STORMWATER MANAGEMENT REPORT
LOADSTAR TRAILERS
Lot 10, DODGE STREET
LUCAS POINT INDUSTRIAL PARK
TOWN OF COBOURG

Dobri Engineering Ltd.
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JULY 2, 2019

July 2, 2019

Stormwater Management Report

Loadstar Trailers are proposing to develop Lot 10 of the Lucas Point Industrial Park in the Town of Cobourg. The subject property is located on Dodge Street, near the east end of the Industrial Park. The site is presently vacant and has a total area of 2.54 ha. The property is fully serviced.

Design Criteria:

1. ***IDF DATA, YARNELL'S EQUATION***

Return Period	*Regression constants a*	*b*
2	*1778*	*13*
5	*2464*	*16*
10	*2819*	*16*
25	*3886*	*18*
50	*4750*	*24*
100	*5588*	*28*

I=a/(T+b), Where T= time of concentration

2. The Stormwater Management Planning and Design Manual, March 2003, prepared by the Ministry of the Environment

3. Runoff Coefficient of 0.30 for landscaped and vegetated areas
   Runoff Coefficient of 0.90 for paved surface, concrete and building roof
   Runoff Coefficient of 0.90 for gravel (but, allowed C=0.60)

4. Rational Method Q=CIA/360
   Where Q= peak flow (cms)
   C= runoff coefficient (0.30 for Pre-Development)
   I= rainfall intensity (mm/hr)
   A= area (hectares)

5. Geotechnical Investigation Report dated April 24, 2019 prepared by Cambium Inc.

The peak runoff flows were calculated for the pre-development and post-development conditions for the 2-yr through the 100-yr storm events. IDF data for Yarnell's Equation and the Rational Method were used to calculate the runoff for each of the storms.

Existing Conditions

Surface drainage from the site is directed from north to south across the site. The low point on the property is at the SE corner of the lot. Stormwater runoff is to be discharged into the existing municipal storm sewer system on Dodge Street.

The initial development of the Industrial Park included a 300mm storm sewer service pipe stub to the property from the CB on Dodge Street. The storm sewer on Dodge Street conveys stormwater south into the existing storm sewer on Thompson Street, where it is directed westerly and eventually outlets into Lake Ontario.

While the Town of Cobourg has engineering drawings for the Industrial Park (Road Construction, Storm Sewers, Sanitary Sewers and Waterworks), the Town does not have a record of the storm sewer design sheets. The Ganaraska Conservation Authority does not have any records either. A meeting was held with Town and GRCA staff on May 28, 2019 to discuss the design of the existing municipal storm sewer system. The conclusion was that stormwater discharge for the development is permitted to discharge at peak pre-development flows. That is, the peak post-development flow can not exceed the peak pre-development flow for all storms up to the 100-yr storm event.

The peak pre-development flows are tabulated below for the vacant lot.

PRE-DEVELOPMENT

t=min	*15.0*		*C=*	*0.300*	*A=*	*2.536*
	2-YR	*5-YR*	*10-YR*	*25-YR*	*50-YR*	*100-YR*
I=mm/hr	*63.50*	*79.48*	*90.94*	*117.76*	*121.79*	*129.95*
Q=cms	*0.134*	*0.168*	*0.192*	*0.249*	*0.257*	*0.275*

The peak post-development discharge must be limited 0.168 cms and 0.275 cms for the 5-yr and 100-yr storm events respectively.

Proposed Development – Quantity Control

Drawing 19-602-POST (Post Development Plan) illustrates the proposed development. Extraneous runoff from the north and onto the property will be intercepted by constructing a swale along the north property line.

Surface runoff from the site will be discharged at a controlled rate, into the existing storm sewer system.

Calculate the average runoff coefficient for Post Development conditions.

Ground Cover	Area (sq.m)	C	A x C
Grass	2933	0.3	879.9
Concrete	182	0.9	163.8
Building	1784	0.9	1605.6
Building Addition	669	0.9	602.1
Asphalt	2310	0.9	2079
Gravel	17483	0.9	15734.7
Total	25361		21065.1
Weighted C		0.83	

The Town of Cobourg uses a runoff coefficient for Industrial developments ranging from 0.50 – 0.90 as the design criteria for storm drainage systems. The average runoff coefficient calculated is within the acceptable range. The peak runoff flows for the proposed conditions are tabulated below for the various storm events, at a 15 minute time of concentration.

POST-DEVELOPMENT

t=min	*15.0*		*C=*	*0.83*	*A=*	*2.536*	
		2-YR	*5-YR*	*10-YR*	*25-YR*	*50-YR*	*100-YR*
I=mm/hr		*63.50*	*79.48*	*90.94*	*117.76*	*121.79*	*129.95*
Q=cms		*0.372*	*0.465*	*0.532*	*0.689*	*0.713*	*0.760*

Stormwater discharge must be controlled to the 5-yr flow of 0.168 cms or less. The following tables present the calculated runoff flows and storage volumes required for the 5-yr and 100-yr storm events.

5-YEAR TOTAL FLOW

AREA	***2.536***		Discharge control		0.168
TIME	INT (I)	Qp	RUNOFF VOL	DISCHAR	STOR VOL
(min)	(mm/hr)	(cms)	(m3)	VOL (m3)	(m3)
10	*94.77*	*0.555*	332.7	100.8	231.9
15	*79.48*	*0.465*	418.6	151.2	267.4
16	*77.00*	*0.451*	432.5	161.3	271.3
18	*72.47*	*0.424*	458.0	181.4	276.6
20	*68.44*	*0.400*	480.6	201.6	279.0
22	*64.84*	*0.379*	500.8	221.7	**279.1**
24	*61.60*	*0.360*	519.0	241.9	277.1
26	*58.67*	*0.343*	535.5	262.1	273.5
28	*56.00*	*0.328*	550.5	282.2	268.3
30	*53.57*	*0.313*	564.2	302.4	261.8
40	*44.00*	*0.257*	617.9	403.2	214.8
50	*37.33*	*0.218*	655.4	503.9	151.4
60	*32.42*	*0.190*	683.0	604.7	78.2

In order to control the peak discharge to the 5-yr peak pre-development flow of 0.168cms, 279.1 cu.m of runoff storage is required.

For the 100-yr storm event, the storage requirements are presented in the following table.

STORAGE CALCULATIONS

100-YEAR TOTAL FLOW

AREA	***2.536***		Discharge control		0.1680	
	TIME	INT (I)	Qp	RUNOFF VOL	DISCHAR	STOR VOL
	(min)	(mm/hr)	(cms)	(m3)	VOL (m3)	(m3)
	10	*147.05*	*0.860*	516.3	100.8	415.5
	20	*116.42*	*0.681*	817.4	201.6	615.9
	30	*96.34*	*0.564*	1014.8	302.4	712.4
	40	*82.18*	*0.481*	1154.0	403.2	750.9
	42	*79.83*	*0.467*	1177.1	423.3	753.8
	44	*77.61*	*0.454*	1198.9	443.5	755.4
	46	*75.51*	*0.442*	1219.5	463.6	**755.9**
	48	*73.53*	*0.430*	1239.1	483.8	755.3
	50	*71.64*	*0.419*	1257.6	503.9	753.7
	60	*63.50*	*0.372*	1337.6	604.7	732.9
	70	*57.02*	*0.334*	1401.3	705.5	695.8
	80	*51.74*	*0.303*	1453.2	806.3	646.9
	90	*47.36*	*0.277*	1496.3	907.1	589.2

In order to control the peak discharge to the 5-yr peak pre-development flow of 0.168cms, 755.9 cu.m of runoff storage is required.

SWM facility storage will be provided along the south property line as noted on the plan. The maximum storage required is 755.9 cu.m for the 100-yr storm event. As proposed, the maximum ponding depth in the SWM facility will be 1.0m.

The orifice equation is used to determine the outlet flow.

$$Q = CA*SQRT(2gH)$$

Where
Q= discharge (cms)
C= 0.6, orifice opening
g= 9.81 m/sec/sec
H= water head (water elevation – centre of orifice elevation)

For the major storm event, at a maximum depth of 1.0m, H=0.85m), the orifice must have a 295mm diameter opening to control the discharge to 0.168 cms. The peak discharge from the proposed development will not exceed the peak Pre-development flows for the lot in the Industrial Park.

Proposed Development – Quality Control

The Industrial Park does not have a central Stormwater Quality control facility, and as such quality control is to be provided for each individual lot.

Prior to commencing construction, a silt fence is to be installed along the east and south property lines, as noted on the Erosion and Sediment Control Plan. All temporary controls are to be maintained for the duration of construction. The temporary controls can be removed once the parking area is fully constructed and vegetation on the property is established.

Permanent stormwater quality control will be provided by installing a quality control structure on the storm sewer outlet pipe. An AquaSwirl Model AS7 BYP will provide an enhanced level of stormwater quality control for the developed site. The appendix includes the manufacturers literature, including the maintenance and operation manual for the structure.

Prepared by:

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LOT 10

CONCESSION B

PROPOSED NEW MANUFACTURING FACILITY

1,784 sq. m.
19,200 sq. ft.

FFE 85.20

OFFICE AREA

FUTURE EXPANSION
567 sq. m. (6096 sq. ft.)
6096m (200') BAY
1 - 0144m (300') BAY

FUTURE BUILDING
112 sq. m. (1200 sq. ft.)
1 - 6096m (20'0") BAY

SWM FACILITY

GATED ENTRANCE TO YARD

LOADING ZONE

ASPHALT

GRAVEL

GRASS

CHAIN LINK FENCE

SILT FENCE

BERM

CURB

DODGE ROAD

156.99m (515.06')

17.38m (57.02')

9.13m (29.95')

113.34m (371.85')

174.34m (571.98')

22.50m (40'-90")

VANCOR PROPERTY

LEGEND

- PROPERTY LINE
- DRAINAGE DIRECTION
- SILT FENCE
- ASPHALT

SURFACE AREA SUMMARY

BUILDING	1,784sq.m
FUTURE ADDITION	669sq.m
ASPHALT	2,310sq.m
GRAVEL	17,483sq.m
CONCRETE	182sq.m
LANDSCAPING	2,933sq.m
TOTAL	25,361sq.m

REV	COMMENT	DATE
3		
2		
1		

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LOADSTAR TRAILERS
POST DEVELOPMENT PLAN
DODGE STREET, LUCAS POINT
TOWN OF COBOURG, ONTARIO

SCALE: 1:750

DATE: JUNE 28/19 BY: BD

DWG. NO.: 19-602-POST

AquaShield™ STORMWATER TREATMENT SOLUTIONS

Sizing Report

2733 Kanasita Drive • Suite 111 • Chattanooga, TN 37343 • Phone: (423) 870-8888 • Fax: (423) 826-2112 • www.aquashieldinc.com

Site Information

LOADSTAR TRAILERS

Project Name: **N. Vancor on Dodge St.**

Site Area (hectacres): **2.5**

Unit Label: **OGS1**

Runoff Coeff. : **1**

Unit Location: **Cobourg, ON**

Target Removal Efficiency(%): **80% based on NJDEP**

Product Recommendation

Aqua-Swirl™ Model	Net Annual TSS Removal Efficiency	Chamber Diameter	Maximum Inside Diameter (mm)		Oil/Debris Storage Capacity	Sediment Storage Capacity
			Offline	BYP[5]		
AS-7	82.74 %	2135 mm.	457 mm.	1067 mm.	2047 L	2.52 m^3

Rainfall Information

NCDC Station[1]: **BOWMANVILLE MOSTERT** Data Range[4]: **178,059 readings taken hourly between 1966 to 2001 (~35 years)**

Rainfall Event Range (mm/hre)	Rainfall Interval Point (mm/hre)	Operating Rate (Lps/m^2)	Total Rainfall (%)	Removal Efficiency (%)[2]	Relative Efficiency(%)
02.00 - 03.00	02.50	04.86	43.17	92.34	39.86
03.00 - 04.00	03.50	06.80	20.80	88.89	18.49
04.00 - 05.00	04.50	08.74	10.34	84.80	08.77
05.00 - 06.00	05.50	10.68	07.76	80.07	06.21
06.00 - 07.00	06.50	12.63	05.01	74.70	03.74
07.00 - 08.00	07.50	14.57	03.28	68.69	02.25
08.00 - 09.00	08.50	16.51	02.26	62.04	01.40
09.00 - 10.00	09.50	18.45	01.68	54.75	00.92
10.00 - 15.00	12.50	24.28	03.78	29.06	01.10
		Total Cumulative Rainfall %:	**98.08[3]**	**Net Annual %:**	**82.74**

Sales Agent Information

Agent Name: **Dave Kanters**

Phone: **416-347-2799**

Company Name: **Soleno**

Fax:

Address: **347, 15-75 Bayly St. W.**

E-mail: **dkanters@soleno.com**

City, State Zip: **Ajax, ON L1S7K7**

Footnotes

1. Recorded as hourly precipitation rainfall data (inches), National Climatic Data Center (NCDC)
2. Based on Tennessee Tech University laboratory testing of the AquaSwirl™ Model AS-3 for OK-110 silica particles 50-125 microns(Neary, 2002)
3. 90% Rainfall Event, calculated as a cumulative percentile of individual events, www.stormwatercenter.net, sizing criteria (Center for Watershed Protection)
4. NCDC data may not be consecutive, skipping days, months and/or years in the range of dates.
5. The Aqua-Swirl™ Internal Bypass (BYP) provides full treatment of the "first flush," while the peak design storm is diverted and channeled through the main conveyance pipe. Please refer to your local representative for more information.
6. When applicable, the performance curve was adjusted via Peclet Scaling to provide estimated sizing per NJDEP PSD (d50 = 67 microns).

To receive pricing and/or technical support on the Aqua-Swirl, please contact Soleno. (www.Soleno.com)

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Email: pantoine@soleno.com

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Engineer, Technical Service
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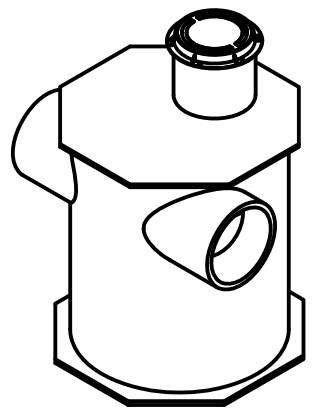
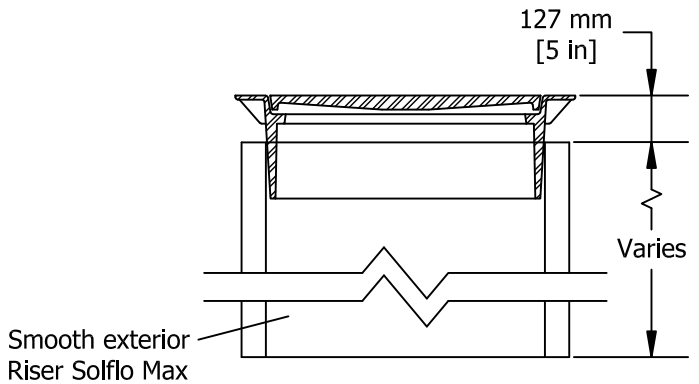
Aqua-Swirl High Density Polyethylene (HDPE)
Stormwater Treatment System



Projected View
SCALE 1:80

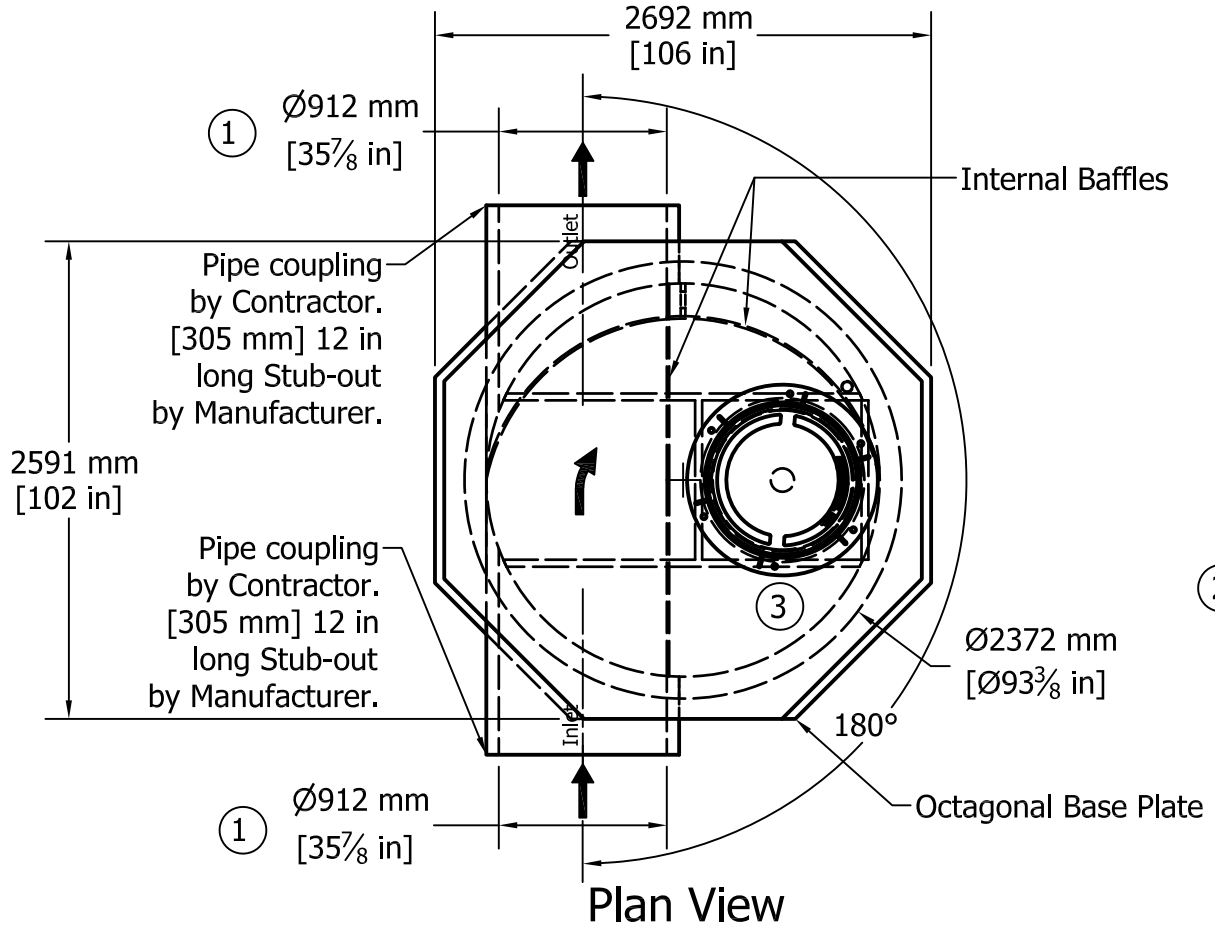
Please see accompanied Aqua-Swirl specification notes. See Site Plan for actual system orientation.
Approximate dry (pick) weight: 1700 kg [3800 lbs].



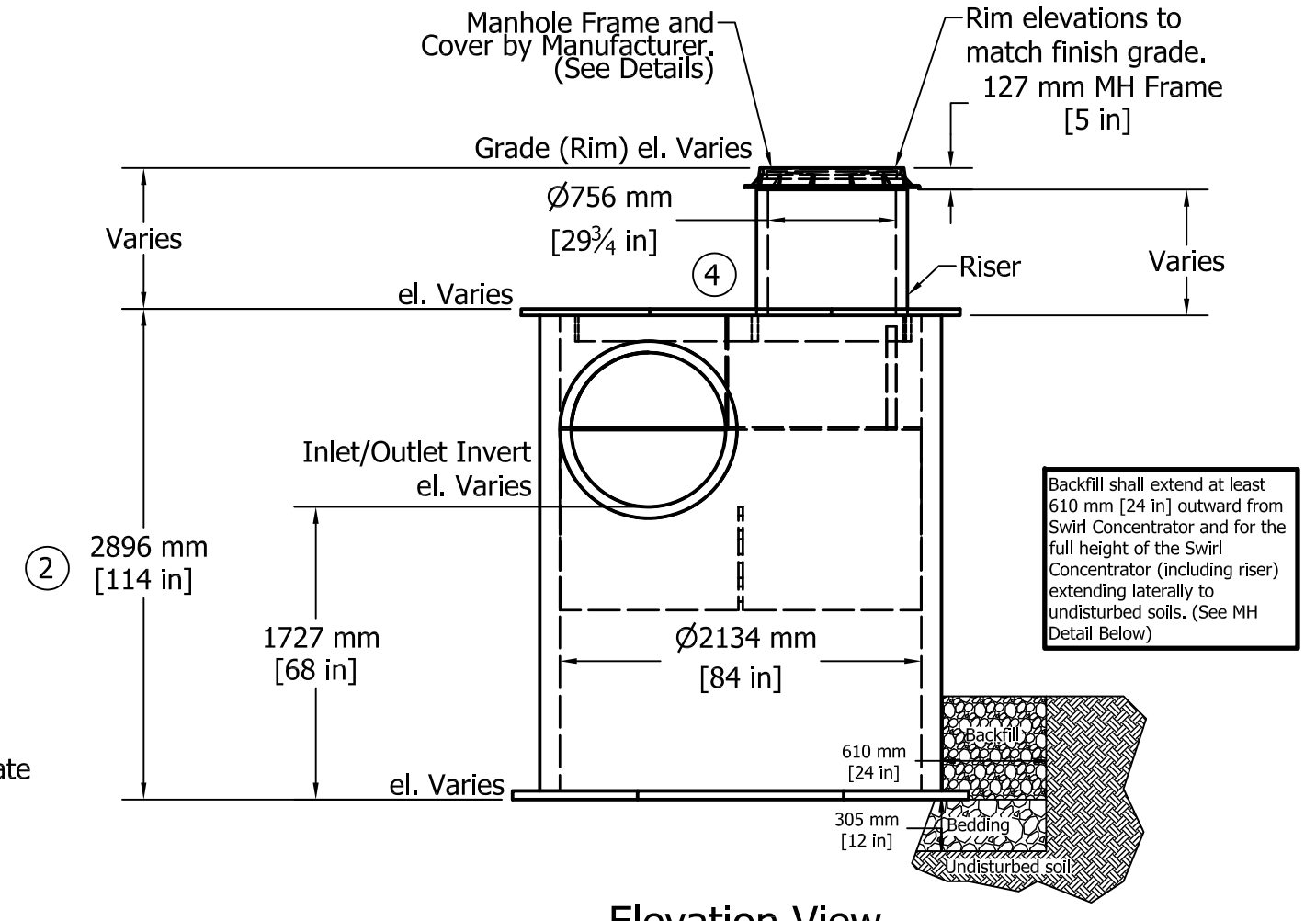
Adjustable Frame and Cover

System shall be designed for the following capacities:
Swirl Treatment Flow: 244 L/s [8.6 cfs]
Swirl Sediment Storage: 2.55 m³ [90 ft³]
Swirl Oil/Debris Storage: 2044 L [540 gal]

1. AS-7 BYP inlet/outlet pipe size ranges from 381 mm [15 in] to 1067 mm [42 in].
2. AS-7 chamber height may vary from 2413 mm [95 in] to 3099 mm [122 in], depending on inlet/outlet pipe size.
3. Orientation may vary from a minimum of 90° to a maximum of 180°.
4. A concrete relieving pad (by Contractor) is required for installation of all AS-5 to AS-11 under traffic areas or under non-traffic areas when depth of cover above top of chamber (i.e. riser length) is greater than 2.4 m [8 ft].



Plan View
SCALE 1:40



Elevation View
SCALE 1:40

AquaShield
WATER TREATMENT SOLUTIONS
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www.aquashieldinc.com

Aqua-Swirl Concentrator
AS-7 BYP CW STD

Standard Detail

Structure #:	AS-7 STD	Rvwed	Rvw. Date
Drawn By:	OFlores		
Scale:	As Shown		
Date:	3/8/2018		

Aqua-Swirl®
Stormwater Treatment System

Inspection and Maintenance Manual

AquaShield™, Inc.
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March 2014

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AquaShield™, Inc
Stormwater Treatment Solutions

The highest priority of AquaShield™, Inc. (AquaShield™) is to protect waterways by providing stormwater treatment solutions to businesses across the world. These solutions have a reliable foundation based on over 20 years of water treatment experience.

Local regulators, engineers, and contractors have praised the AquaShield™ systems for their simple design and ease of installation. All the systems are fabricated from high performance, durable and lightweight materials. Contractors prefer the quick and simple installation of our structures that saves them money.

The patented line of AquaShield™ stormwater treatment products that provide high levels of stormwater treatment include the following:

- **Aqua-Swirl® Stormwater Treatment System:** hydrodynamic separator, which provides a highly effective means for the removal of sediment, floating debris and free-oil.

- **Aqua-Filter™ Stormwater Filtration System:** treatment train stormwater filtration system capable of removing gross contaminants, fine sediments, waterborne hydrocarbons, heavy metals and total phosphorous.

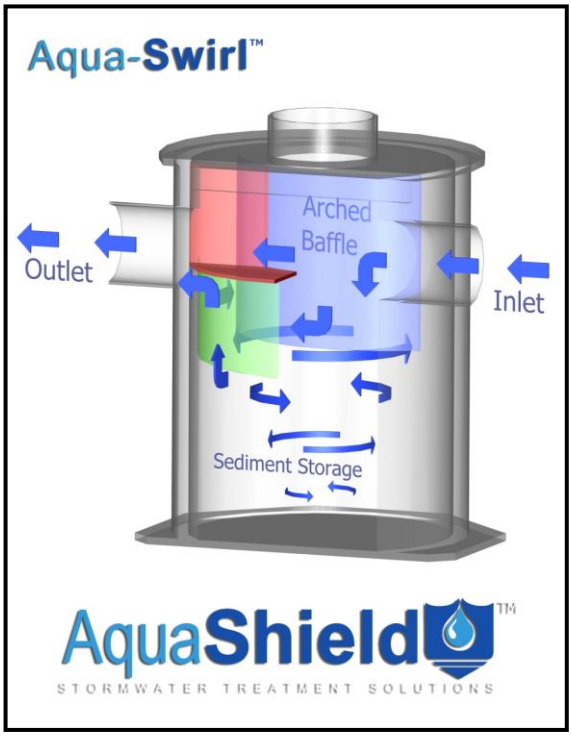
Aqua-Swirl® Stormwater Treatment System

Aqua-Filter™ Stormwater Filtration System

Aqua-Swirl® Stormwater Treatment System

The patented Aqua-Swirl® Stormwater Treatment System is a single chamber hydrodynamic separator which provides a highly effective means for the removal of sediment, free oil, and floating debris. Both treatment and storage are accomplished in the swirl chamber without the use of multiple or "blind" chambers. Independent laboratory and field performance verifications have shown that the Aqua-Swirl® achieves over 80% suspended solids removal efficiency on a net annual basis.

The Aqua-Swirl® is most commonly installed in an "off-line" configuration. Or, depending on local regulations, an "in-line" (on-line) conveyance flow diversion (CFD) system can be used. The CFD model allows simple installation by connecting directly to the existing storm conveyance pipe thereby providing full treatment of the "first flush," while the peak design storm is diverted and channeled through the main conveyance pipe.



The patented Aqua-Swirl® Stormwater Treatment System provides a highly effective means for the removal of sediment, floating debris, and free oil. Swirl technology, or vortex separation, is a proven form of treatment utilized in the stormwater industry to accelerate gravitational separation.

Floatable debris in the Aqua-Swirl®

Each Aqua-Swirl® is constructed of high performance, lightweight and durable materials including polymer coated steel (PCS), high density polyethylene (HDPE), or fiberglass reinforced polymer (FRP). These materials eliminate the need for heavy lifting equipment during installation.

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 contaminates 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.

AquaShield™ Product 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 AquaShield™ Stormwater Treatment Systems 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.

Inspection

All AquaShield™ products can be inspected from the surface, eliminating the need to enter the systems 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.

Aqua-Swirl® 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.

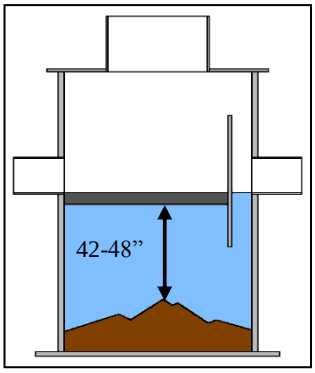
Aqua-Swirl® Inspection Procedure

To inspect the Aqua-Swirl®, a hook is 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

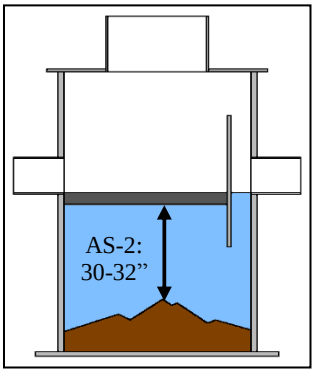
affixed inside the access riser which provides our contact information, the Aqua-Swirl® model size, and serial number.

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.

Sediment inspection using a stadia rod in a single chamber



Maintenance trigger for Aqua-Swirl® Models AS-3 through AS-13 occurs when sediment pile is 42-48 inches below water surface.



Maintenance trigger for Aqua-Swirl® Model AS-2 occurs when sediment pile is 30 to 32 inches below water surface.

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 above. 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.

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 (hidden or "blind") chambers in the Aqua-Swirl®, there are no restrictions to impede on-site maintenance tasks.

Disposal of Recovered Materials

Disposal of recovered material is typically handled in the same fashion as catch basin cleanouts. 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 truck quickly cleans the Aqua-Swirl® from a single 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. For Aqua-Swirl® Models AS-3 through AS-13, schedule cleaning if value in Step #2 is 48 to 42 inches or less.
4. For Aqua-Swirl® Model AS-2, schedule cleaning if value in Step #2 is 32 to 30 inches or less.

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 vactor 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

	Month											
Activity	**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

	Month											
Activity	**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

	Month											
Activity	**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.