from the surface without entry to the system. AquaShield[™] recommends quarterly inspections and annual cleanout events; however, site conditions will ultimately dictate those event cycles. An Aqua-Swirl[®] Inspection & Maintenance Manual is provided for all site installations. The manual is also available at <http://www.aquashieldinc.com/-aqua-swirl-resources.html>. The manual describes the technology and cleaning methods, and includes log sheets to document facility conditions and operational activities:

2.0 TEST LOOP

The test loop is a recirculation system designed to provide metered flow. **Figure 3** is an illustration of the test loop. A 10 hp pump draws tap water from a supply tank whereby influent piping is routed to the AS-3s test unit. Effluent piping from the AS-3s leads back to a separate 2,700 gallon water supply tank.

2.1 Flow

Inflow to the AS-3s test unit uses a factory calibrated Badger M-2000 flow meter. A 1-micron filter assembly manufactured by Filtra Systems, Model # FSSB-080808CSVR2, Option B is used to ensure that clean water is entering the test unit. A polyethylene 1 mm mesh opening net was placed over the opening of the effluent pipe where water discharges into the water supply tank (**Figure 4**). The purpose of the net was to catch trash material in the event that such material escaped the test unit.



Figure 4. Net at effluent pipe discharge.

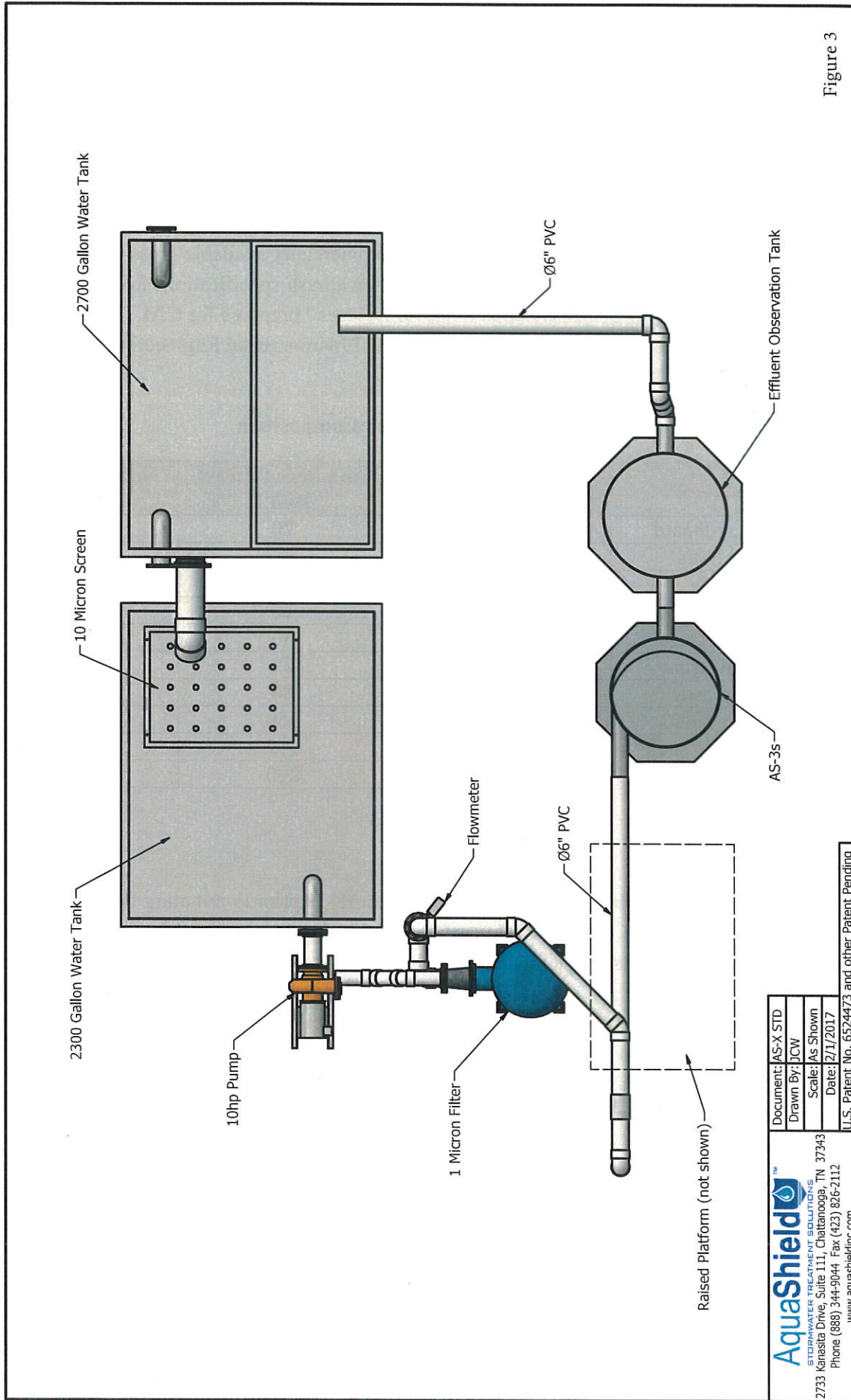


Figure 3

Document:	AS-X STD
Drawn By:	JCW
Scale:	As Shown
Date:	2/1/2017
U.S. Patent No. 6524473 and other Patent Pending	

AquaShieldSM
 STORMWATER TREATMENT SOLUTIONS
 2733 Kanesita Drive, Suite 111, Chattanooga, TN 37343
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www.aquashieldinc.com

3.0 TRASH DESCRIPTION

3.1 Trash Composition

A composition of simulated trash was prepared by AquaShield™ for this testing program. The types of trash material and number of pieces associated with each of the three performance runs are listed below in **Table 1**. Given the absence of a commercially available gross solids test material, a test composition was fundamentally based on a trash specification cited in the report titled “*Laboratory Testing of Gross Solids Removal Devices*” prepared for CALTRANS by Bassam A. Younis, Professor, Department of Civil and Environmental Engineering, UC Davis, May 2005, Report #CTSW-RT-05-73-18.1.

Table 1. Simulated Trash Composition

Type of Material	Number of Pieces Run 1	Number of Pieces Run 2	Number of Pieces Run 3
Shredded cardboard	35	70	105
Cigarette butts	250	500	750
Cloth strips	20	40	60
Aluminum foil (balls)	10	20	30
Aluminum foil (strips)	15	30	45
Plastic film strips	30	60	90
Chopped plastic	40	80	120
Styrofoam peanuts	75	150	225
Wooden popsicle sticks	56	112	168
Shredded paper	100	200	300

3.2 Trash Loading

Trash material listed in **Table 1** was preloaded into the AS-3s prior to initiating flow for each of the three performance runs. The material was contained in three separate 0.67 cubic foot containers (5 gallon buckets) to facilitate the loading process. Trash was loaded directly into the standing water of the treatment area (influent side of arched baffle and screen) for each of the three consecutive trash retention test runs. The static water level in the unit corresponds to the invert elevations of both the influent and effluent piping. Test runs were performed on a cumulative trash loading basis. That is, the second performance run included the trash volume from the first run as well as a second addition of the trash test material. Likewise, the third run included a third addition of trash material such that the previously retained material from both runs 1 and 2 were included in run 3.

4.0 TRASH RETENTION TESTING

A total of three trash retention test runs were performed at three different screen loading rates (gpm/ft²) under the direct observation of an independent observer representing AIRL, Inc. of Cleveland, Tennessee (<http://www.airlonline.com/>). AIRL holds a number of industry, state and federal certifications for analytical testing. A copy of the AIRL report for this trash retention testing program is attached hereto.

4.1 Retention Run 1 at 21 gpm/ft²

Prior to initiating retention run 1, the contents of the first 0.67 cubic feet of trash material was poured into the AS-3s and stirred to achieve a reasonably even distribution of the material across the treatment area of the swirl chamber (**Figure 5**). The pump was then activated and ramped up to 21 gpm/ft² of screen area. Run 1 was 15 minutes in duration. At the conclusion of the test run period the pump was deactivated and circulation within the swirl chamber came to a stop. No trash was observed in the effluent during the flow period nor was trash captured in the discharge net. The 2,700 gallon water tank contained no trash material.



Figure 5. Trash material preloading for run 1.

4.2 Retention Run 2 at 52 gpm/ft²

Once all residual flow from run 1 ended a second 0.67 cubic feet of trash material was added to the swirl chamber and stirred as described above (**Figure 6**). It was noted by this time that cloth strips, foil, many paper strips and a number of cigarette butts had accumulated at the base of the swirl chamber as reported by AIRL. There was still some floatables present in the swirl chamber. Flow was ramped up to 52 gpm/ft² for the second retention run. Flow was stopped after 15

minutes and circulation came to an end. Again, no trash was observed in the effluent during the flow period, nor was trash observed in the discharge net or water supply tank.



Figure 6. Trash material preloading for run 2.

4.3 Retention Run 3 at 98 gpm/ft²

After the residual circulation flow following run 2 came to an end, the third 0.67 cubic feet of trash material was added to the swirl chamber and stirred (**Figure 7**). Flow was ramped up to 98 gpm/ft² and another 15 minute flow period was conducted. No trash was observed in the effluent, the discharge net or the water tank.



Figure 7. Trash material preloading for run 3.

4.4 Trash Inventory

At the conclusion of the third retention run the AS-3s was drained of water and the trash material that had been added to the test unit was inventoried and compared to the pre-test inventory of the total trash material. **Figure 8** displays the post-testing trash material arranged according to material type. The trash inventory was identical for the pre-test and post-test material; thus, 100% of the trash that was added to the AS-3 was retained during the three performance runs.



Figure 8. Inventory of post-testing trash material arranged according to material type.

5.0 CONCLUSION

Testing was performed at the AquaShield™ laboratory facility to document the trash retention capability of a full scale, commercially available Aqua-Swirl® Model AS-3s. All testing was performed under the direction of an independent observer. In addition to the standard AS-3 configuration, the AS-3s test unit utilized a trash retention screen having an array of 4.7 mm diameter perforations. The screen extends below the inner arched baffle and is capped at the bottom to prevent trash from escaping the unit.

Three trash retention test runs of 15 minutes each (total of 45 minutes) were conducted at loading rates ranging from approximately 21 gpm/ft² to 98 gpm/ft² of screen area . The simulated trash material contained a variety of materials commonly found in stormwater runoff including cardboard, cigarette butts, cloth, aluminum foil, plastic, styrofoam, popsicle sticks and paper.

This testing program demonstrated that the Aqua-Swirl® Model AS-3s using the trash retention screen achieved full trash capture and qualifies as a full-capture device under the California Trash TMDL.

All Aqua-Swirl® systems are designed according to site-specific conditions such that the design treatment capacity is not less than the peak flow resulting from a one-year, one-hour storm in the sub-drainage area. An Aqua-Swirl® sizing chart is shown below in **Table 2**.

Table 2. Aqua-Swirl® Sizing Chart

Model	Diameter (ft)	Treatment Capacity (cfs)	Screen Area (ft ²)
AS-2	2.5	1.1	5.0
AS-3	3.5	2.1	9.6
AS-4	4.5	3.5	16.0
AS-5	5	4.4	20.2
AS-6	6	6.3	28.9
AS-7	7	8.6	39.4
AS-8	8	11.2	51.3
AS-9	9	14.2	65.0
AS-10	10	17.5	80.1
AS-11*	11	21.2	97.1
AS-12*	12	25.2	115.4
AS-13*	13	29.6	135.6
AS-XX**	Custom		

6.0 APPLICANT PROFILE

AquaShield™, Inc. manufactures stormwater treatment systems used worldwide to protect sensitive receiving waters from the harmful effects of stormwater. The commitment of AquaShield™ to provide quality environmental solutions began in the early 1980s with its founder solving surface water and groundwater contaminant issues at industrial and commercial facilities through his previously owned environmental consulting/contracting companies. The first product was a catch basin insert introduced in 1997. Subsequently, a stormwater filtration system was introduced in 1999. Early in 2000, AquaShield™ formed its corporate headquarters in Chattanooga, Tennessee and began its campaign as the vanguard for treatment of stormwater and industrial runoff for both domestic and international markets. Recognition of the increasing compliance standards for waterborne pollutants set AquaShield™ apart in a fast growing industry. AquaShield™ received patents for treatment systems that integrated hydrodynamic swirl separation technology for pretreatment with high flow filtration technology in a single device. In 2001, the patented standalone Aqua-Swirl® hydrodynamic swirl concentrator was introduced to meet the increasing requests for primary pollutant removal of sediment and floatable debris and oils.

AquaShield™ offers essential alternatives for treating stormwater and industrial runoff: the Aqua-Swirl®, the Aqua-Filter™ and the Aqua-Guardian™. Other derivatives of these core products have been adapted for customers needing further enhanced water treatment. These products distinguish themselves from other systems with their high performance, lightweight construction material, providing unmatched flexibility and adaptation to site-specific conditions. The Aqua-Swirl® and Aqua-Filter™ are available in both high density polyethylene (HDPE) and Polymer Coated Steel (PCS). Each product arrives at the project job site completely assembled and ready for installation. Leak tests are performed for every structure prior to shipment to ensure the product's integrity. A limited one year warranty applies to all AquaShield™ products.

Comprehensive information about AquaShield™ and our products is available at www.aquashieldinc.com.

Attachment: AIRL Report (1 page)

A. I. R. L. Inc.

1550 37th Street, NE, Cleveland, TN 37312
Phone: (423) 476-7766 or Fax: (423) 476-7714

Customer: AquaShield, Inc.
Reference Laboratory ID: 01/27/17 California Trash Test Observation

296201

Case Narrative:

01/27/17 I arrived at AquaShield Laboratory at 8:30am, to observe filtration testing of trash. I first observed that trash loads were in three different five gallon buckets each containing counts as follows:

- Shredded cardboard-35pcs.
- Cigarette butts-250pcs.
- Cloth strips-20pcs.
- Aluminum foil-10 balls, 15 strips
- Plastic film strips-30pcs.
- Chopped plastic-40pcs.
- Styrofoam peanuts-75pcs.
- Wooden Popsicle sticks-56pcs.
- Shredded paper-100pcs

As testing began a five gallon bucket of trash was emptied and stirred into Aqua-Swirl, a flow of 21gpm/sq.ft +/- was obtained. Flow was maintained for fifteen minutes. After the fifteen minute interval flow was stopped and circulation ended. At this time second load of trash was stirred into Aqua-Swirl and flow re-adjusted to 52gpm/sq.ft and ran for another fifteen minutes. It was noted that at this time cloth strips and foil as well as paper strips and some cigarette butts were obtained on the filter. After this fifteen minute interval the flow was stopped again and circulation ended. When all trash and water became still the third load of trash was mixed into the Aqua-Swirl. Flow was then adjusted to 98gpm.sq.ft +/- and ran for a third fifteen minute interval.

After the third and final run Aqua-Swirl was drained and trash was then counted to calculate retention.

All trash introduced into the Aqua-Swirl was retained by the filter, 100% retention of trash was achieved.

Pictures of testing observations are attached.

Thank You,
Sherry Williams, A.I.R.L



QA/QC Procedures required by the Method(s) were followed unless otherwise noted. Performance and acceptance standards for required QA/QC procedures were achieved unless otherwise noted. No significant modifications have been made to the Method(s). I attest that, based upon my inquiry of those individuals immediately responsible for reviewing the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

These results relate only to the items tested. This report shall not be reproduced except in full and with permission of this laboratory. The laboratory retains sole ownership of data until full reimbursement has been made.