

**AGREEMENT FOR
STORM WATER SYSTEM MAINTENANCE**

This Agreement for Storm Water System Maintenance (this "Agreement") is made and entered into on this 27th day of September, 2013, by and among METROPOLITAN INVESTMENT GROUP OF ROCHESTER HILLS LLC, a Delaware limited liability company ("Owner"), whose address is c/o Kaplan Papadakis & Gournis, P.C., 180 N. LaSalle Street, Suite 2108, Chicago, Illinois 60601; BANK OF AMERICA, NATIONAL ASSOCIATION, a national banking association ("Developer"), whose address is 13850 Ballantyne Corporate Place, NC2-150-03-06, Charlotte, North Carolina 28277; and the CITY OF ROCHESTER HILLS (the "City"), whose address is 1000 Rochester Hills Drive, Rochester Hills, MI 48309.

WHEREAS, Owner owns the property described in the attached Exhibit "A", having an address of 2748 S. Adams Road, Rochester Hills, Michigan (the "Property"); and

WHEREAS, Developer leases the Property from Owner pursuant to a Lease Agreement between Owner and Developer dated March 9, 2011, as subsequently amended (the "Lease"); and

WHEREAS, Developer proposes to develop the Property pursuant to the rights granted to it under the Lease; and

WHEREAS, the proposed development of the Property will alter the natural flow of surface and storm water drainage; and

WHEREAS, Developer has proposed, and the City has approved, a storm water drainage system (the "System") comprised of storm sewer pipe, catch basins, manholes, swales, roof drain pipes and cleanouts, oil and debris stop device, and a water quality treatment structure and device for the Property as described and depicted in the Storm Water System Plan attached as Exhibit "B"; and

WHEREAS, Owner has agreed that it will assume all of Developer's obligations under this Agreement upon the expiration or earlier termination of the Lease; and

WHEREAS, all of the parties will benefit from the proper operation, use, and maintenance of the system and enter into this agreement to provide for the same.

THEREFORE, the parties agree:

1. Use of the System:

Components of the System, including any and all water conveyance, and water quality treatment facilities and devices, storm sewer pipe, catch basins, manholes, oil and debris

stop device, swales, and the roof drain pipe and cleanouts shall be used solely for the purpose of conveying, and treating storm and surface drainage on the property until such time as (i) The City determines and notifies Owner and Developer or Developer's successors, grantees or assigns, in writing, that it is no longer necessary to convey or treat the storm and surface drainage; or (ii) an adequate alternative for conveying, and treating storm and surface drainage has been provided which is acceptable to the City and which includes the granting of any easements to the City or third parties as may be required or necessary for the alternative drainage system.

2. Maintenance:

- a. Developer or its successors, grantees, or assigns shall be responsible for the proper maintenance, repair, and replacement of the System and all parts thereof as detailed in the Operations and Maintenance Manual attached as Exhibit "C". In the event that Developer or its successors, grantees, or assigns fail or neglect to perform the proper maintenance, repair, and/or replacement of the System as provided herein, then Owner shall be responsible for fulfilling Developer's obligations.
- b. Proper maintenance of the System shall include, but is not limited to: (i) Removing accumulated sediment, oil/grease, trash, and debris from the catch basins, sumps, manholes, storm sewers, oil and debris stop device, and treatment structure; (ii) Managing deleterious vegetative growth; (iii) Maintaining storm sewer, structures, and safety features; (iv) Controlling the effects of erosion; (v) Inspection and cleaning of the water quality treatment device; (vi) Inspection of drainage structures and storm sewers for structural integrity; (vii) Inspection and cleaning of the storm sewer and catch basins upstream from the storm sewer outlet; and (viii) any other maintenance that is reasonable and necessary to facilitate and continue the proper operation and use of the System.

3. Action by City:

If, at any time, Developer or Developer's successors, grantees or assigns, neglect or fail to properly maintain the System or any part thereof, the City may notify both Owner and Developer or Developer's successors, grantees or assigns. The notice shall be in writing and shall list and describe maintenance deficiencies and demand that they be corrected within thirty (30) days.

The notice shall further specify a date and place for a hearing to be held at least fourteen (14) days after the date of the notice before the City Council, or such other board or official as the City Council may designate. At the hearing the City Council (or other designated board or official) may affirm or modify the list and description of maintenance deficiencies and, for good cause shown, may extend the time for the deficiencies to be corrected.

Thereafter, if the maintenance deficiencies are not corrected within the time allowed, the City may undertake the necessary corrective actions, and the City may maintain the System for up to one (1) year. Such maintenance of the System by the City shall not be construed to be a trespass or a taking of the Property, nor shall the City's actions vest in the public any right to enter or use the property. Thereafter, if Owner and Developer, or Developer's successors, grantees or assigns do not properly maintain the System, the City may, after providing similar written notice, schedule and hold another hearing to determine whether the City should maintain the System for another year, and subject to a similar notice, hearing and determination in subsequent years.

In the event the City determines an emergency condition caused by or relating to the System threatens the public health, safety or general welfare, the City shall have the right to immediately and without notice enter the Property and undertake appropriate corrective action.

4. Charges:

The City shall charge to the current owner of the Property the cost of maintenance or other corrective action undertaken by the City under this agreement, plus a ten percent (10%) administrative fee. If not timely paid, the City may place the charges on the City's tax roll, which charges shall be a lien on the real property and shall be collectable and enforceable in the same manner general property taxes are collected and enforced.

5. Notice:

Any notices required under this agreement shall be sent by certified mail or by nationally recognized overnight courier service (e.g., UPS, FedEx) to the address for each party set forth below, or to such other addresses as such party may notify the other parties in writing, and such notice shall be deemed given upon receipt or on the date delivery is first attempted:

To Developer: Bank of America, National Association
13850 Ballantyne Corporate Place
NC2-150-03-06
Charlotte, NC 28277
Attn: Lease Administration

With a copy to:

Judy L. Wilkinson, Transaction Specialist
Bank of America, National Association
1201 Main Street, 18th Floor
TX1-609-18-13
Dallas, TX 75202

To Owner: Metropolitan Investment Group Of Rochester Hills LLC
c/o Kaplan Papadakis & Gournis, P.C.
180 N. LaSalle Street, Suite 2108
Chicago, IL 60601
Attn: Dean Papadakis

To The City: City Clerk
City of Rochester Hills
1000 Rochester Hills Drive
Rochester Hills, MI 48309

- 6. Effect of Expiration of Lease; Release of Developer:** Developer, Owner, and the City expressly acknowledge and agree that Developer will be responsible for the maintenance and repair of the System as provided herein only during such time as the Lease remains in effect. Further, Owner and the City expressly acknowledge and agree that upon the expiration or earlier termination of the Lease, Developer will no longer be bound by this Agreement or the obligations placed on Developer herein, and that on the date the Lease expires or is earlier terminated, Owner (or its successors or assigns as fee simple owner of the Property) shall immediately become responsible for all of the obligations of Developer as set forth herein, and Developer will be fully released from all such obligations as of such date.

7. Successors and Assigns:

This agreement shall bind and inure to the benefit of the parties and their respective successors, grantees, and assigns. The benefits, burdens, rights, obligations and responsibilities hereunder shall run with the land and shall bind all current and future owners and, if applicable, lessees of the Property and any divisions thereof.

8. Recording of Agreement:

This agreement shall be recorded at the Oakland County Register of Deeds.

DEVELOPER:

CITY:

BANK OF AMERICA, NATIONAL ASSOCIATION, a national banking association

CITY OF ROCHESTER HILLS

By: Judy L. Wilkinson
Judy L. Wilkinson VP-16080
Its: Assistant Vice President

By: _____
Bryan K. Barnett, Mayor
By: _____
Tina Barton, Clerk

OWNER:

METROPOLITAN INVESTMENT GROUP OF ROCHESTER HILLS, LLC, a Delaware limited liability company

By: Dean J. Papadakis
Dean J. Papadakis
Its: Authorized Member

NOTARY ACKNOWLEDGMENT FOR DEVELOPER

STATE OF TEXAS

COUNTY OF DALLAS

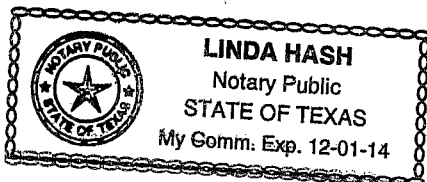
This Agreement was acknowledged before me on this 8 day of October, 2013, by Judy L. Wilkinson, the Assistant Vice President of BANK OF AMERICA, NATIONAL ASSOCIATION, a national banking association, on behalf of the association.

Linda Hash
Notary Public

John Staran
Approved 10/27/13

Dallas County, State of Texas

My commission expires: 12-01-14



NOTARY ACKNOWLEDGMENT FOR OWNER

STATE OF ILLINOIS
COUNTY OF COOK

This Agreement was acknowledged before me on this 21st day of SEPTEMBER, 2013, by Dean J. Papadakis, the Authorized Member of METROPOLITAN INVESTMENT GROUP OF ROCHESTER HILLS, LLC, a Delaware limited liability company, on behalf of the company.

[Signature]
Notary Public

Cook County, State of Illinois

My commission expires: 11-27-16



NOTARY ACKNOWLEDGMENT FOR CITY

STATE OF MICHIGAN
COUNTY OF OAKLAND

This Agreement was acknowledged before me on _____, 2013 by Bryan K. Barnett, Mayor, and Tina Barton, Clerk, of the CITY OF ROCHESTER HILLS, on behalf of the City.

Notary Public

_____ County, State of Michigan

My commission expires: _____

Approved as to form:

Rochester Hills City Attorney

Drafted by:

Amelia L. Martin, Assistant General Counsel (P64000)
Bank of America, National Association
214 N. Tryon Street, NC1-027-20-05
Charlotte, NC 28255

When Recorded Return to:

City Clerk
City of Rochester Hills
1000 Rochester Hills Drive
Rochester Hills, MI 48309

EXHIBIT "A"

1. BANK OF AMERICA BRANCH
AT ADAMS MARKETPLACE
2748 S. ADAMS ROAD
ROCHESTER HILLS, MI 48309
2. PROPERTY TAX ID NO. 70-15-30-301-040
3. LEGAL DESCRIPTION OF PROPERTY

THE LAND REFERRED TO IN THIS COMMITMENT, SITUATED IN THE COUNTY OF OAKLAND, CITY OF ROCHESTER HILLS, STATE OF MICHIGAN, IS DESCRIBED AS FOLLOWS:

PART OF THE SOUTHWEST 1/4 OF SECTION 30, TOWN 3 NORTH, RANGE 11 EAST, CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MICHIGAN, BEING MORE PARTICULARLY DESCRIBED AS: COMMENCING AT THE WEST 1/4 CORNER OF SAID SECTION 30 (AS REMONUMENTED); THENCE SOUTH 85 DEGREES 49 MINUTES 02 SECONDS WEST 1.93 FEET ALONG THE WESTERLY EXTENSION OF THE EAST AND WEST 1/4 LINE OF SAID SECTION 30 TO A PROPERTY CONTROLLING CORNER (FORMERLY DESCRIBED AS THE WEST 1/4 CORNER OF SAID SECTION 30); THENCE PROCEEDING ALONG A PROPERTY CONTROLLING LINE (AS MONUMENTED), FORMERLY DESCRIBED AS THE WEST LINE OF SECTION 30, ALSO BEING THE CENTERLINE OF OLD ADAMS ROAD (VARIABLE WIDTH) SOUTH 01 DEGREE 30 MINUTES 03 SECONDS EAST 380.18 FEET MEASURED (DUE SOUTH 380.00 FEET RECORD); THENCE NORTH 85 DEGREES 38 MINUTES 52 SECONDS EAST MEASURED (NORTH 87 DEGREES 46 MINUTES 00 SECONDS EAST RECORD) 945.60 FEET ALONG THE CENTERLINE OF A 60-FOOT WIDE INGRESS AND EGRESS EASEMENT FOR A PRIVATE ROAD KNOWN AS INDUSTRIAL DRIVE; THENCE SOUTH 02 DEGREES 02 MINUTES 36 SECONDS EAST 319.64 FEET; THENCE THE FOLLOWING TWO (2) COURSES ALONG THE NORTHERLY RIGHT-OF-WAY LINE OF SOUTH ADAMS ROAD (VARIABLE WIDTH) 1) 36.85 FEET ALONG THE ARC OF A CURVE TO THE RIGHT, RADIUS 880.00 FEET, CENTRAL ANGLE 02 DEGREES 23 MINUTES 57 SECONDS AND A CHORD THAT BEARS SOUTH 82 DEGREES 41 MINUTES 55 SECONDS EAST 36.85 FEET AND 2) SOUTH 81 DEGREES 29 MINUTES 57 SECONDS EAST 225.57 FEET TO THE POINT OF BEGINNING; THENCE NORTH 08 DEGREES 30 MINUTES 03 SECONDS EAST 210.04 FEET; THENCE SOUTH 82 DEGREES 12 MINUTES 07 SECONDS EAST 164.66 FEET; THENCE SOUTH 79 DEGREES 54 MINUTES 04 SECONDS EAST 58.24 FEET; THENCE THE FOLLOWING TWO (2) COURSES ALONG THE WEST LINE OF MARKETPLACE CIRCLE (VARIABLE WIDTH) 1) 97.91 FEET ALONG THE ARC OF A CURVE TO THE LEFT, RADIUS 530.00 FEET, CENTRAL ANGLE 10 DEGREES 35 MINUTES 04 SECONDS AND A CHORD THAT BEARS SOUTH 13 DEGREES 47 MINUTES 35 SECONDS WEST 97.77 FEET AND 2) SOUTH 08 DEGREES 30 MINUTES 03 SECONDS WEST 113.08 FEET; THENCE ALONG SAID NORTHERLY RIGHT-OF-WAY LINE OF SOUTH ADAMS ROAD NORTH 81 DEGREES 29 MINUTES 57 SECONDS WEST 213.85 FEET TO THE POINT OF BEGINNING.

4. TOTAL GROSS SITE AREA = 45,433 SQUARE FEET OR 1.043 ACRES.

Prepared by:



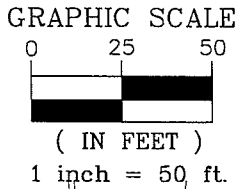
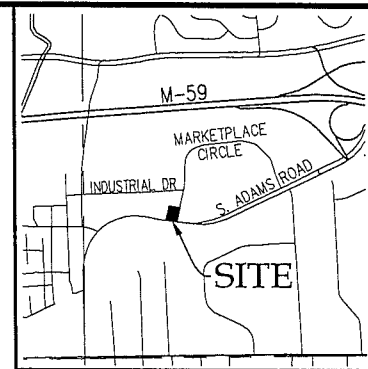
KRAFT ENGINEERING & SURVEYING, INC.
409 W. Seventh Street, Flint, MI 48503
Phone: (810) 234-2694 • FAX: (810) 234-2696
E-mail: mail@kraftengineering.com

• CIVIL ENGINEERS • SURVEYORS • LAND PLANNERS

March 7, 2013

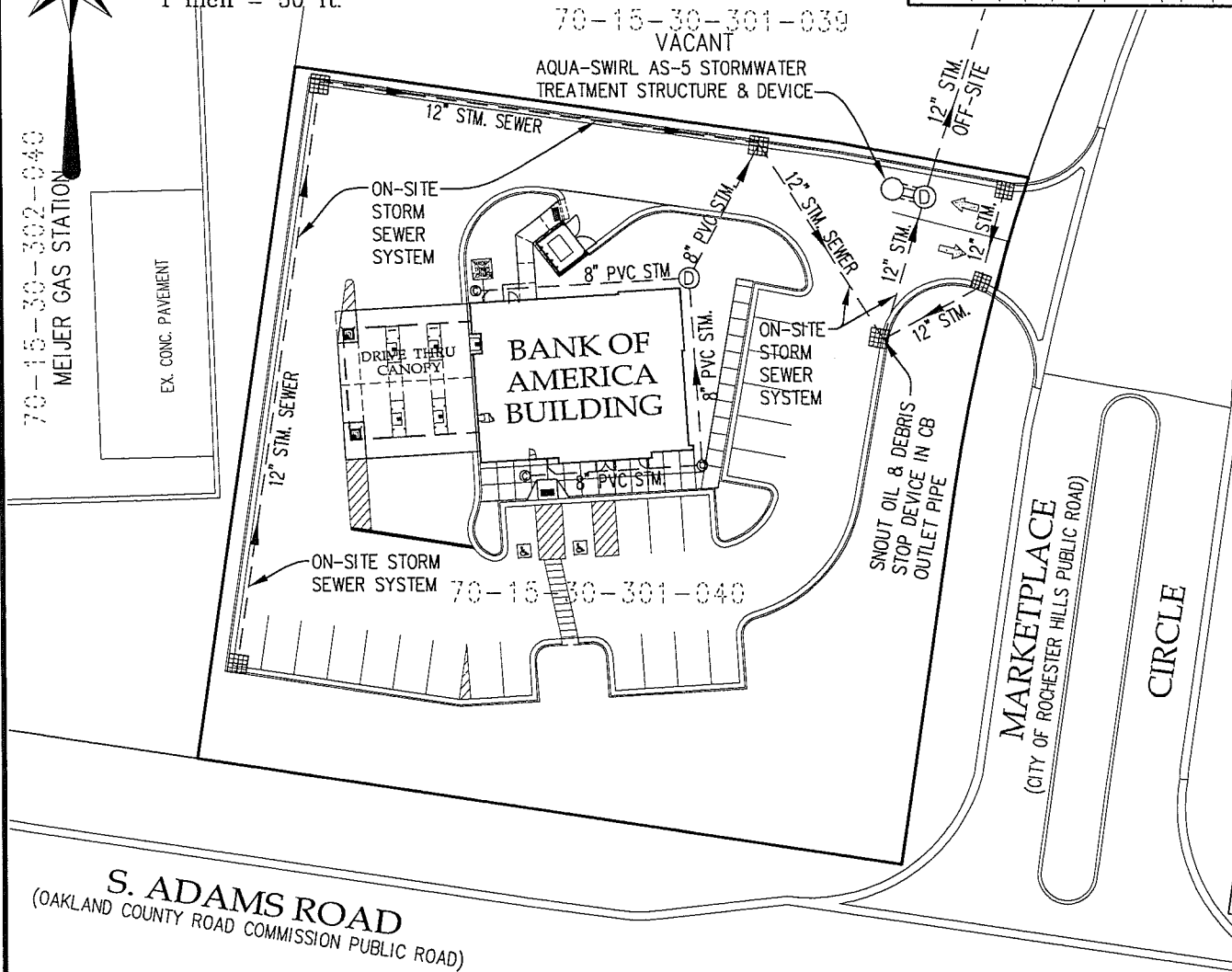
*Mike Tawnt
Approved
9/20/13*

EXHIBIT "B"
STORM WATER DRAINAGE SYSTEM PLAN FOR:
BANK OF AMERICA BRANCH
2748 S. ADAMS ROAD, ROCHESTER HILLS, MI 48309



LEGEND

- STORM CATCHBASIN (CB)
- STORM MANHOLE (MH)
- STORM SEWER (STM)



S. ADAMS ROAD
 (OAKLAND COUNTY ROAD COMMISSION PUBLIC ROAD)

MARKETPLACE
 (CITY OF ROCHESTER HILLS PUBLIC ROAD)

CIRCLE

	PREPARED FOR: JONES LANG LASALLE/BANK OF AMERICA 135 S. LASALLE, SUITE 1225, CHICAGO, IL 60601			
	PROJECT NAME: BANK OF AMERICA BRANCH 2748 S. ADAMS ROAD, ROCHESTER HILLS, MI 48309			
SCALE: 1"=50' PAGE: B-1	DRAWING NO: 201103-SW	DRN BY: RADO CKD BY: M.R.P.	DATE: 03.07.2013 REV:	
PREPARED BY: KRAFT ENGINEERING & SURVEYING, INC. engineers - surveyors - planners 409 WEST SEVENTH STREET FLINT, MICHIGAN 48503 PHONE: 810.234.2694 or 810.234.2695 FAX: 810.234.2696 E-MAIL: MAIL@KRAFTENGINEERING.COM				

EXHIBIT "C"

OPERATIONS AND MAINTENANCE MANUAL

BANK OF AMERICA BRANCH AT ADAMS MARKETPLACE
2748 S. ADAMS ROAD
ROCHESTER HILLS, MI 48309

Property Manager:

Jones Lang LaSalle Americas, Inc.
Attn: Tim Lauricella LEED Green Associate
2600 West Big Beaver; MI8-900-04-26
Troy, MI 48084

Prepared by:



KRAFT ENGINEERING & SURVEYING, INC.
409 W. Seventh Street, Flint, MI 48503
PHONE: (810) 234-2694 • FAX: (810) 234-2696
E-mail: mail@kraftengineering.com

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March 7, 2013

OPERATIONS AND MAINTENANCE MANUAL

INTRODUCTION:

This manual identifies the ownership, operation, and maintenance responsibilities for all stormwater management systems, including the underground storm sewer system, and the stormwater treatment structure and device as incorporated into and detailed on the approved Site Construction Plans as prepared by Kraft Engineering and Surveying, Inc. In order to comply with the local best management practices (BMP) and requirements, this manual should serve as a minimum performance standard. This manual should be retained intact and read in its entirety by all parties responsible for the operations and maintenance of the on-site BMP's.

PROPERTY OWNER:

Dean J. Papadakis
Kaplan, Papadakis & Gournis, P.C.
180 North LaSalle Street
Suite 2108
Chicago, IL 60601
Phone: (312) 726-0531
Fax: (312) 726-4928
E-mail: DPapadakis@KPGlaw.com

PROPERTY MANAGER:

Tim Lauricella, LEED Green Associate
Senior Property Manager
Jones Lang LaSalle Americas, Inc.
2600 West Big Beaver; MI8-900-04-26
Troy, MI 48084
Phone: (248) 764-8539
Fax: (312) 821-6579
E-mail: TimLauricella@am.jll.com

PROPERTY INFORMATION:

This Operations and Maintenance Manual covers the stormwater system located at the following subject property:

LEGAL DESCRIPTION OF PROPERTY:

THE LAND REFERRED TO IN THIS COMMITMENT, SITUATED IN THE COUNTY OF OAKLAND, CITY OF ROCHESTER HILLS, STATE OF MICHIGAN, IS DESCRIBED AS FOLLOWS:

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LEGAL DESCRIPTION OF PROPERTY CONTINUED:

MONUMENTED), FORMERLY DESCRIBED AS THE WEST LINE OF SECTION 30, ALSO BEING THE CENTERLINE OF OLD ADAMS ROAD (VARIABLE WIDTH) SOUTH 01 DEGREE 30 MINUTES 03 SECONDS EAST 380.18 FEET MEASURED (DUE SOUTH 380.00 FEET RECORD); THENCE NORTH 85 DEGREES 38 MINUTES 52 SECONDS EAST MEASURED (NORTH 87 DEGREES 46 MINUTES 00 SECONDS EAST RECORD) 945.60 FEET ALONG THE CENTERLINE OF A 60-FOOT WIDE INGRESS AND EGRESS EASEMENT FOR A PRIVATE ROAD KNOWN AS INDUSTRIAL DRIVE; THENCE SOUTH 02 DEGREES 02 MINUTES 36 SECONDS EAST 319.64 FEET; THENCE THE FOLLOWING TWO (2) COURSES ALONG THE NORTHERLY RIGHT-OF-WAY LINE OF SOUTH ADAMS ROAD (VARIABLE WIDTH) 1) 36.85 FEET ALONG THE ARC OF A CURVE TO THE RIGHT, RADIUS 880.00 FEET, CENTRAL ANGLE 02 DEGREES 23 MINUTES 57 SECONDS AND A CHORD THAT BEARS SOUTH 82 DEGREES 41 MINUTES 55 SECONDS EAST 36.85 FEET AND 2) SOUTH 81 DEGREES 29 MINUTES 57 SECONDS EAST 225.57 FEET TO THE POINT OF BEGINNING; THENCE NORTH 08 DEGREES 30 MINUTES 03 SECONDS EAST 210.04 FEET; THENCE SOUTH 82 DEGREES 12 MINUTES 07 SECONDS EAST 164.66 FEET; THENCE SOUTH 79 DEGREES 54 MINUTES 04 SECONDS EAST 58.24 FEET; THENCE THE FOLLOWING TWO (2) COURSES ALONG THE WEST LINE OF MARKETPLACE CIRCLE (VARIABLE WIDTH) 1) 97.91 FEET ALONG THE ARC OF A CURVE TO THE LEFT, RADIUS 530.00 FEET, CENTRAL ANGLE 10 DEGREES 35 MINUTES 04 SECONDS AND A CHORD THAT BEARS SOUTH 13 DEGREES 47 MINUTES 35 SECONDS WEST 97.77 FEET AND 2) SOUTH 08 DEGREES 30 MINUTES 03 SECONDS WEST 113.08 FEET; THENCE ALONG SAID NORTHERLY RIGHT-OF-WAY LINE OF SOUTH ADAMS ROAD NORTH 81 DEGREES 29 MINUTES 57 SECONDS WEST 213.85 FEET TO THE POINT OF BEGINNING.

STORMWATER MAINTENANCE EXHIBIT:

Exhibit "B" of the Stormwater Maintenance Agreement is the stormwater system plan which provides a clear presentation of all components of the stormwater system. This system is subject to the long-term operation and maintenance responsibilities detailed in this manual. The system includes:

- Storm sewer pipes
- Storm sewer structures (manholes, and catch basins)
- Roof drain pipes and cleanouts
- Pre-Treatment Device (Aqua-Swirl Concentrator Model AS-5 Horseshoe Polymer Coated Steel)
- Snout Oil and Debris Stop Device (BMP, Inc. 18R)

INSPECTIONS:

The frequency of system inspections outlined in the manual and attached exhibits should be considered the minimum, if no events warrant additional inspections. The frequency of inspections should be fine-tuned over time as system specific conditions are better known and the rate at which certain maintenance operations need to be performed is better understood. Maintenance Inspection Checklists are provided for each of the BMP's in this system. Inspections should be performed by personnel responsible for maintenance and may need to be certified for confined space entry, depending on the component being inspected. Operation of outlet control structures and pre-treatment devices may need to be inspected by a practicing civil engineer familiar with their operation.

INSPECTIONS Continued:

Records of all routine inspections and any work performed on the system for maintenance, repair, or replacement should be maintained by the Owner and kept for a minimum of ten (10) years. A copy of all records should be provided to the City of Rochester Hills Engineering plans and as-built documents, a maintenance log of work performed to the system(s) and contact information for the system inspector, civil engineer, landscape architect, geotechnical engineer, and contractor involved with the system.

STORMWATER SYSTEMS MAINTENANCE:

Regular inspection and maintenance of BMP's are necessary if these facilities are to consistently perform up to expectations. Stormwater systems are expected to perform quality and quantity control functions as long as the land use they serve exists. Failure to maintain these systems can create the following adverse impacts:

- Increased pollutants to surrounding surface water features
- Potential bodily injury and/or loss of life or property damage resulting from catastrophic failure of the facility
- Aesthetic or nuisance conditions, such as mosquitoes or reduced property values due to a degraded facility condition
- Noxious or unpleasant odors
- Flooding
- Loss of site use and business

Most of these impacts can be avoided through proper and timely inspection and maintenance. A major concern associated with these impacts is the general public's expectations related to the quality of life provided, in part, by construction of these systems. Inadequate maintenance means the general public may have a false sense of security. The most common cause of stormwater system failure is the lack of adequate and proper operation, inspection, maintenance, and management.

Good design and construction can reduce subsequent maintenance needs and costs, but they cannot eliminate the need for maintenance altogether. Maintenance requires a long-term commitment of time, money, personnel, and equipment. Monitoring the overall performance of the stormwater management system is a major aspect of any maintenance program. The maintenance responsibilities for these systems lie with the current property owner and transfer with the property in perpetuity. If maintenance of the system is not performed, the City of Rochester Hills reserves the right to enter the property and perform all necessary work at the property owner's cost. Refer to the *Agreement for Stormwater System Maintenance* for additional details.

General Maintenance Items:

Parking Lot Sweeping:

Routine sweeping of all paved surfaces provides a more attractive appearance and removes accumulations of sediment and trash that tend to migrate into stormwater management systems during rainfall events. Parking lot sweeping should be performed quarterly or as necessary to limit sediment and trash build up.

Grass Mowing and Maintenance:

Mowing requirements at a facility should be designed to the specific site conditions, grass types and seasonal variations in climate. Grassed areas require periodic fertilizing, de-thatching and soil conditioning in order to maintain healthy growth. Provisions will need to be made to reseed and reestablish grass cover in areas damaged by sediment accumulation, stormwater flow, erosion or other causes. Dead turf will need to be replaced after being discovered. Inspection of the grass areas and other landscaping features should be made annually.

Trash and Debris Removal:

Removal of trash and debris from all areas of the property should be performed monthly. Removal of these items will prevent damage to vegetated areas and eliminate their potential to enter or inhibit the operation of any of the stormwater management systems. Sediment, debris, and trash that are removed and collected should be disposed of according to Local, State, and Federal regulations at suitable disposal and/or recycling centers.

Stormwater System Maintenance Items:

The following narratives give an overview of the maintenance requirements of the different components of the stormwater system. The inspection checklists attached to this report offer a more complete listing of what should be inspected, when inspection should occur and the likely frequency of maintenance activities.

Storm Sewer and Structures:

Catch basins, inlets, manholes, and sewer pipes should be inspected to check for sediment accumulation and clogging, floatable oil or grease, floatable debris, sticks, stones, wood, cups, dead vegetation, and any other debris. The structures and sewer should also be observed during a wet weather event to ensure their proper operation. Accumulated sediment and debris should be removed on an annual basis or as needed based on observed conditions. Structural repairs or maintenance should occur as needed based on observed conditions such as cracks, spalling, joint failure, leakage, misalignment or settlement of structures. A civil engineer should be retained if problems are thought to exist.

Stormwater Pre-Treatment Device (Aqua-Swirl):

Refer to the attached maintenance manual from AquaShield Stormwater Treatment Solutions for all inspection and maintenance requirements for the Aqua-Swirl system.

Checklists:

The following page includes an inspection checklist for the various devices and components listed above. A written record of all required inspections shall be made as stipulated in the checklist. All written inspection documents shall be properly organized and filed, and they shall be readily accessible.

STORMWATER SEWER SYSTEM INSPECTION CHECKLIST

Date/Time of Inspection: _____

Inspector: _____

STORMWATER SEWER SYSTEM MAINTENANCE TASKS AND SCHEDULE

POST CONSTRUCTION MAINTENANCE ACTIVITIES (Monitoring/Inspection)	SYSTEM COMPONENTS						FREQUENCY	COMMENTS
	Catch Basins and Manholes	Snout Oil/ Debris Stop (DS2)	Storm Sewer & Root Drain Pipes	Parking Lot	Greenbelts & Land-scaping			
Inspect for floatables, sediment, oil, grease, dead vegetation, & debris	X	X	X				Annually	
Inspect for sediment and debris accumulation				X	X		Every grass mowing	
Inspect for erosion	X		X		X		Annually and after major rainfall	
Inspect all components during wet weather and compare to as-built plans					X		Annually	
Inspect inside of structures and pipes for cracks, spalling, joint failure, settlement, sagging and misalignment	X		X				Annually	
PREVENTATIVE MAINTENANCE								
Remove accumulated sediment	X		X				Annually or as needed	
Remove floatables, sediment, oil, grease, dead vegetation, & debris	X	X	X				Annually or as needed	
REMEDIAL ACTIONS								
Repair/stabilize areas of erosion					X		As needed	
Structural repairs	X		X				As needed	
Make adjustments/repairs to ensure proper functioning	X		X	X			As needed	

SUMMARY:

Inspector's Remarks: _____

Overall Condition of Facility: _____

Recommended Actions Needed: _____

Dates Any Maintenance Must Be Completed By: _____



KRAFT ENGINEERING & SURVEYING, INC.
 409 W. Seventh Street, Flint, MI 48503
 Phone: (810) 234-2694 • FAX: (810) 234-2696
 E-mail: mail@kraftengineering.com



Aqua-Swirl™
Stormwater Treatment System
Inspection and Maintenance Manual

AquaShield,™ Inc.
2705 Kanasita Drive, Chattanooga, TN 37343
Phone: (423) 870-8888
Fax: (423) 826-2112
Email: info@aquashieldinc.com

Table of Contents

Introduction / Operation / Maintenance

- **Introduction to AquaShield™ Stormwater Treatment Systems**
- **Operation of the Aqua-Swirl™ Stormwater Treatment System**
- **Inspection & Maintenance of the Aqua-Swirl™ System**
- **Appendix**
Inspection & Maintenance Data Sheet

2705 Kanasita Drive, Chattanooga, Tennessee 37343
Phone (888) 344-9044, Fax (423) 870-2112
www.aquashieldinc.com



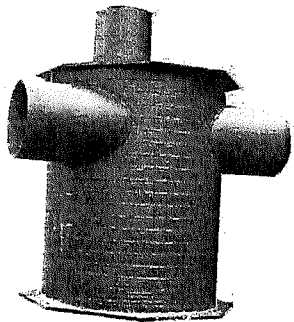
AquaShield™, Inc **Stormwater Treatment Solutions**

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.

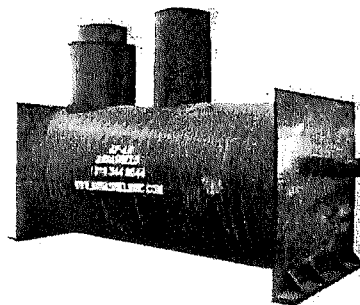
Local regulators, engineers, and contractors have praised the AquaShield™ systems for their simple design and ease of installation. All the systems are fabricated from durable, lightweight materials, and contractors prefer the quick and simple installation of our structures that saves them money.

The AquaShield™ line of patented stormwater treatment products provide for high levels of stormwater treatment:

- The ***Aqua-Swirl™ Stormwater Treatment System*** is a hydrodynamic separator, which provides a highly effective means for the removal of TSS (fine to coarse sediment), floating debris and free-oil.
- The ***Aqua-Filter™ Stormwater Filtration System*** is an treatment train stormwater filtration system capable of gross contaminant removal, and the removal of fine sediments, waterborne hydrocarbons, heavy metals (i.e. zinc) and nutrients such as phosphorous and nitrogen.



**Aqua-Swirl™ Stormwater
Treatment System**



**Aqua-Filter™ Stormwater
Filtration System**

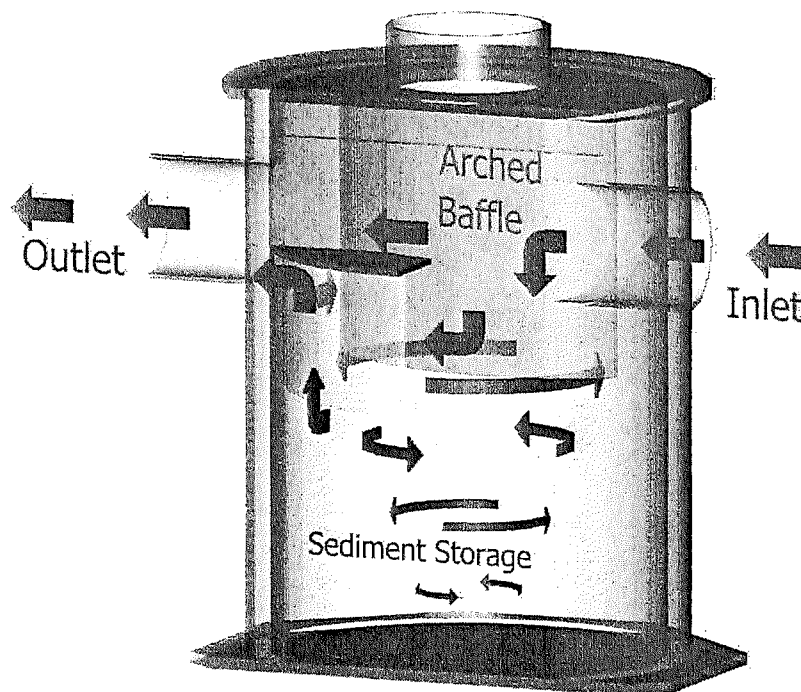


Aqua-Swirl™ Stormwater Treatment System

The patented *Aqua-Swirl™* Stormwater Treatment System is a hydrodynamic separator, which provides a highly effective means for the removal of sediment, free oil, and floating debris. Independent university laboratory performance evaluations have shown that the *Aqua-Swirl™* achieves a TSS removal of 91% calculated on a net annual basis.

The *Aqua-Swirl™*, with a conveyance flow diversion system, allows simple installation by connecting "directly" to the existing storm conveyance pipe. This connection provides full treatment of the "first flush," while the peak design storm is diverted and channeled through the main conveyance pipe.

Aqua-Swirl™

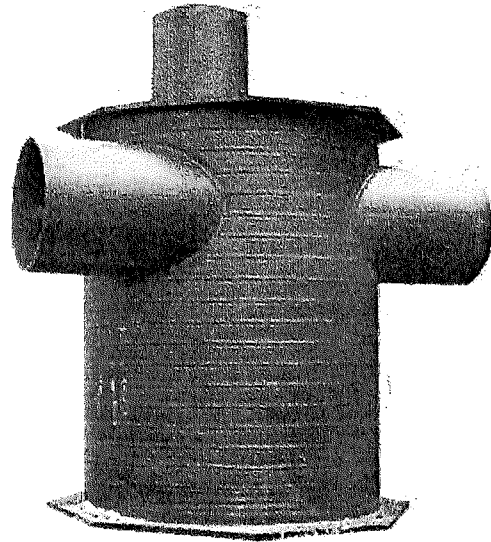


AquaShield™
STORMWATER TREATMENT SOLUTIONS



Aqua-Swirl™ Stormwater Treatment System

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. Independent university laboratory performance evaluations have shown the Aqua-Swirl™ achieves a TSS (Total Suspended Solids) removal of 91% calculated on a net annual basis. *See the "Performance and Testing" Section for more details.*



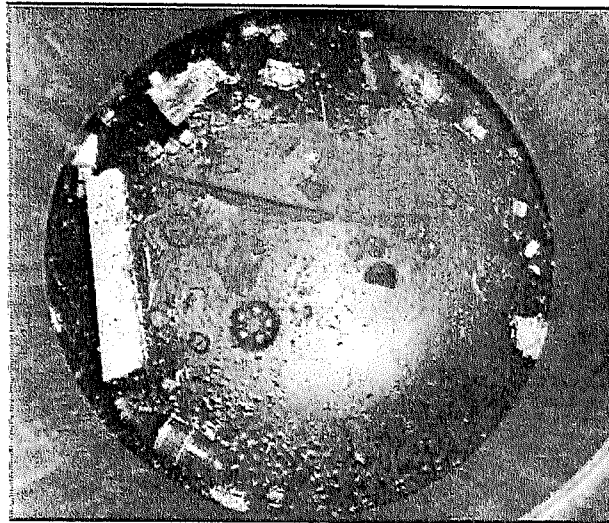
Each Aqua-Swirl™ is constructed of lightweight and durable materials, eliminating the need for heavy lifting equipment during installation. Inspection and maintenance are made easy, with oversized risers that allow for both examination and cleanout without entering the chamber.



System Operation

The Aqua-Swirl™, with a conveyance flow diversion system, provides full treatment for the most contaminated "first flush", while the cleaner peak storm flow is diverted and channeled through the main conveyance pipe. Many regulatory agencies are in the process of establishing "water quality treatment flow rates" for specific areas based on the initial migration of pollutants into the storm drainage system.

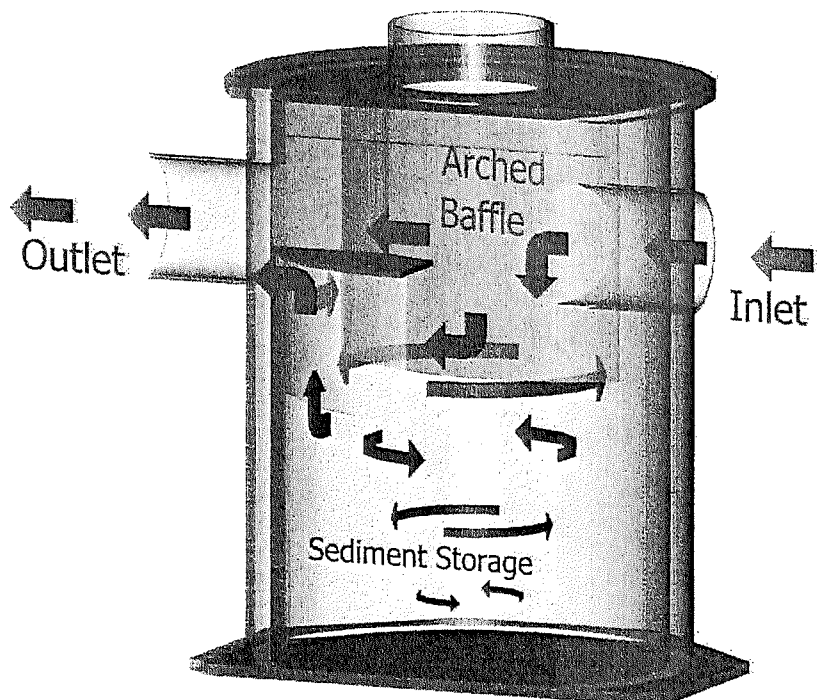
The treatment operation begins when stormwater enters the Aqua-Swirl™ through a tangential inlet pipe that produces a circular (or vortex) flow pattern that causes contaminants to settle to the base of the unit. Since stormwater flow is intermittent by nature, the Aqua-Swirl™ retains water between storm events providing both "dynamic and quiescent" settling of solids. The dynamic settling occurs during each storm event while the quiescent settling takes place



Floatable debris in the Aqua-Swirl™

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, as shown from extensive CFD modeling. See "Performance and Testing" for more details.

A large percentage of settleable solids in stormwater are reported to be small and have low settling velocities. Therefore, the volume of water retained in the Aqua-Swirl™ provides the quiescent settling that increases performance. Furthermore, due to finer sediment adhering onto larger particles (less than 200 microns), the larger particles settle, rather than staying suspended in the water.

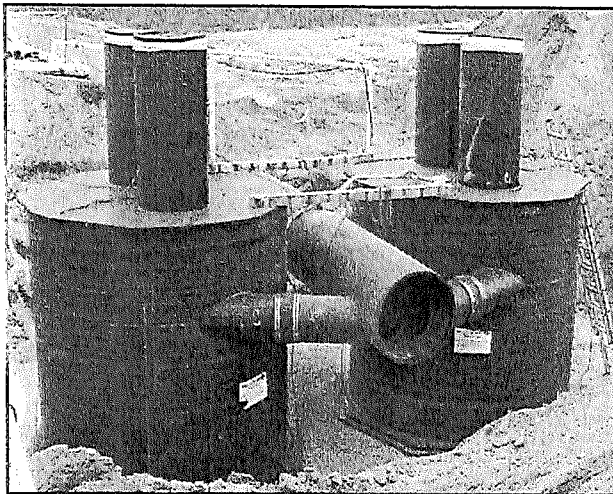


The treated flow then exits the Aqua-Swirl™ behind the arched outer baffle. The top of the baffle is sealed across the treatment channel, thereby eliminating floatable pollutants from escaping the system. A vent pipe is extended up the riser to expose the backside of the baffle to atmospheric conditions,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

As recommended by the Center for Watershed Protection and several municipalities, the Aqua-Swirl™ can also operate in an offline configuration providing full treatment of the "first flush." However, this orientation requires the installation of additional manhole structures to diverge the flow to the Aqua-Swirl™ for treatment and conveyance back to the existing main conveyance storm drainage system.



Custom Applications



Custom designed AS-9 Twin, Aqua-Swirl™

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 on the left demonstrates the flexibility of Aqua-Swirl™ installations. 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. This configuration is an example of the many ways AquaShield™ can use our products to adapt to a variety of applications.



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.



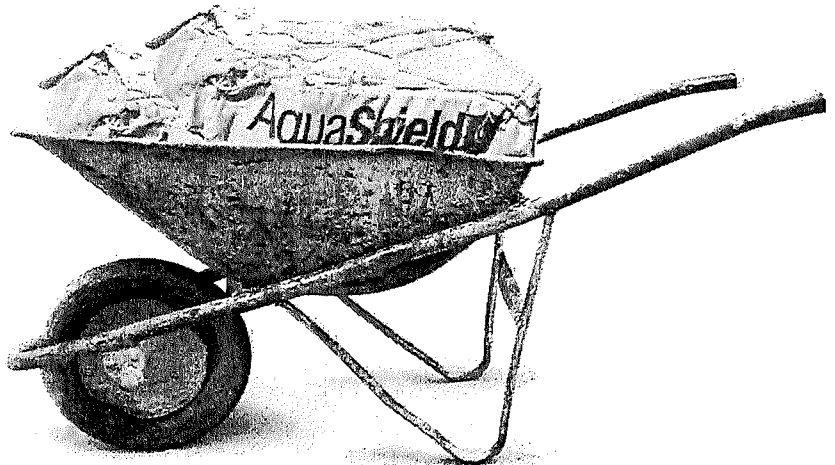
AquaShield™ Product System Maintenance

The long-term performance of the stormwater treatment structures (including manufactured systems, ponds, swales, etc.), and the effective protection of receiving waters, 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. An AquaShield™ field representative will be available as needed to assist local maintenance personnel in the field. Please contact us for a copy of a product-specific "Inspection and Maintenance Manual".



It is important that a routine inspection and maintenance program be established for each unit based on (1) the volume or load of the contaminants of concern, (2) the frequency of releases of contaminants at the facility or location, and (3) 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 of the Stormwater Treatment Systems 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 system can be inspected and maintained completely 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.

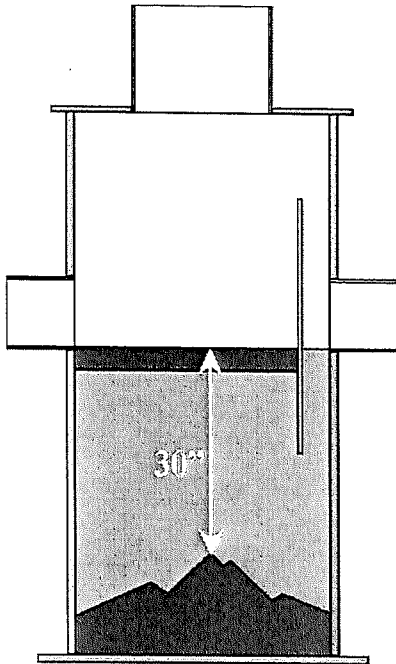
Inspection of any free-floating oil and floatable debris can be directly observed and maintained through the manhole access provided directly over the swirl chamber.

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 logo to make it easy for maintenance crews to locate the system in the field. We also provide a permanent metal information plate attached inside the access riser, which provides our contact information, the Aqua-Swirl™ model size, and serial number.



Sediment inspection
using a stadia rod



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 tremendous 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. When the sediment pile is within 30 to 36 inches of the water surface, the system should be maintained.

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. The finer sediment at the top of the pile, typically offers less resistance to the measuring device than the larger particles.

Aqua-Swirl™ Cleanout Procedure

Clean out of the Aqua-Swirl™ is simple. Free-floating oil and floatable debris can be observed and removed directly through the 30-inch service access provided.

A vacuum truck can be used to remove the accumulated sediment and debris. It is important to note that the entire sediment storage area can be reached with a vacuum hose from the surface (reaching all the sides).

Disposal of the material is typically treated in the same fashion as catch basin cleanouts. AquaShield™ recommends that all materials removed be handled and disposed of in accordance with local and state requirements.



Vacuum truck cleans the Aqua-Swirl™

Inspection Data Sheets are provided in the Appendix of this Manual.

OPERATIONS AND MAINTENANCE GUIDELINES

FOR AQUASHIELD AQUA-SWIRL POLYMER COATED STEEL (PCS) STORM WATER TREATMENT SYSTEM

AQUA-SWIRL CONCENTRATOR MODEL AS-5 HORSESHOE PCS STORM WATER TREATMENT SYSTEM

INTRODUCTION

The patented Aqua-Swirl™ Concentrator 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. Independent university laboratory performance evaluations have shown the Aqua-Swirl™ achieves a TSS (Total Suspended Solids) removal of 91% calculated on a net annual basis.

Each Aqua-Swirl™ is constructed of High-Density Polyethylene (HDPE), and is therefore modular, lightweight and durable, eliminating the need for heavy lifting equipment during installation. Inspection and maintenance are made easy, with oversized risers that allow for both examination and cleanout without entering the chamber.

OPERATIONS

As recommended by the Center for Watershed Protection and most municipalities, Aqua-Swirl systems typically operate in an off-line configuration providing full treatment of the "first flush" (or approximately 1/3) of the peak design storm diverted to our structure, as shown in the photograph. This allows roughly 90% – 95% of a site's annual runoff volume to be treated by the Aqua-Swirl. The larger portion of less frequent storm events are routed past the treatment chamber, thereby reducing turbulence within the system and eliminates the possibility of re-suspension of previously captured pollutants.

The operation begins when stormwater enters the Aqua-Swirl™ by means of its tangential inlet pipe, which induces a circular (or vortex) flow pattern. Because stormwater flow is intermittent by nature, the Aqua-Swirl™ Concentrator retains water between storm events providing both "quiescent and dynamic" settling of inorganic 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 lowest.

Given that a large percentage of settleable solids in stormwater are reported to be small and have low settling velocities, the volume of water retained in the Aqua-Swirl™ Concentrator, providing the quiescent settling, increases its performance. Further, with inorganic particle sizes less than 200 microns, the water velocity needed to promote re-suspension increases due to increasing cohesiveness of finer sediment.

The treated flow exits the Aqua-Swirl™ behind an arced baffle. The top of the baffle is sealed, thereby eliminating any possibility of floatables to escape 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.

The Aqua-Swirl Concentrator Conveyance Flow Diversion System provides full treatment for the most contaminated first flush, while the cleaner peak storm flow is diverted and channeled through the main conveyance pipe. Many regulatory agencies are establishing water quality treatment flow rates for their areas based on the initial movement of pollutants into the storm drainage system.

The operation begins when stormwater enters the Aqua-Swirl through a tangential inlet pipe which produces a circular (or vortex) flow pattern that causes contaminants to settle. Because stormwater flow is intermittent by nature, the Aqua-Swirl Concentrator retains water between storm events providing both dynamic and quiescent settling of inorganic 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, as shown from extensive CFD modeling.

A large percentage of settleable solids in stormwater are reported to be small and have low settling velocities. Therefore, the volume of water retained in the Aqua-Swirl™ Concentrator provides the quiescent settling that increases performance. Furthermore, due to finer sediment adhering onto larger particles (less than 200 microns), these larger particles settle rather than stay suspended in the water.

The treated flow exits the Aqua-Swirl™ Concentrator behind the arched outer baffle. The top of the baffle is sealed across the treatment channel, thereby eliminating any possibility of floatable pollutants to escape 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.

AQUA-SWIRL UNIT CLEANOUT

Inspection and cleanout of the Aqua-Swirl™ is simple. The chamber can be inspected and maintained completely from the surface. Free-floating oil and floatable debris can be directly observed and removed through the provided service access.

Cleanout of accumulated sediment will need to be performed when the usable sediment storage volume has been occupied. Sediment depths can easily be determined by lowering a measuring device (i.e. stadia rod) to the top of the sediment pile and to the water's surface.

A vacuum truck can be used to remove the accumulated sediment and debris. Disposal of the material is typically treated in the same fashion as catch basin cleanouts. AquaShield™ recommends that all materials removed be handled and disposed of in accordance with local and state requirements.

For further details on inspection and cleanout procedures, please see the "Inspection and Maintenance Manual" section.

Checklist

An AquaShield Inspection and Maintenance Manual Checklist is included on the following pages. A written record of all inspections shall be made and filed on an annual basis or as may be required.

Aqua-Swirl™

Inspection and Maintenance Manual for BMP Owners

(Note: Attach certifications for local regulatory authority including any applicable fees.)

Site and Owner Information

Site Name: _____ Change in ownership since last inspection Y N

Owner Name: _____

Owner Address: _____

Owner Phone Number: _____

Emergency Phone Number: _____

Location: _____

Date: _____

Time: _____

Inspector Name: _____

Maintenance Items

Inspection

Floatable Debris and Oil

1. Remove manhole lid to expose liquid surface of 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 1/2" or more oil is present (see "Cleaning" Figure 5).

Note: Water in an Aqua-Swirl™ can appear black like oil due to the dark body of the surrounding structure. Oil appears darker than water in the system and is usually accompanied by debris (e.g. Styrofoam, etc.) with obvious signs of oil stains. The depth of oil can be measured with an oil/water interface probe, a stadia rod with water phytic paste, a coliwasa, or by simply collecting a representative sample with a jar attached to a rod.

Sediment Accumulation

Make measurements as follows (see Figures 1 and 2):

1. Lower measuring device (i.e. stadia rod) into Aqua-Swirl™ through service access provided. (See Figure 2)
2. Record distance to top of sediment pile (in): _____
3. Record distance to top of water (in): _____
4. Calculate distance to sediment minus distance to water (in): _____
5. Schedule cleaning if value in step 4 is 30" or less. (See Figure 3).

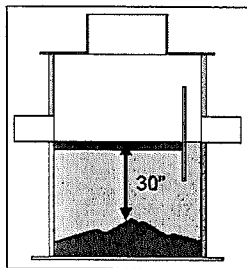


Figure 1



Figure 2

Inspection (continued)

Diversion Structures

If a diversion structure is present on the site, this should be inspected for the following items.

1. Inspect weir or other structure 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, in the case of concrete or brick weirs, or decaying if a steel weir was used.
2. Inspect diversion structure and by-pass piping for signs of structural damage or blockage from debris or sediment accumulation.
3. Measure elevations on diversion weir or piping to ensure it is consistent with site plan design.
4. Inspect downstream structure in diversion system for signs of blockage or structural failure.

Cleaning

Schedule cleaning with local vector company or AquaShield™'s Maintenance Department to remove sediments, oils, and other floatable pollutants with a vector trailer. The captured sediment generally does not require any special treatment or handling for disposal. AquaShield recommends that all materials removed during the maintenance process be handled and disposed of in accordance with local and state requirements.



Figure 3

Maintenance Schedule

During Construction

Inspect the Aqua-Swirl™ every three 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 sediment or oil storage capacity.

First Year Post-Construction

Inspect the Aqua-Swirl™ every three 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.

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, 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, the system should be inspected once every six months and cleaned as needed. The Aqua-Swirl™ should be cleaned annually regardless of whether it reaches its sediment or floatable pollutant capacity.

Bypass Structures

Bypass structures should be inspected whenever the Aqua-Swirl™ is inspected and maintained as needed.

Maintenance Company Information

Company Name: _____
Street Address: _____
City, State, Zip: _____
Contact: _____
Office Phone: _____
Mobile Phone: _____
Pager: _____



Activity Log

Date of cleaning: _____ (Next inspection should be 3 months from this date for the first year).
Time of cleaning: _____
Date of next inspection: _____
Floatable debris present (Y/N)? _____
Oil present (Y/N)? _____ Oil depth (inches): _____

Structural Conditions and Comments

Any structural damage?	Y	N	Where? _____
Any evidence of structural wear?	Y	N	Where? _____
Odors present?	Y	N	Describe: _____
Any plugging?	Y	N	Describe: _____

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 Structures (if applicable) 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.

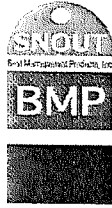
First Year Post-Construction												
Activity	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Inspect and Clean as Needed			X			X			X			X
Inspect Bypass Structures (if applicable) and Maintain As Needed			X			X			X			X
Clean System*												X*

* 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 Structures (if applicable) and 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, 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, the system should be inspected once every six months (more frequently if past history warrants) and cleaned as needed. The Aqua-Swirl™ should be cleaned annually regardless of whether it reaches its sediment or floatable pollutant capacity.



Maintenance Considerations for SNOUT® Stormwater Quality Systems

Background:

The SNOUT system from Best Management Products, Inc. (BMP, Inc.) is based on a vented hood that can reduce floatable trash and debris, free oils, and other solids from stormwater discharges. In its most basic application, a SNOUT hood is installed over the outlet pipe of a catch basin or other stormwater quality structure which incorporates a deep sump (see Installation Drawing). The SNOUT forms a baffle in the structure which collects floatable debris and free oils on the surface of the captured stormwater, while permitting heavier solids to sink to the bottom of the sump. The clarified intermediate layer is forced out of the structure through the open bottom of the SNOUT by displacement from incoming flow. The resultant discharge contains considerably less unsightly trash and other gross pollutants, and can also offer reductions of free-oils and finer solids.

As with any structural stormwater quality BMP (Best Management Practice), design and maintenance considerations will have a dramatic impact on SNOUT system performance over the life of the facility. The most important factor to consider when designing structures which will incorporate a SNOUT is the depth of the sump (the sump is defined as the depth from beneath the invert of the outlet pipe to the bottom of the structure). Simply put, the deeper the sump, the more effective the unit will be both in terms of pollutant removals and reducing frequency of maintenance. More volume in a structure means more quiescence, thus allowing the pollutant constituents a better chance to separate out. Secondly, more volume means fewer cycles between maintenance operations, because the structure has a greater capacity.

Maintenance Recommendations:

First year only recommendations:

- ❖ Monthly monitoring of a new installation after the site has been stabilized.
- ❖ Measurements should be taken after each rain event of .5 inches or more, or monthly, as determined by local weather conditions.
- ❖ Checking sediment depth and noting the surface pollutants in the structure will be helpful in planning maintenance. Rainfall volume vs. sediment and debris capture can then be plotted as an accurate predictor of service intervals.

For ongoing maintenance after first year:

- ❖ The pollutants collected in SNOUT equipped structures will consist of floatable debris, trash and oils on the surface of the captured water, and grit and sediment on the bottom of the structure.
- ❖ It is best to schedule maintenance based on the solids collected in the sump.
- ❖ Optimally, the structure should be cleaned when the sump is half full (e.g. when 2 feet of material collects in a 4 foot sump, clean it out).
- ❖ For Floatables and Trash only (with or without TrashScreen), service when 6" of floating material accumulates on surface above static water level.
- ❖ Structures should also be cleaned if a spill or other incident causes a larger than normal accumulation of pollutants in a structure.
- ❖ Maintenance is best done with a vacuum truck.
- ❖ If Bio-Skirts™ are being used in the structure to enhance hydrocarbon capture and/or bacteria removals, they should be checked on a monthly basis, and serviced or replaced when more than 2/3 of the boom is submerged, indicating a nearly saturated state. Assuming a typical pollutant-loading environment exists, Bio-Skirts should be serviced* or replaced annually.
- ❖ In the case of an oil spill, the structure should be serviced and Bio-Skirts replaced (if any) immediately
- ❖ All collected wastes must be handled and disposed of according to local environmental requirements.
- ❖ To maintain the SNOUT hoods themselves, an annual inspection of the anti-siphon vent and access hatch are recommended. A simple flushing of the vent, or a gentle rodding with a flexible wire are all that's typically needed to maintain the anti-siphon properties. Opening and closing the access hatch once a year ensures a lifetime of trouble-free service.
- ❖ To maintain TrashScreen, hose off debris from screen (if any) prior to removal of pollutants by vacuum truck.

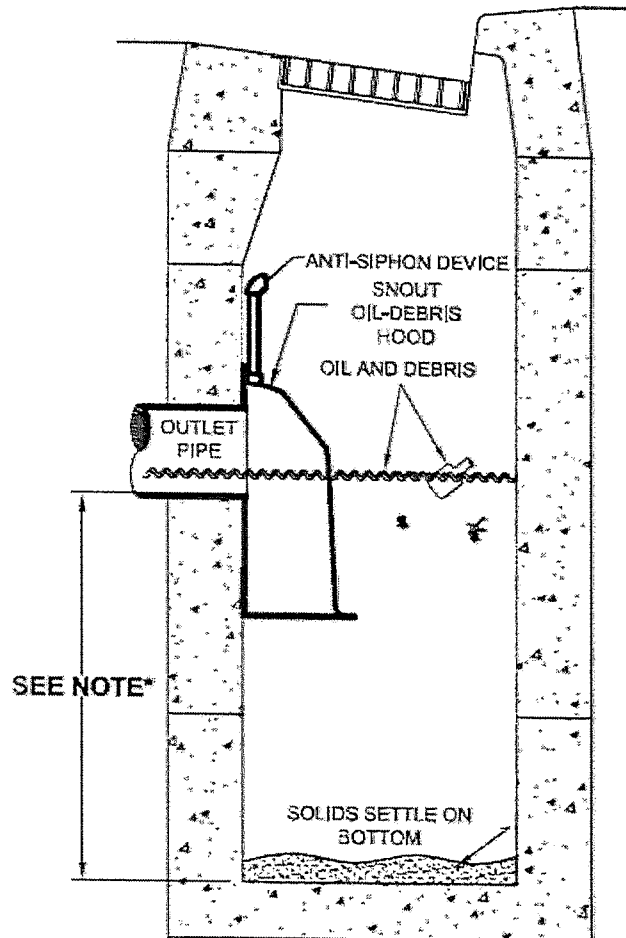
Further structural design guidelines including CAD drawings, hydraulic spreadsheets, and site inspection and maintenance field reports and installation inspection sheets are available from BMP, Inc.

*To extend the service life of a Bio-Skirt, the unit may be "wrung out" to remove accumulated oils and washed in an industrial washing machine in warm water. The Bio-Skirt may then be re-deployed as long the material maintains it's structural integrity.

Installation Drawing:



TYPICAL INSTALLATION



*NOTE- SUMP DEPTH OF 36" MIN. FOR \leq OR= 12" DIAM. OUTLET. FOR OUTLETS $>$ OR= 15", DEPTH = 2.5-3X DIAM.

Contact Information:

Please contact us if we can offer further assistance. 53 Mt. Archer Rd. Lyme, CT 06371. Technical Assistance: T. J. Mullen (800-504-8008, tjm@bmpinc.com) or Lee Duran (888-434-0277).

Website: www.bmpinc.com

The SNOUT® is protected by: US PATENT # 6126817 and CANADIAN PATENT # 2285146

SNOUT® is a registered trademark of Best Management Products, Inc.