

**AGREEMENT FOR
STORM WATER SYSTEM MAINTENANCE**

This Agreement for Storm Water System Maintenance (“Agreement”) is made on November 8, 2016, by and between **JUST BURGERS & FRIES HOLDINGS, LLC**, a Michigan limited liability company, whose address is 4564 Oakhurst Ridge Road, Clarkston, Michigan 48348 (“Developer”), and **THE CITY OF ROCHESTER HILLS**, a municipal corporation, whose address is 1000 Rochester Hills Drive, Rochester Hills, MI 48309 (the “City”).

WHEREAS, Developer owns and intends to develop the property described in the attached “**Exhibit A**” (the “Property”); and

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

WHEREAS, the Developer has proposed, and the city has approved, a storm water drainage and detention system comprised of storm water detention and water quality treatment facilities and devices, storm sewer pipe, catch basins, manholes, end-sections, ditches, swales, open water courses and rip-rap (the “System”) 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 hereby enter into this agreement to provide for the same.

NOW THEREFORE, in consideration of the foregoing, the execution of this Grant by the parties hereto and for other good and valuable consideration, the receipt of which is hereby acknowledged by the parties hereto, it is agreed as follows:

1. **Use of the System.** Components of the System, including any and all water conveyance, detention and water quality treatment facilities and devices, storm sewer pipes, 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 system 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 rip-rap outlet pipes; (viii) Inspection and cleaning of the storm sewer and catch basins upstream from the detention system; (ix) Inspection and replacement of stone around the outlet pipe; and (x) Any other maintenance that is reasonable and necessary to facilitate and continue the proper operation and use of the System.
3. **Action by the 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 the same be corrected within ninety (90) days.

The notice shall further specify a date and place for a hearing to be held at least thirty (30) 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, shall 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.

4. **Charges.** The City shall charge to the current owner of the Property the reasonable cost of maintenance or other corrective action undertaken by the City under this agreement. If not timely paid, the City may place the charges on the City's tax roll, which charges shall then 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 to the address for each party set forth below, or to such other addresses as a party may specify to the other party in writing at a later date:

If to Developer:

Just Burgers & Fries Holdings, LLC
Attn: Andrew Zielke
4564 Oakhurst Ridge Road
Clarkston, Michigan 48348

If to the City:

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

6. **Successors and Assigns.** This Agreement shall be binding on, 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 or any divisions thereof.
7. **Recording of Agreement.** This Agreement shall be recorded at the Oakland County Register of Deeds.
8. All exhibits referred to herein and attached hereto shall be deemed to be a part of this Agreement.
9. This Agreement is exempt from transfer taxes under MCL 207.505(a) and MCL 207.526(a).

[THE REST OF THIS PAGE IS INTENTIONALLY BLANK. SIGNATURES TO FOLLOW.]

EXHIBIT A

TO AGREEMENT FOR STORM WATER SYSTEM MAINTENANCE

Legal description of the Property

Land situated in the City of Rochester Hills, County of Oakland, and State of Michigan, described as:

A part of the Northwest $\frac{1}{4}$ of Section 35, Town 3 North, Range 11 East, City of Rochester Hills, Oakland County, Michigan, being more particularly described as commencing at the Northwest corner of said Section 35, thence North 87 degrees 47 minutes 36 seconds East 378.42 feet along the North line of said Section 35 and following Auburn Road to the point of beginning, thence continuing North 87 degrees 47 minutes 36 seconds East 128.19 feet along said North line and following said Auburn Road; thence south 02 degrees 12 minutes 24 seconds East 33.00 feet; thence along a curve to the right 62.83 feet, said curve having a radius of 40.00 feet, a central angle of 90 degrees 00 minutes 00 seconds and a long chord bearing of South 47 degrees 12 minutes 24 seconds East 56.57 feet; thence South 02 degrees 12 minutes 24 seconds East 126.00 feet; thence along a curve to the right 271.63 feet, said curve having a radius of 186.00 feet, a central angle of 83 degrees 40 minutes 27 seconds and a long chord bearing of South 39 degrees 37 minutes 49 seconds West 248.13 feet; thence North 02 degrees 36 minutes 28 seconds West 383.88 feet to the point of beginning. Containing 1.2 acres (gross) or 1.08 acres (net) excluding the Northerly 60 feet for the Auburn Road right of Way.

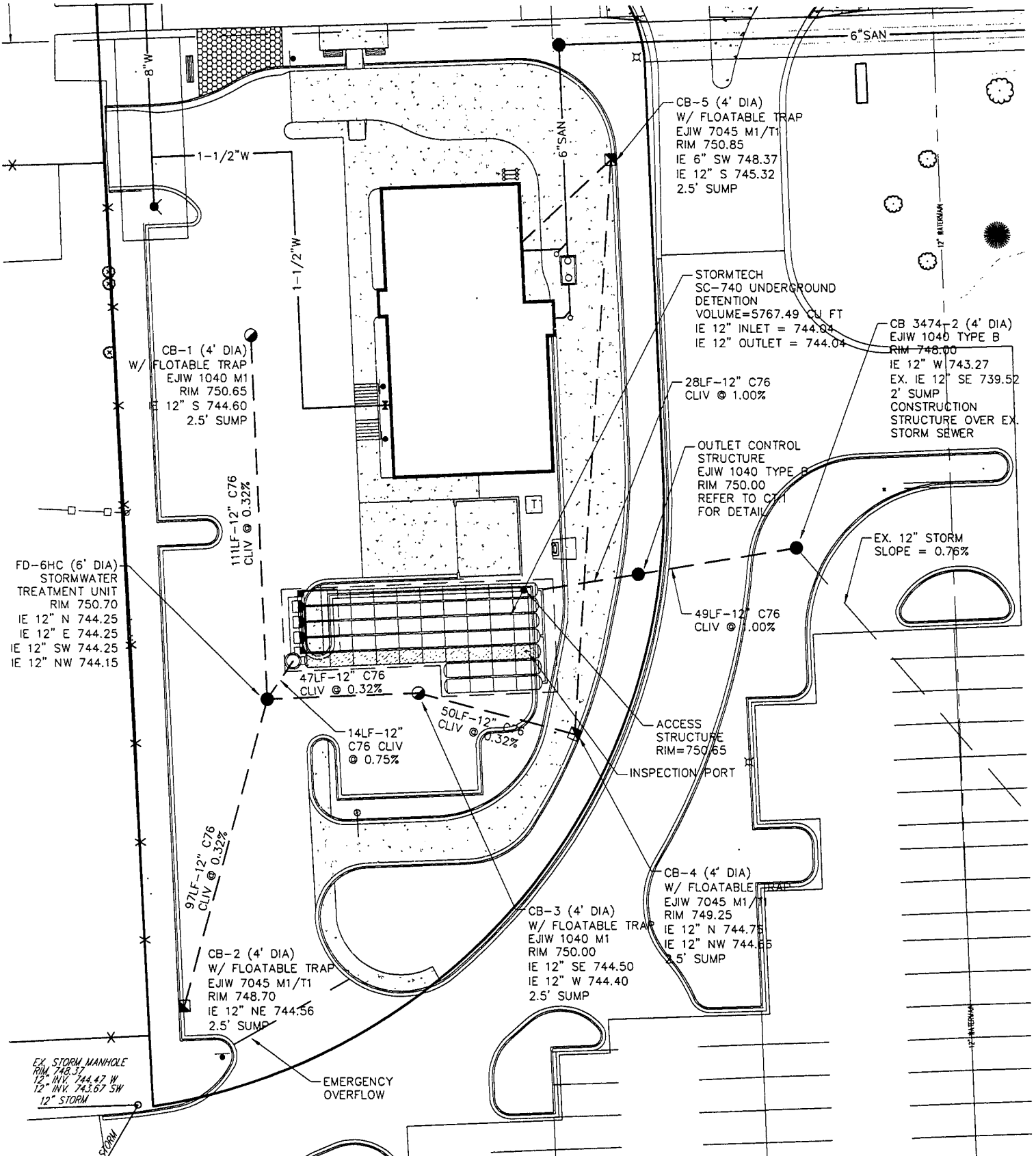
Currently part of Tax ID Number-70-15-35-100-053

Mike Tavant
Approved 11/29/16

EXHIBIT B

TO AGREEMENT FOR STORM WATER SYSTEM MAINTENANCE

Storm Water System Plan



Jason Appd
12/9/14

EXHIBIT C

TO AGREEMENT FOR STORM WATER SYSTEM MAINTENANCE

Maintenance Plan Exhibit "C"

Operations Stormwater Drainage and Maintenance Plan

Culvers of Rochester Hills Rochester Hills, MI

This long term maintenance operations and maintenance plan (O&M) shall use BMP's (Best Management Practices) to ensure that the stormwater management system performs and functions as designed. The stormwater management system is an effective way to enhance the water quality of the stormwater by effectively removing the sediment and pollutants from stormwater runoff. This will help ensure that we save our environment and help protect the valuable land and water resources. This O&M will outline the ownership/facility, underground detention system location, inspection and maintenance checklists, manufacturers O&M manuals. It will also outline the components of:

- System inspections.
- Removal of trash and litter debris from the site, including roadways/parking lot areas, drive thru, service/dumpster areas, and landscape beds.
- Removal of dirt and sediment in swales, catch basins, water quality units, and sewer pipes.
- Grass mowing and vegetated area maintenance.

Ownership/Facility Manager Contact Information:

Andrew Zielke
Just Burgers & Fries, LLC
92 E. Auburn Rd.
Rochester Hills MI 48307

Stormwater Site Plan:

The Developer has proposed as shown in **Exhibit "B"** of the Stormwater Maintenance Agreement plan, a detailed drawing showing the location of the storm water drainage and detention system comprised of storm water detention and water quality treatment facilities and devices, storm sewer pipe, catch basins, manholes, end-sections, ditches, swales, open water courses and rip-rap (the "System") for the Property as described and depicted in the Storm Water System Plan attached as "**Exhibit B**". Stormwater runoff is collected in the parking lot catch basins and water is conveyed by a systems of underground pipes to a water quality unit. The water quality unit provides treatment to the water by removing sediment, pollutants, and floating contaminants prior to reaching the underground storage system. Maintenance and inspections of the system will help assure adequate performance. The structures and sewers shall also be observed during large rain events to ensure proper operation of the system.

Jason Approved
10/18/16

Stormwater System Inspections:

Attached in **Exhibit" C"** is a inspection and maintenance plan outline for stormwater management structures. The outline of the schedule will give the frequency and descriptions of areas to inspect and maintain in order to ensure the system is functioning as designed. This maintain checklist shall be performed by personnel that is responsible for the maintenance of the system and may need to be certified for the entry of a confined space.

The inspections shall be recorded and maintained by the owner for a minimum of ten (10) years and copies shall be provided to the City of Rochester Hills Engineering Department.

Trash and Litter:

The inspection for trash and litter on the property shall be a regular routine. Proper disposal of items shall meet all State and Federal regulations. Parking lot sweeping shall also be performed to help provide a more overall attractive appearance to the outside of the building. Parking lot curb gutters shall also be maintained and kept free of dirt and sediment. A periodic inspection of landscape beds for debris shall be performed as needed. Plants, shrubs and trees shall also be inspected for healthy growth.

Stormwater System Management Maintenance:

Attached in the exhibits is a operations and maintenance manuals for the stormwater system. This give a introduction, operation, and maintenance of the overall system. Refer to manuals for overview of the maintenance requirements of the different components to the stormwater system. An inspection and maintenance plan is attached for areas to inspect, inspection timeline schedule, and corrective actions if needed.

**INSPECTION AND MAINTENANCE PLAN
FOR STORMWATER MANAGEMENT STRUCTURES (BMPS)**

Tasks	Street	Storm Sewer System	Catch Basins & Manholes	Catch Basin Inlets	Outlet Control Structures	Detention Chambers	Vegetated Areas	Roadways & Parking Areas
Inspect for Sediment Accumulation	Weekly	Annually	Annually	Annually	Annually	Annually	Weekly	Annually
Removal of Sediment Accumulation	Weekly or as needed	Annually or as needed	Annually or as needed	Annually or as needed	Annually or as needed	Annually or as needed	As Needed	Annually or as needed
Inspect and Cleaning for Floatables and Debris	Weekly	Annually	Annually	Annually	Annually	Annually	As Needed	As Needed
Inspection for Erosion							Annually	
Wet Weather Inspection	As Needed, After & During Large Rain Events	As Needed, After & During Large Rain Events	As Needed, After & During Large Rain Events	As Needed, After & During Large Rain Events	As Needed, After & During Large Rain Events	As Needed, After & During Large Rain Events	As Needed, After & During Large Rain Events	As Needed, After & During Large Rain Events
Inspect inside of structure, Pipes for Cracks, Pipe Joints, Settlement or Failure	Annually	Annually	Annually	Annually	Annually	Annually		Annually

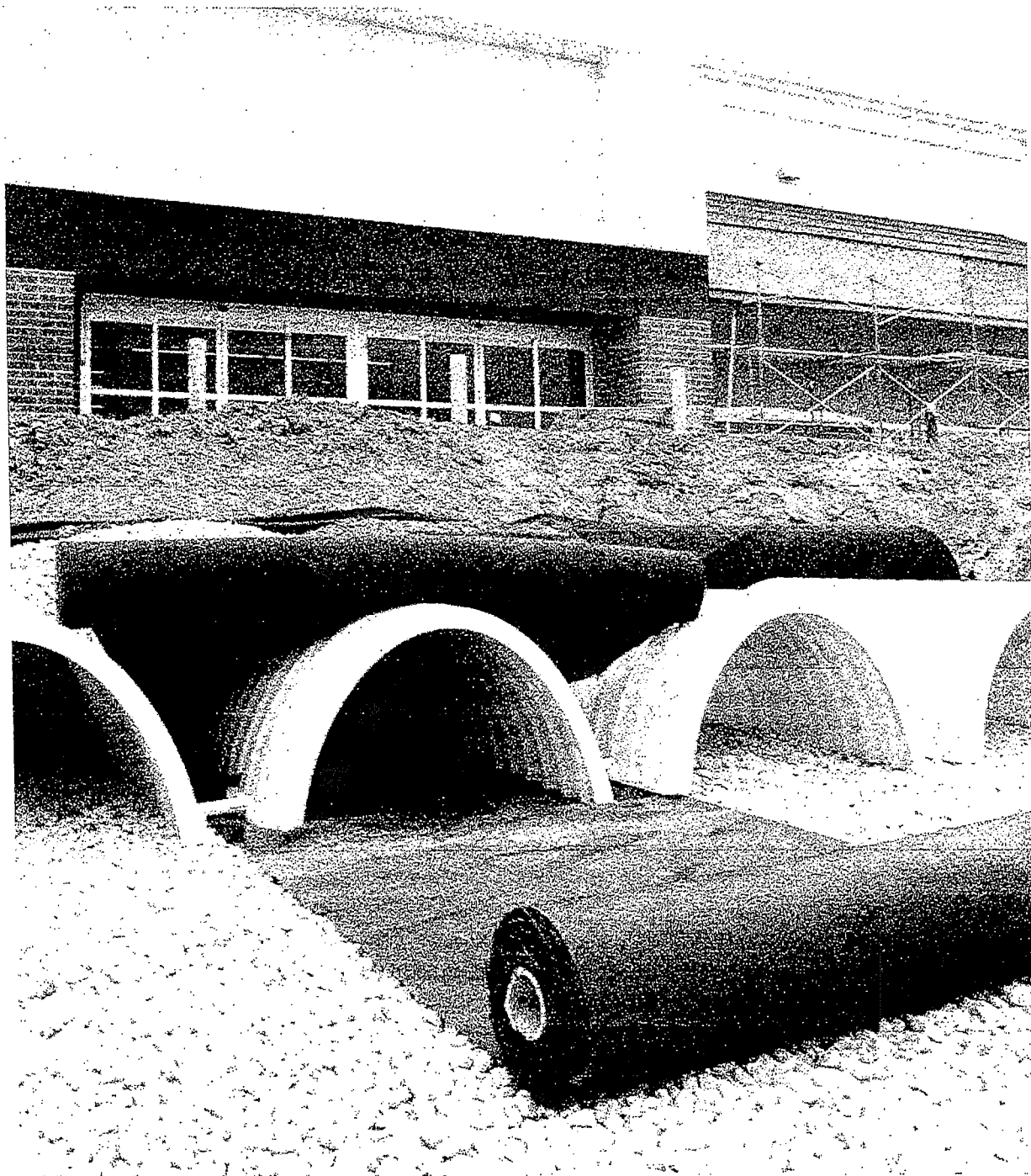
Inspection
Comments:

Corrective Action Plan:

Completed
By:

Date:

**Save Valuable Land and
Protect Water Resources**

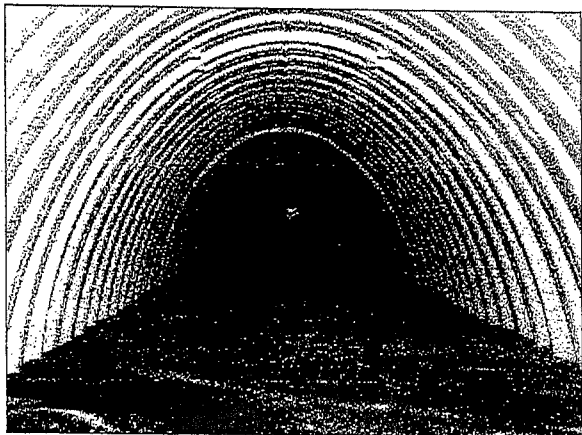


Isolator[®] Row O&M Manual
StormTech[®] Chamber System for Stormwater Management

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 patented 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-310-3, SC-740, DC-780, MC-3500 or MC-4500 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 (SC-310, SC-310-3 and SC-740 models) 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.

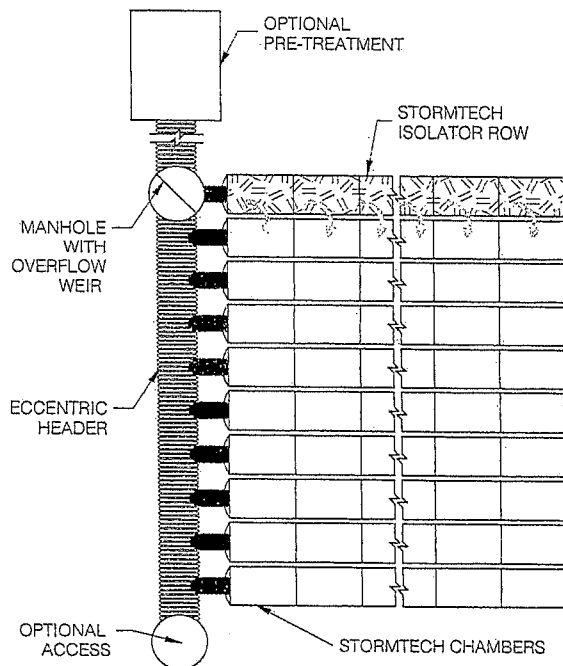
Two different fabrics are used for the Isolator Row. A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The tough geotextile provides a media for storm water filtration and provides a durable surface for maintenance operations. It is also designed to prevent scour of 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 non-woven fabric is not required over the DC-780, MC-3500 or MC-4500 models as these chambers do not have perforated side walls.

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 overflow 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)



2.0 Isolator Row Inspection/Maintenance



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.

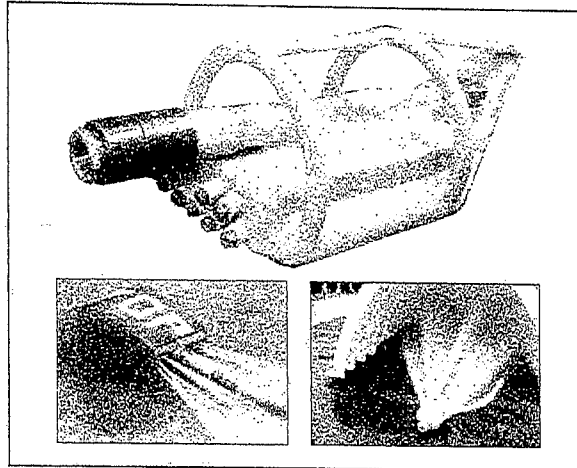
At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

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

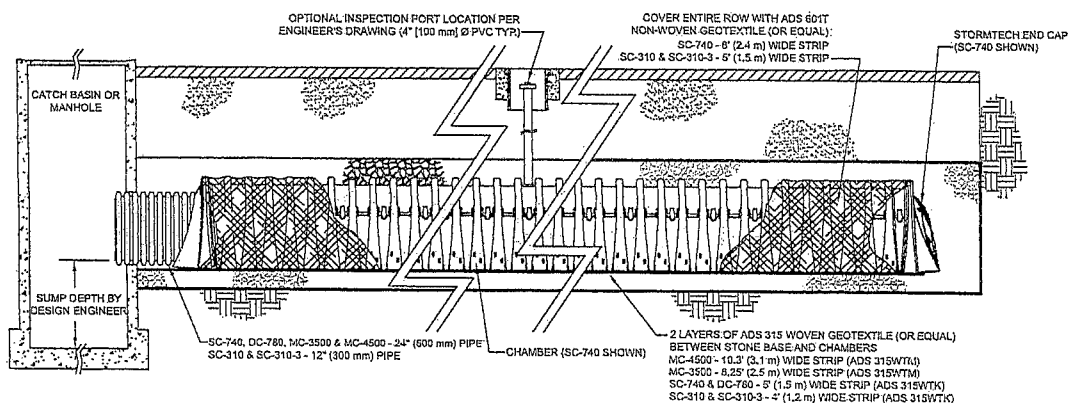
The Isolator Row was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via 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)

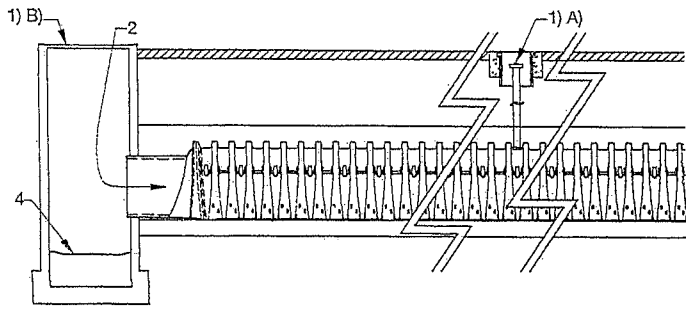


NOTE: NON-WOVEN FABRIC IS ONLY REQUIRED OVER THE INLET PIPE CONNECTION INTO THE END CAP FOR DC-780, MC-3500 AND MC-4500 CHAMBER MODELS AND IS NOT REQUIRED OVER THE ENTIRE ISOLATOR ROW.

3.0 Isolator Row Step By Step Maintenance Procedures

- Step 1) Inspect Isolator Row for sediment**
- A) Inspection ports (if present)
- Remove lid from floor box frame
 - Remove cap from inspection riser
 - Using a flashlight and stadia rod, measure depth of sediment and record results on maintenance log.
 - If sediment is at, or above, 3 inch depth proceed to Step 2. If not proceed to step 3.
- B) All Isolator Rows
- Remove cover from manhole at upstream end of Isolator Row
 - Using a flashlight, inspect down Isolator Row through outlet pipe
 - Mirrors on poles or cameras may be used to avoid a confined space entry
 - Follow OSHA regulations for confined space entry if entering manhole
 - 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.

StormTech Isolator Row (not to scale)



- Step 2) Clean out Isolator Row using the JetVac process**
- A fixed culvert cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
 - Apply multiple passes of JetVac until backflush water is clean
 - 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

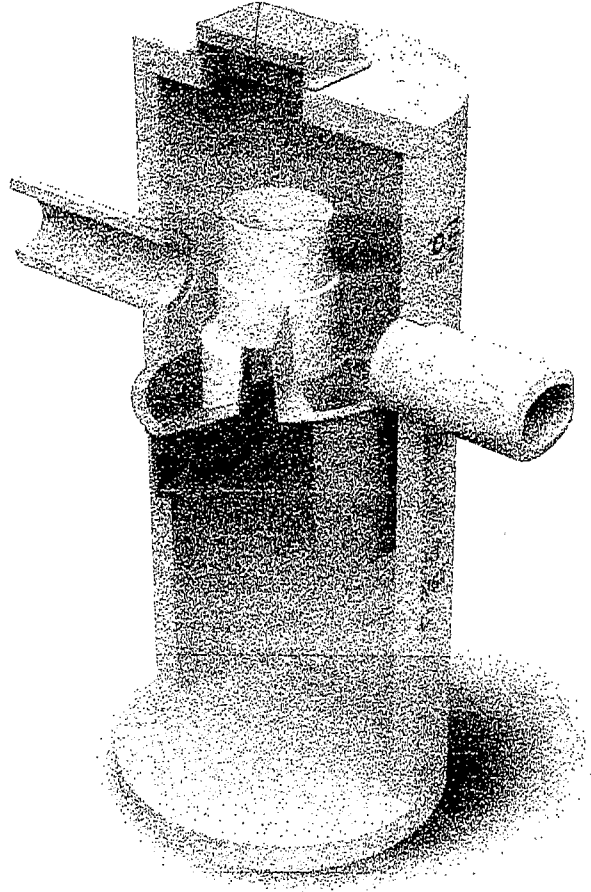
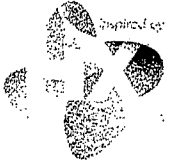
Sample Maintenance Log

Date	Stadia Rod Readings		Sediment depth (1) - (2)	Observations/Actions	Inspector
	Fixed point in chamber bottom (1)	Fixed point to top of sediment (2)			
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	0.5 ft.	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



70 Inwood Road, Suite 3 | Rocky Hill | Connecticut | 06067
 860.529.8188 | 888.892.2694 | fax 866.328.8401 | www.stormtech.com

ADS "Terms and Conditions of Sale" are available on the ADS website, www.ads-pipe.com
 Advanced Drainage Systems, the ADS logo, and the green stripe are registered trademarks of Advanced Drainage Systems.
 Stormtech® and the Isolator® Row are registered trademarks of StormTech, Inc.
 Green Building Council Member logo is a registered trademark of the U.S. Green Building Council.



Operation and Maintenance Manual

First Defense® and First Defense®-HC

Vortex Separator for Stormwater Treatment

Stormwater Solutions
Turning Water Around ...®

Table of Contents

3	First Defense® by Hydro International
	- Introduction
	- Operation
	- Pollutant Capture and Retention
4	Model Sizes & Configurations
	- First Defense® Components
5	Maintenance
	- Overview
	- Maintenance Equipment Considerations
	- Determining Your Maintenance Schedule
6	Maintenance Procedures
	- Inspection
	- Floatables and Sediment Clean Out
8	First Defense® Installation Log
9	First Defense® Inspection and Maintenance Log

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DISCLAIMER: Information and data contained in this manual is exclusively for the purpose of assisting in the operation and maintenance of Hydro International plc's First Defense®. No warranty is given nor can liability be accepted for use of this information for any other purpose. Hydro International plc has a policy of continuous product development and reserves the right to amend specifications without notice.

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

I. First Defense® by Hydro International

Introduction

The First Defense® is an enhanced vortex separator that combines an effective and economical stormwater treatment chamber with an integral peak flow bypass. It efficiently removes total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® is available in several model configurations (refer to *Section II. Model Sizes & Configurations*, page 4) to accommodate a wide range of pipe sizes, peak flows and depth constraints.

Operation

The First Defense® operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The First Defense® has been designed to allow for easy and safe access for inspection, monitoring and clean-out procedures. Neither entry into the unit nor removal of the internal components is necessary for maintenance, thus safety concerns related to confined-space entry are avoided.

Pollutant Capture and Retention

The internal components of the First Defense® have been designed to optimize pollutant capture. Sediment is captured and retained in the base of the unit, while oil and floatables are stored on the water surface in the inner volume (Fig.1).

The pollutant storage volumes are isolated from the built-in bypass chamber to prevent washout during high-flow storm events. The sump of the First Defense® retains a standing water level between storm events. This ensures a quiescent flow regime at the onset of a storm, preventing resuspension and washout of pollutants captured during previous events.

Accessories such as oil absorbent pads are available for enhanced oil removal and storage. Due to the separation of the oil and floatable storage volume from the outlet, the potential for washout of stored pollutants between clean-outs is minimized.

Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for "offline" arrangements using separate junction manholes
- Proven to prevent pollutant washout at up to 500% of its treatment flow
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

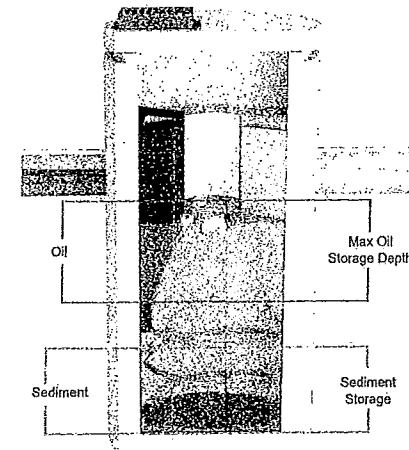


Fig.1 Pollutant storage volumes in the First Defense®.



II. Model Sizes & Configurations

The First Defense® inlet and internal bypass arrangements are available in several model sizes and configurations. The components of the First Defense®-4HC and First Defense®-6HC have modified geometries as to allow greater design flexibility needed to accommodate various site constraints.

All First Defense® models include the internal components that are designed to remove and retain total suspended solids (TSS), gross solids, floatable trash and hydrocarbons (Fig.2a - 2b). First Defense® model parameters and design criteria are shown in Table 1.

First Defense® Components

1. Built-In Bypass
2. Inlet Pipe
3. Inlet Chute
4. Floatables Draw-off Port
5. Outlet Pipe
6. Floatables Storage
7. Sediment Storage
8. Inlet Grate or Cover

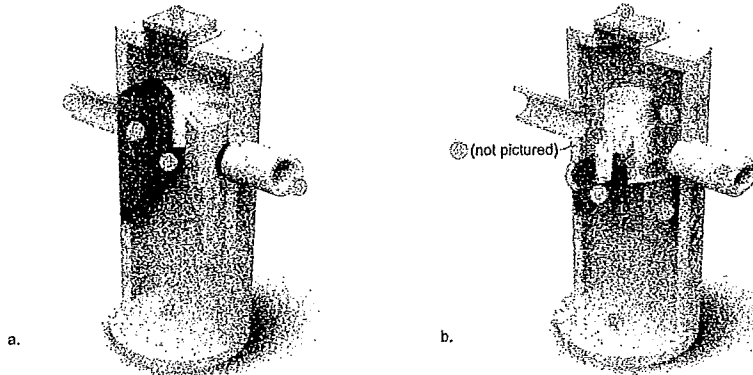


Fig.2a) First Defense®-4 and First Defense®-6; b) First Defense®-4HC and First Defense®-6HC, with higher capacity dual internal bypass and larger maximum pipe diameter.

Table 1. First Defense® Pollutant Storage Capacities and Maximum Clean out Depths

First Defense® Model Number	Diameter (ft / m)	Oil Storage Capacity (gal / m³)	Oil Clean Out Depth (ft / m)	Maximum Sediment Storage Capacity ¹		Recommended Sediment Clean-out Capacity	
				Volume (yd³ / m³)	Depth (ft / m)	Volume (yd³ / m³)	Depth (ft / m)
FD-4	4 / 1.2	180 / 681	<23.5 / 60	1.3 / 1.0	33 / 84	0.7 / 0.5	18 / 46
FD-4HC		191 / 723	<24.4 / 62				
FD-6	6 / 1.8	420 / 1,590	<23.5 / 60	3.3 / 2.5	37.5 / 95	1.6 / 1.2	18 / 46
FD-6HC		496 / 1,878	<28.2 / 72				

NOTE

¹ Sediment storage capacity and clean out depth may vary, as larger sediment storage sump volumes are provided when required.

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
 Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

III. Maintenance

Overview

The First Defense® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the First Defense®. The First Defense® will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the First Defense® will no longer be able to store removed sediment and oil. Maximum pollutant storage capacities are provided in Table 1.

The First Defense® allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole.

Maintenance events may include inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the First Defense®, nor do they require the internal components of the First Defense® to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

Maintenance Equipment Considerations

The internal components of the First Defense®-HC have a centrally located circular shaft through which the sediment storage sump can be accessed with a sump vac hose. The open diameter of this access shaft is 15 inches in diameter (Fig.3). Therefore, the nozzle fitting of any vactor hose used for maintenance should be less than 15 inches in diameter.

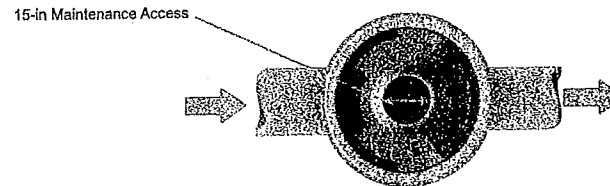


Fig.3 The central opening to the sump of the First Defense®-HC is 15 inches in diameter.

Determining Your Maintenance Schedule

The frequency of clean out is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge-Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil / floatables removal, for a 6-ft First Defense® typically takes less than 30 minutes and removes a combined water/oil volume of about 765 gallons.



Inspection Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. Fig.4 shows the standing water level that should be observed.
4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the components and water surface.
5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel.
6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.
7. Securely replace the grate or lid.
8. Take down safety equipment.
9. Notify Hydro International of any irregularities noted during inspection.

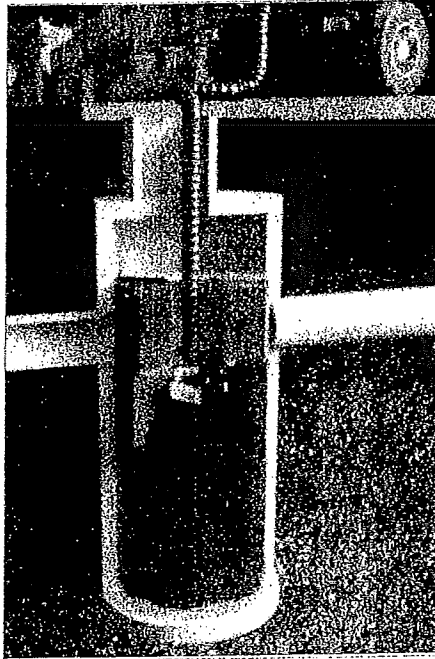


Fig.4 Floatables are removed with a vactor hose (First Defense model FD-4, shown).

Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge Judge®)
- Vactor truck (flexible hose recommended)
- First Defense® Maintenance Log

Floatables and Sediment Clean Out

Floatables clean out is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig.5).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose and skimmer pole to be lowered to the base of the sump.

Scheduling

- Floatables and sump clean out are typically conducted once a year during any season.
- Floatables and sump clean out should occur as soon as possible following a spill in the contributing drainage area.

Floatables and sediment Clean Out Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
4. Remove oil and floatables stored on the surface of the water with the vactor hose (Fig.5) or with the skimmer or net (not pictured).
5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (page 9).
6. Once all floatables have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris off the sump floor (Fig.5).
7. Retract the vactor hose from the vessel.
8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components, blockages, or irregularly high or low water levels.
9. Securely replace the grate or lid.

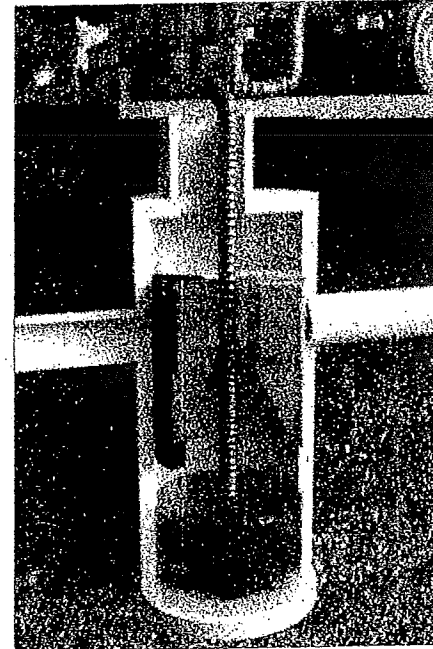


Fig.5 Sediment is removed with a vactor hose (First Defense model FD-4, shown).

Maintenance at a Glance

	Frequency
Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Oil and Floatables Removal	- Once per year, with sediment removal - Following a spill in the drainage area
Sediment Removal	- Once per year or as needed - Following a spill in the drainage area

NOTE: For most clean outs the entire volume of liquid does not need to be removed from the manhole. Only remove the first few inches of oils and floatables from the water surface to reduce the total volume of liquid removed during a clean out.



Notes



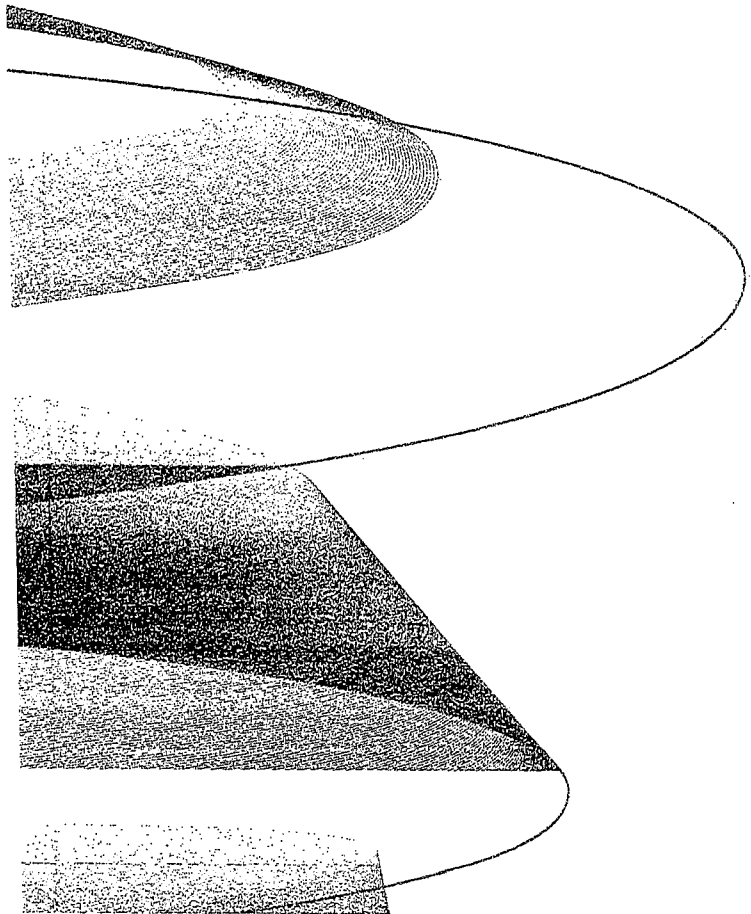


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