

**AGREEMENT FOR
STORM WATER SYSTEM MAINTENANCE**

This Agreement is made on _____, by JARNA DEVELOPMENT, LLC ("Developer"), a ~~(corporation, limited liability company, partnership)~~ whose address is P.O. BOX 1733 TROY, MI 48099 and the CITY OF ROCHESTER HILLS (the "City"), whose address is 1000 Rochester Hills Drive, Rochester Hills, MI 48309.

WHEREAS, Developer owns and proposes to develop the Property described in attached Exhibit A; 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 and detention system (the "System") comprised of storm water detention and water quality treatment facilities and devices, pumping system, storm sewer pipe, catch basins, manholes, end-sections, ditches, swales, open water courses and rip-rap, for the Property as described and depicted in the Storm Water System Plan attached as Exhibit B; and

WHEREAS, 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, detention and water quality treatment facilities and devices, pumping system, storm sewer pipe, catch basins, manholes, end-sections, ditches, swales, open water courses and rip-rap, shall be used solely for the purpose of conveying, detaining and treating storm and surface drainage on the property until such time as: (i) The City determines and notifies Developer or Developer's successors, grantees or assigns, in writing, that it is no longer necessary to convey, detain or treat the storm and surface drainage; and (ii) An adequate alternative for conveying, detaining 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 shall be responsible for the proper maintenance, repair and replacement of the System and all parts thereof as detailed in the Maintenance Plan attached as Exhibit C.

B. Proper maintenance of the System shall include, but is not limited to: (i) Removing accumulated sediment, trash and debris from the detention basin and at inlet pipes; (ii) Managing deleterious vegetative growth; (iii) Maintaining storm sewer, structures, end-sections and safety features; (iv) Controlling the effects of erosion; (v) Inspection and cleaning of the water quality treatment device; (vi) Inspection of inlet and outlet pipes for structural integrity; (vii) Inspection and replacement of riprap at inlet pipes; (viii) Inspection and cleaning of the storm sewer and catch basins upstream from the detention basin; (ix) Inspection and replacement of stone around the outlet pipe; and (vi) Any other maintenance that is reasonable and necessary to facilitate and continue the proper operation and use of the System.

3. Transfer of Control to Homeowners Association:

In the event Developer or Developer's successors, grantees or assigns later transfer or convey their interest in or control over the Property and the System to a homeowners association, the association members shall each bear their prorata share of the costs of maintaining the System (including any property taxes levied thereon), which shall constitute a lien against each member's lot or parcel. This obligation shall apply to and burden the homeowners association and the association members' lots and shall run with the land regardless of whether the obligation is stated in the homeowners association's or members' deeds.

4. 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 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 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.

5. Charges:

A. 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.

B. If the System is conveyed to a homeowners association, the City shall charge the association 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. The City may, at its option, subrogate to the right of the association against the association members to recover the cost. Prior to exercising its right of subrogation, the City shall provide thirty (30) days advance written notice to the association members. Association members shall each bear their prorata share of the costs of maintaining the System (including any property taxes levied thereon). The City may place unpaid charges on the City's tax roll, which charges shall be a lien on the member's lot or parcel and shall be collectable and enforceable in the same manner general property taxes are collected and enforced. The prorated share of the costs shall be based on the ratio of each lot to the total number of lots in the development, not including lots owned by the association.

6. Notice:

Any notices required under this agreement shall be sent by certified mail to the address for each party set forth below, or to such other addresses as such party may notify the other parties in writing:

To JARNA DEVELOPMENT, LLC:

ATTN.: MR. JAMES ALLEN
P.O. BOX 1733
TROY, MI 48099

To the City:

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

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 of the Property and any divisions thereof.

8. Recording of Agreement:

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

JARNA Development, LLC a Michigan Limited Liability Company
By: [Signature]
Its: JAMES D. ALLEN, MEMBER

CITY OF ROCHESTER HILLS

By: _____
Bryan K. Barnett, Mayor

By: _____
Jane Leslie, Clerk

STATE OF MICHIGAN
COUNTY OF Oakland

This agreement was acknowledged before me on 12/15/2010, by James D Allen, Member
of Troy, Michigan

on behalf of ~~the~~ JARNA Development LLC, a Michigan Limited Liability Company

NICOLE RAO
Notary Public, State of Michigan
County of Oakland
My Commission Expires 10-05-2013
Acting in the County of Oakland

Nicole Rao
Nicole Rao, notary public
Oakland County, Michigan
My commission expires: 10/5/2013

STATE OF MICHIGAN
COUNTY OF OAKLAND

This agreement was acknowledged before me on _____, by Bryan K. Barnett, Mayor, and Jane Leslie, Clerk, of the City of Rochester Hills, on behalf of the City.

Drafted By:

Notary public
County, Michigan
My commission expires:

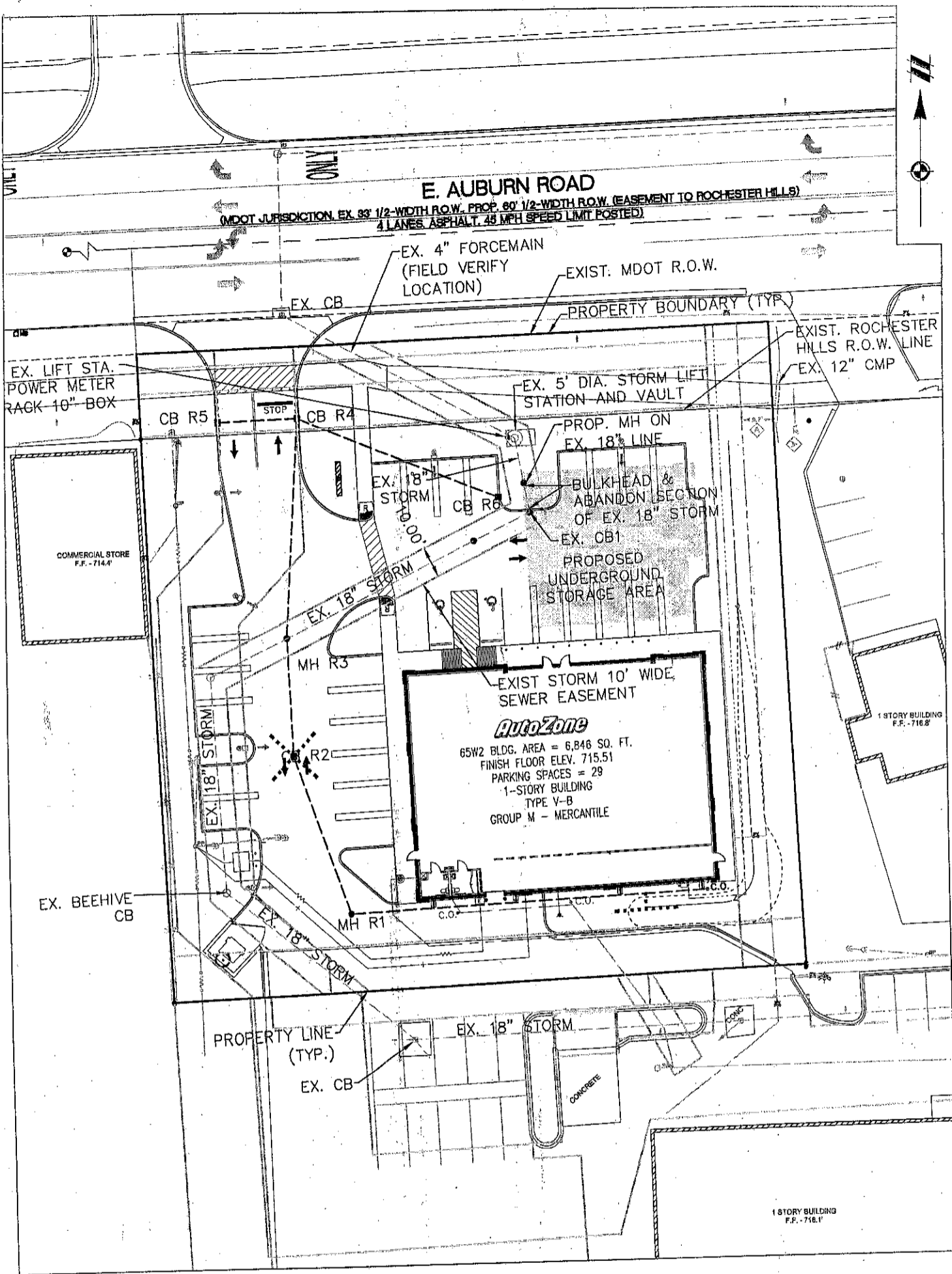
When Recorded Return to:
City Clerk
City of Rochester Hills
1000 Rochester Hills Drive
Rochester Hills, MI 48309

EXHIBIT "A"

LEGAL DESCRIPTION

THIS SURVEY DESCRIPTION DESCRIBES THE PARCEL AS DESCRIBED IN FIRST AMERICAN TITLE INSURANCE COMPANY COMMITMENT NUMBER NU504464, BEARING AN EFFECTIVE DATE JANUARY 27, 2010.

PART OF THE NORTHEAST 1/4 OF SECTION 35, TOWN 3 NORTH, RANGE 11 EAST, CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MICHIGAN, DESCRIBED AS COMMENCING AT THE NORTHEAST CORNER OF SAID SECTION; THENCE S87°48'57"W ALONG THE NORTH SECTION LINE A DISTANCE OF 391.60 FEET (RECORDED AS S87°09'50"W); THENCE S02°34'12"E A DISTANCE OF 33.00 FEET TO THE NORTHWEST CORNER OF LOT 1, "SUPERVISOR'S AVON TWP PLAT No. 7 A RESUBDIVISION OF LOTS 53 AND 54 OF BROOKLANDS" AS RECORDED IN LIBER 12 OF PLATS, PAGE 59, OAKLAND COUNTY RECORDS AND POINT OF BEGINNING; THENCE N87°48'57"E ALONG THE NORTH LINE OF SAID LOT 1 A DISTANCE OF 200.00 FEET (RECORDED AS N87°09'50"E); THENCE PARALLEL WITH THE EAST LINE OF SAID LOT 1 S02°34'12"E A DISTANCE OF 205.09 FEET (RECORDED AS S02°30'00"W); THENCE S87°48'57"W A DISTANCE OF 200.00 FEET (RECORDED AS S87°09'50"W) TO THE WEST LINE OF SAID LOT 1; THENCE N02°34'12"W ALONG SAID WEST LOT LINE A DISTANCE OF 205.09 FEET (RECORDED AS N02°30'00"W) TO THE POINT OF BEGINNING. CONTAINS 41,017 SQUARE FEET OR 0.9416 ACRES. SUBJECT TO ANY EASEMENTS, RESTRICTIONS, AND RIGHTS OF WAY OF RECORD, IF ANY.



CLIENT
AUTOZONE DEVELOPMENT CORP.

**AUTOZONE STORE
 DEVELOPMENT EXHIBIT "B"
 STORM WATER SYSTEM PLAN
 ROCHESTER HILLS, MI**

SCALE:
 1 INCH = 40 FEET

JOB: 10000952	CAD: 10000952-EX-B
DR. JTL	CH. MM
BOOK XX	PG.
SHEET 1 OF 1	DATE: 12-10-10
FILE CODE: 10000952-EX-B	

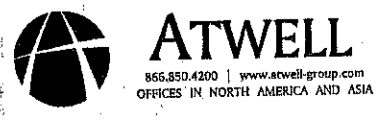


EXHIBIT "C"

OPERATIONS AND MAINTENANCE MANUAL

AUTOZONE STORE NO. 4319

STORM WATER MAINTENANCE PLAN

ROCHESTER HILLS, MI

OWNER: Jarna Development, LLC

P.O. Box 1733
Troy, MI 48099
Phone (248)-583-0030
Fax (248)-583-0031

LESSEE: AutoZone Development Corporation

123 S. Front Street
Memphis, TN 38103
Phone (901)-495-8701
Fax (901)-495-8969

Prepared by:

Atwell, LLC
Two Towne Square
Suite 700
Southfield, Michigan 48076
Phone (248)-447-2000
Fax (248)-447-2001

December 8, 2010

Operations and Maintenance Manual

AutoZone Store No. 4319
Rochester Hills, Michigan

This manual establishes the procedures for maintenance and operation of the storm water facilities including the underground detention system, storm sewer pipe and structures, storm water pump station and mechanical storm water pre-treatment devices. In order to maintain compliance of this Best Management Practice (BMP) with local regulations, this manual should serve as a minimum performance standard. This manual should be retained intact and reviewed in its entirety by all parties responsible for the maintenance of the BMP.

I. Owner

The Owner is defined as "Jarna Development, LLC"
P.O. Box 1733, Troy, MI 48099

Lessee

The Lessee is defined as "AutoZone Development Corporation."
123 S. Front Street, Memphis, TN 38103

II. Property Location

This O&M Manual covers the storm water systems located at the following subject property:

DESCRIPTION OF A 0.94 +/- ACRE PARCEL OF LAND LOCATED IN THE NORTHEAST 1/4 OF SECTION 35, T3N, R11E, CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MICHIGAN.

This survey description describes the parcel as described in First American Title Insurance Company Commitment Number NU504464, bearing an effective date January 27, 2010.

Part of the northeast 1/4 of Section 35, Town 3 North, Range 11 East, City of Rochester Hills, Oakland County, Michigan, described as commencing at the northeast corner of said section; thence S87°48'57"W along the North section line a distance of 391.60 feet (recorded as S87°09'50"W); thence S02°34'12"E a distance of 33.00 feet to the Northwest corner of lot 1, "Supervisor's Avon Twp Plat No. 7 a resubdivision of lots 53 and 54 of Brooklands" as recorded in Liber 12 of plats, Page 59, Oakland county records and point of beginning; thence N87°48'57"E along the North line of said lot 1 a distance of 200.00 feet (recorded as N87°09'50"E); thence parallel with the East line of said lot 1 S02°34'12"E a distance of 205.09 feet (recorded as S02°30'00"W); thence S87°48'57"W a distance of 200.00 feet (recorded as S87°09'50"W) to the West line of said lot 1; thence N02°34'12"W along said West lot line a distance of 205.09 feet (recorded as N02°30'00"W) to the point of beginning. contains 41,017 square feet or 0.9416 acres. Subject to any easements, restrictions, and rights of way of record, if any.

II. STORM WATER MAINTENANCE EXHIBIT

Attached to this report is the Storm Water Maintenance Exhibit which provides a visual presentation of the major components of the storm water system. Elements include the following:

1. Storm Sewer Pipe (RCP, PVC and Underdrain)
2. Storm Structures (Manholes, Catch Basins, Cleanouts and Roof Conductors)
3. Mechanical Water Quality Units
4. Pump Station
5. Underground Detention System

STORMWATER BEST MANAGEMENT PRACTICE GENERAL MAINTENANCE AND OPERATION

Regular inspection and maintenance of BMP's are necessary if these facilities are to consistently perform up to expectations. Stormwater maintenance 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 loss of life and property, resulting from catastrophic failure of the facility
- Aesthetic or nuisance problems, such as mosquitoes or reduced property value, due to a degraded facility appearance

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.

Section 1: Aesthetic, Functional, and Maintenance Best Management Practices

1. Inspection Reports

Inspections of the facility should be completed each year as well as immediately following each heavy rain event. Inspection reports should be maintained by the Lessee/Owner of the facility for all stormwater management systems and be available for review by the local agency. Inspection reports assist in ensuring that the responsible maintenance entity is adequately performing its responsibilities. The Lessee/Owner shall retain the services of a qualified individual, such as a registered civil engineer, CPSWO, NICET certified engineering technologist in stormwater system inspection or MDEQ certified stormwater operator to provide inspection and maintenance services.

Inspection reports for stormwater management systems should include the following:

- Date of inspection
- Name of inspector
- Condition of:
 - Vegetation or filter media
 - Fences or other safety devices
 - Spillways, valves, mechanical water quality structures, or pump stations
 - Embankments, slopes and safety benches
 - Reservoir, treatment areas or mechanical water quality units
 - Inlet and outlet channels or structures
 - Underground drainage and storm water detention systems
 - Sediment and debris accumulation in storage areas
 - Any nonstructural practices to the extent practicable
 - Any other item that could affect the proper functioning of the stormwater management system
 - Description of needed maintenance
 - Any concerns that may arise due to abnormal odors and/or color.

Any concerns that may require immediate action are to be reported immediately to the Lessee/Owner. The Lessee/Owner should contact the civil engineering consultant of the facility (Atwell, LLC), or other approved representative as designated by Lessee. The Lessee/Owner will retain a qualified environmental consultant to assess the site, characterize site conditions, and recommend steps of action as needed.

2. Record Keeping

The Lessee/Owner of the BMP should keep a file containing all information pertaining to repair, replacement, and maintenance of the BMP. Files should be readily accessible to parties performing maintenance on the BMP and upon request copies can be provided to the City of Rochester Hills Engineering Department.

Files should include the following:

- Operations and Maintenance Manual
- Inspections Sheets - All completed inspection sheets and blank forms
- Construction plans (as-builts if applicable) - Including grading and benchmarks
- Specifications - Storm drainage and landscaping
- Maintenance Log - Log of all inspections, repairs, and associated costs
- Contact Information – Certified Storm water operator, Licensed Civil Engineer, Geotechnical Engineer, Landscape Architect, and Contractor qualified to perform tasks.

After construction, the Lessee/Owner is responsible for coordinating BMP maintenance and submittals made to the local jurisdiction.

3. Parking Lot Sweeping

Routine sweeping of the parking lot provides a more attractive appearance to the general public. In addition accumulations of sediment and trash can be removed from the parking surface before entering the stormwater facilities. Parking lot maintenance shall be performed quarterly, and additionally as necessary.

4. Grass Maintenance and Mowing

Mowing requirements at a facility should be tailored to the specific site conditions, grass type and seasonal variation in climate. Grassed areas require limited periodic fertilizing, de-thatching and soil conditioning in order to maintain healthy growth. Provisions may have to be made to reseed and reestablished grass cover in areas damaged by sediment accumulation, stormwater flow, or other causes. Dead turf, will need to be replaced after being discovered. Local soil conservation districts or cooperative extension service offices can provide assistance in determining maintenance requirements for various types of vegetation.

5. Removal of Trash and Debris

Removal of trash and debris from paved areas, open area, and landscaped areas shall be performed weekly. Removal of trash and debris will prevent possible damage to vegetated areas and eliminate potential mosquito breeding habitats. Sediment, debris and trash that inhibit the ability of the facility to store or convey water should be removed immediately to restore proper functioning of the facility. Temporary arrangements should be made for handling the sediments until a more permanent arrangement is made. Disposal of debris and trash must comply with all local, county, State and federal waste control programs. Only suitable disposal and recycling sites should be used.

Inlet and outlet flow control structures, pump stations and mechanical water quality units of the BMP that build up sediment quickly should be cleaned out more frequently. The rate at which the sediment builds up should be something that can be calculated based on the inspection reports.

Sediment to be removed from all points of inlets and outlets, pump station of the storm sewer system, and detention pipes, by means of vacuum truck and power jetting when it is determined by inspection to have significant sediment deposits.

The minimum criteria for sediment removal is:

- any sump is 75% full, or
- when the sediment in the underground storm detention pipes reaches 3 inches or
- as outlined in the attached Storm Tech O & M Manual or
- as outlined in the attached Aqua-Swirl System Maintenance sheets or
- as determined by the certified storm water operator

6. Storm Structure Maintenance

Inspect all inlets, outfalls, trash racks, structures, piping, clean outs, roof conductors, catch basins and curb inlets semi-annually. Remove trash, debris, accumulated silt and sediment that may obstruct flow. Make minor repairs as needed. If major repairs are needed Contractor should report damage or failure to the Lessee/Owner. Minor repairs are defined as repairs that can be made during a regular maintenance event.

- a. Catch basins and curb inlets sumps and truck well drains must be cleaned by vacuum truck as needed or as required by local regulation and site conditions. Debris removed from catch basins must be disposed of in accordance with Federal, State and local regulations at an approved disposal facility.

7. Structural Elements (Underground Detention System)

- a. Structural Elements - At a minimum, Isolator Row of the underground detention system should be thoroughly inspected once a year but for the first year it should be inspected every six (6) months. Refer to the StormTech O & M Manual for Maintenance Inspections Checklist. The inspections should include the following and any additional items outlined in the StormTech O & M Manual:
 - The inside of the structure should be inspected for cracks, joint failure or leaks and sediment a minimum of once per year. If signs of cracks, leaks, misalignment, sediment build up and sagging or settlement of the structure or relay pipe are observed, a Civil Engineer or Geotechnical Engineer should be retained to determine the probable cause and recommended remediation.
 - The Isolator Row should be checked for sediment accumulation after every major storm event. Any sediment or debris removal should be removed to prevent blockage.
- b. Ground Surface - The ground surface should be inspected a minimum of once per year. Visual inspection should be done in areas where any underground storage devices are located. If there are any signs of sink holes, a Civil Engineer should be retained to determine the probable cause and recommended remediation.

8. Mechanical Water Quality Unit (Aqua-Swirl System)

- a. Mechanical Water Quality Unit - At a minimum, the structural elements of the Mechanical Water Quality Unit should be thoroughly inspected quarterly for the first year. Based on experience of the systems first year in operation, the inspection schedule can be revised to reflect the site specific conditions encountered but should continue on a semi-annual basis. Removal of sediment accumulation on an annual basis or as needed. Refer to the attached Aqua-Swirl System Maintenance sheets for inspection and maintenance procedures.

9. Storm Pump Station

- a. Storm Pump Station - At a minimum, the storm pump station which controls discharge from the detention system should be thoroughly inspected once a year by a certified technician retained by the Lessee/Owner. Several of the structural elements may need more frequent inspections. The inspections should include the following:
 - The inside of the pump station structure should be inspected for cracks, spalling, joint failure or leaks a minimum of once per year. If signs of cracks, leaks, or joint failure are observed, a Contractor or Pump Installer should be retained by the Lessee to determine the probable cause and recommended remediation.
 - The pumps, electrical and alarm system should be tested and inspected at a minimum of once per year and if any deficiencies are identified a Contractor or Pump Installer should be retained by the Lessee to determine the cause and recommend remediations.
 - The inlet/outlet pipes should be visually inspected for alignment, cracks and leaks a minimum of once per year.
 - The inside of the pump station structure should be inspected for sediment semi-annually and/or as determined by the storm water operator.

MAINTENANCE INSPECTION CHECKLIST

AutoZone No. 4319
Rochester Hills, Michigan

Date: _____ BMP Device#: _____


Time:

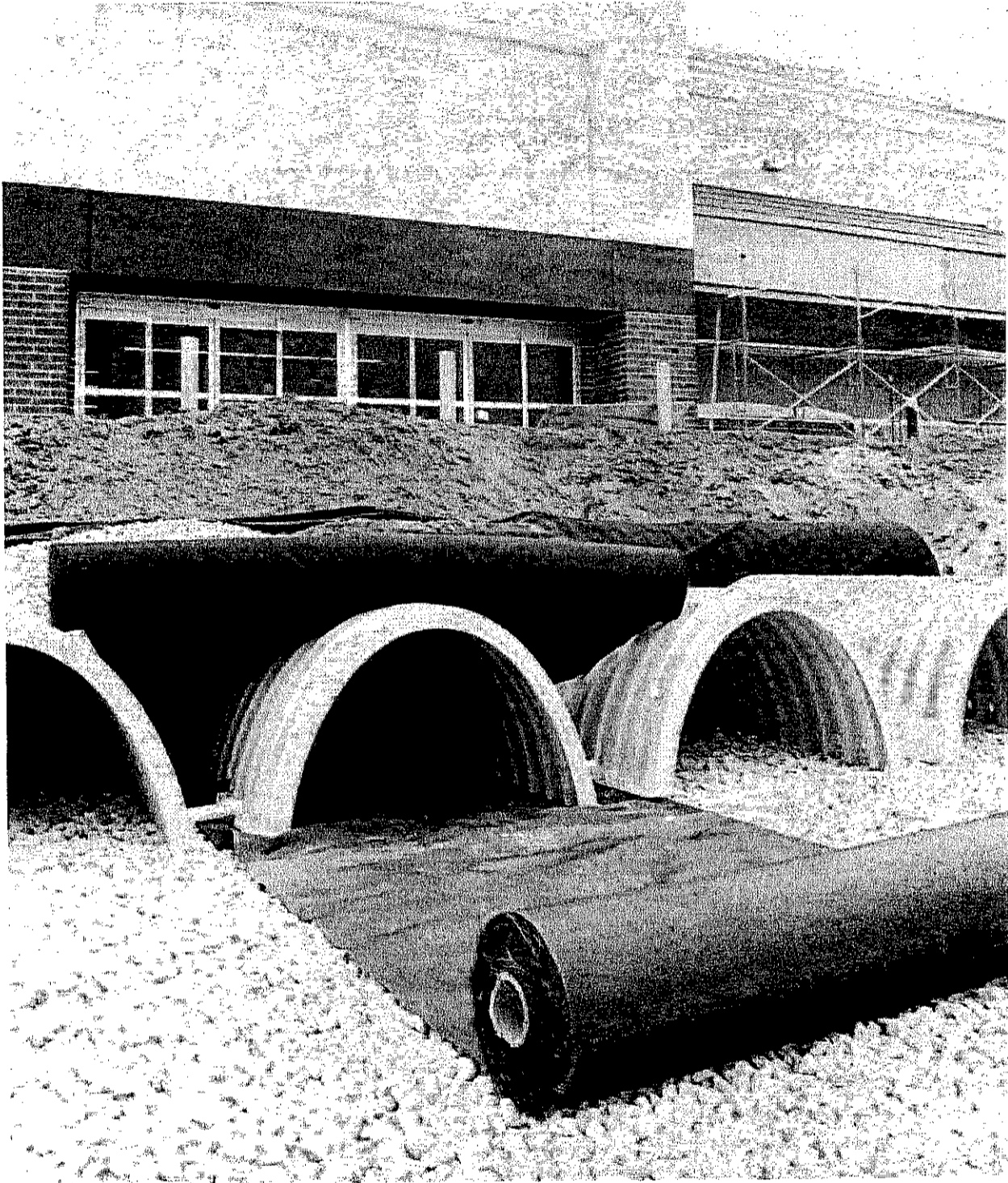
Weather Conditions:

Inspector's Name:

Site Status:

**Save Valuable Land and
Protect Water Resources**


StormTech[®]
Detention • Retention • Recharge
Subsurface Stormwater ManagementSM

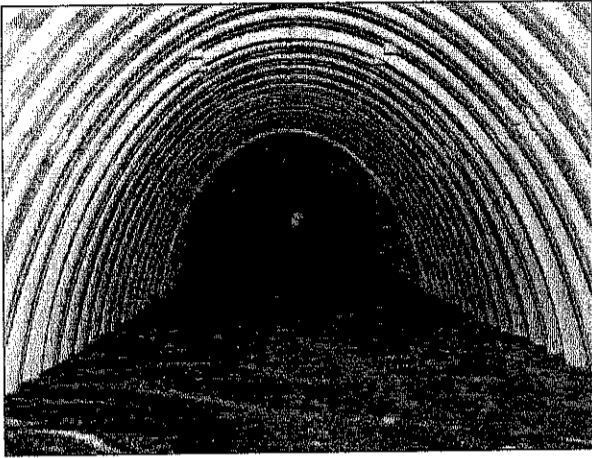


Isolator™ Row O&M Manual
StormTech[®] Chamber System for Stormwater Management

1.0 The Isolator™ Row

1.1 INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a patent pending technique to inexpensively enhance Total Suspended Solids (TSS) removal and provide easy access for inspection and maintenance.



Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.

1.2 THE ISOLATOR™ ROW

The Isolator Row is a row of StormTech chambers, either SC-310, SC-740 or MC-3500 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

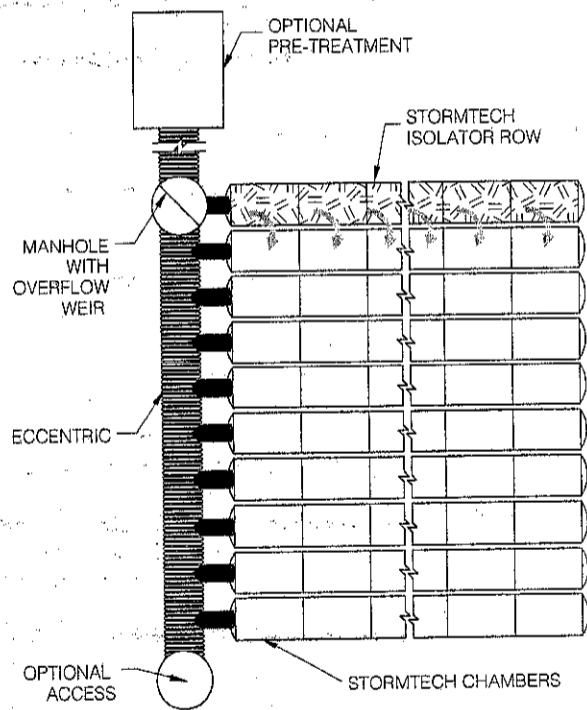
Two different fabrics are used for the Isolator Row. A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The tough geotextile provides a media for storm water filtration and provides a durable surface for maintenance operations. It is also designed to prevent scour of the underlying stone and remain intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber.

The Isolator Row is typically designed to capture the "first flush" and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole not only provides access to the Isolator Row but typically includes a high flow weir such that storm water flowrates or volumes that exceed the capacity of the Isolator Row overtop the over flow weir and discharge through a manifold to the other chambers.

The Isolator Row may also be part of a treatment train. By treating storm water prior to entry into the chamber system, the service life can be extended and pollutants such as hydrocarbons can be captured. Pre-treatment best management practices can be as simple as deep sump catch basins, oil-water separators or can be innovative storm water treatment devices. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.

StormTech Isolator Row with Overflow Spillway (not to scale)



2.1 INSPECTION

The frequency of Inspection and Maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

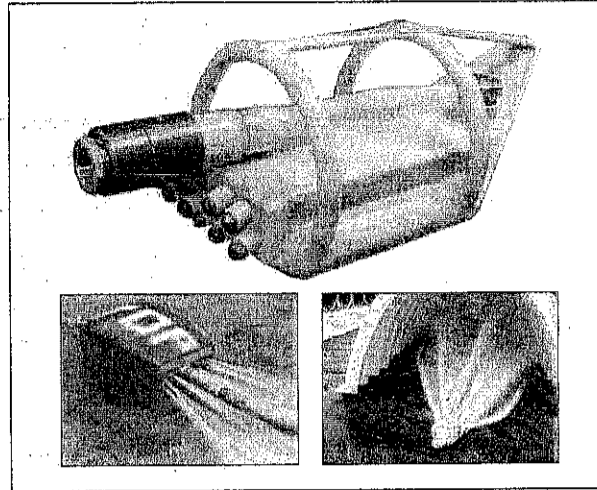
At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

2.2 MAINTENANCE

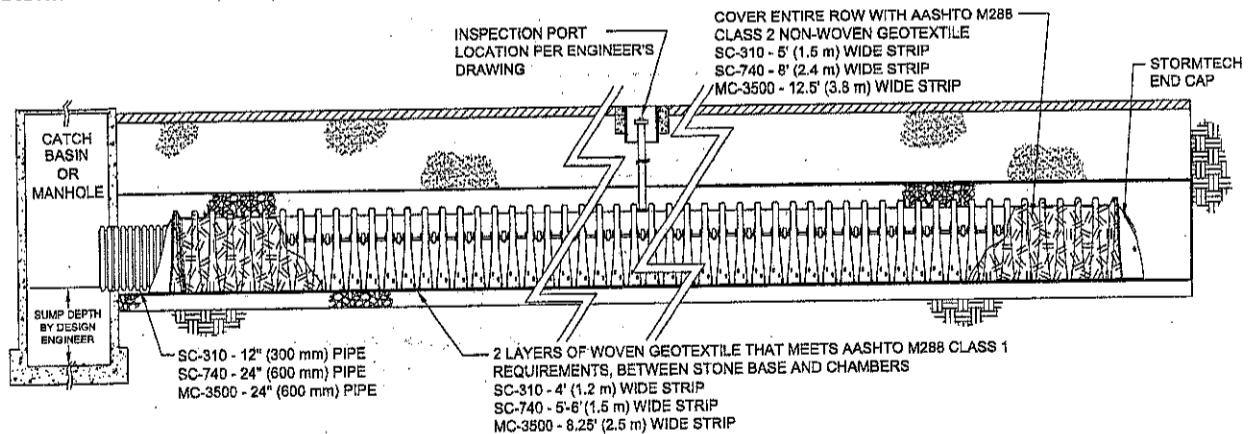
The Isolator Row was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.



Examples of culvert cleaning nozzles appropriate for Isolator Row maintenance. (These are not StormTech products.)

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row (not to scale)

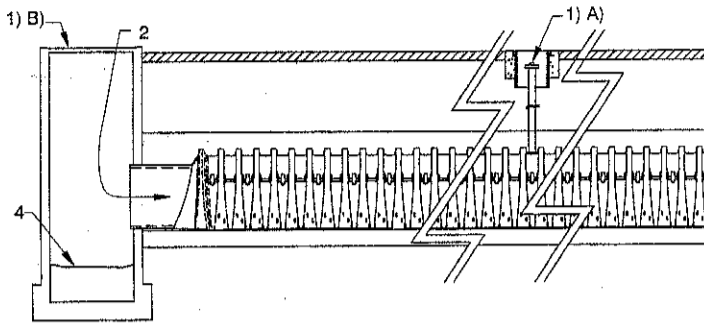


3.0 Isolator Row Step By Step Maintenance Procedures

Step 1) Inspect Isolator Row for sediment

- A) Inspection ports (if present)
 - i. Remove lid from floor box frame
 - ii. Remove cap from inspection riser
 - iii. Using a flashlight and stadia rod, measure depth of sediment and record results on maintenance log.
 - iv. If sediment is at, or above, 3 inch depth proceed to Step 2. If not proceed to step 3.

StormTech Isolator Row (not to scale)



B) All Isolator Rows

- i. Remove cover from manhole at upstream end of Isolator Row
- ii. Using a flashlight, inspect down Isolator Row through outlet pipe
 - 1. Mirrors on poles or cameras may be used to avoid a confined space entry
 - 2. Follow OSHA regulations for confined space entry if entering manhole
- iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches) proceed to Step 2. If not proceed to Step 3.

Step 2) Clean out Isolator Row using the JetVac process

- A) A fixed culvert cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
- B) Apply multiple passes of JetVac until backflush water is clean
- C) Vacuum manhole sump as required

Step 3) Replace all caps, lids and covers, record observations and actions

Step 4) Inspect & clean catch basins and manholes upstream of the StormTech system

Sample Maintenance Log

Date	Depth	Sediment	Notes	Inspector
3/15/01	6.3 ft.	none	New installation. Fixed point is CI frame at grade	djm
9/24/01	6.2	0.1 ft.	Some grit felt	sm
6/20/03		5.8'	Mucky feel, debris visible in manhole and in isolator row, maintenance due	rv
7/7/03	6.3 ft.	0	System jetted and vacuumed	djm



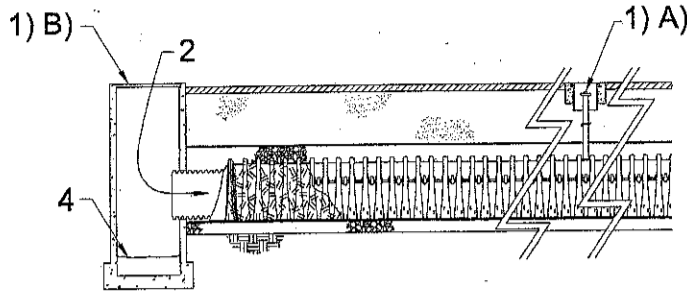
Subsurface Stormwater ManagementSM

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S090809

StormTech Isolator Row (not to scale)



Step 1) Inspect Isolator Row for sediment

- A. Inspection ports (if present)
 - I. Remove lid from floor box frame
 - II. Remove cap from inspection riser
 - III. Using a flashlight and stadia rod, measure depth of sediment and record results on maintenance log
 - IV. If sediment is at, or above, 3 inch depth proceed to Step 2, if not proceed to Step 3
- B. All Isolator Rows
 - I. Remove cover from manhole at upstream end of Isolator Row
 - II. Using a flashlight, inspect down Isolator Row through outlet pipe
 - a. Mirrors on poles or cameras may be used to avoid a confined space entry
 - b. Follow OSHA regulations for confined space entry if entering manhole
 - III. If sediment is at or above the lower row of sidewall holes (approximately 3 inches) proceed to Step 2. If not proceed to Step 3.

Step 2) Clean out Isolator Row using the JetVac process

- A. A fixed culvert cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
- B. Apply multiple passes of JetVac until backflush water is clean
- C. Vacuum manhole sump as required

Step 3) Replace all caps, lids and covers, record observations and actions

Step 4) Inspect & clean basins and manholes upstream of the StormTech system

Additional Notes

1. Inspect every 6 months during the first year of operation. Adjust the inspection interval based on previous observations of sediment accumulation and high water elevations.
2. Conduct jetting and vactoring only when inspection shows that maintenance is necessary

Sample Maintenance Log

DATE	Stadia rod readings		Sediment Depth (1) - (2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/01	6.3 ft	none		New installation. Fixed point is Cl. frame at grade	djm
9/24/01		6.2	0.1 ft	Some grit felt	sm
6/20/03		5.8	0.5 ft	Mucky feel, debris visible in manhole and in isolator row, maintenance due	rv
7/7/03	6.3		0	System jetted and vacuumed	djm



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.

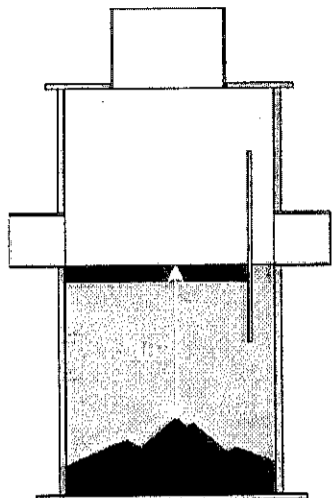
Aqua-Swirl™ Inspection Procedure

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™

An "Inspection and Maintenance Manual" is provided with each Aqua-Swirl™ system for more detailed maintenance procedures. On the following page, you will find sample Inspection Data Sheets.



Aqua-Swirl™ Inspection Data Sheet

Location: _____

Date	Inspector Name	Distance to Sediment (in.)	Distance to Water (in.)	Floatable Layer Thickness (describe)	Maintenance Required? (yes/no)



Aqua-Swirl™ Maintenance Data Sheet

Inspector: _____ Date: _____
Location: _____ Time: _____

INSPECTION

General Site Condition

Visible Evidence of Spills/ Releases (oils, grease, fuels, paints, chemicals):

Visible Evidence of Heavy Sediment Deposition:

Swirl

Condition of Swirl: _____

Condition of Baffle: _____

Distance to Sediment: _____

Distance to Water: _____

**Note: If sediment is less than 30 to 36 inches below water surface, sediment should be removed.

CONTAMINATION REMOVAL DATA

Floating Oil and Debris

Approx. Volume: _____

Description: _____

Elapsed Removal Time: _____

Sediment

Approx. Volume: _____

Description: _____

Elapsed Removal Time: _____

Other Comments

