STORMWATER MANAGEMENT MAINTENANCE PLAN

Prepared for:

PL 611 FRONT URBAN RENEWAL, LLC 235 SOUTH HARRISON STREET, SUITE 100 EAST ORANGE, NJ 07018

Regarding the:

Mixed Use Redevelopment Project 611 West front Street City of Plainfield Union County, New Jersey

Block 233, Lots 2, 3, 7 & 12

Prepared by:

E2 Project Management, LLC 87 Hibernia Avenue Rockaway, New Jersey 07866

E2PM Project No. P-20-33-04

May 5, 2022 nout

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1. INTRODUCTION

Subject Property

This report has been prepared to present the design methodology and calculations for the management of stormwater runoff associated with the proposed project. The subject property is known as Block 233, Lots 2,3, 7 & 12 as shown on the City of Plainfield tax maps. The property has a total area of approximately 5.63 acres, is located fronting onto West Front Street to the west, and is bordered by Plainfield Avenue and commercial and residential properties to the north, Conrail mainline to the east and Waynewood Park and commercial property to the south in the City of Plainfield, Union County, New Jersey (see Appendix A for a site location map).

The site is located in the Block 233 Redevelopment Plan, Marino's Tract, Redevelopment Area and has been previously disturbed, graded and filled, with existing warehouse and car dealership buildings, asphalt parking areas, lawn and wooded areas. No wetlands are present on-site and no water-courses pass through the site.

Proposed Development

The proposed development will consist of two separate buildings; The north building along West Front Street containing an 18,000 sf commercial space and 217 residential units above and the south building containing 284 residential units above. Additional site improvements include pavement parking areas, concrete sidewalks, and utility infrastructure, as well as grading, landscaping and lawn areas that are associated with the proposed development of the site. The proposed development has the following:

Building coverage = 165,736 sf(67.6%) - 80% max. allowed Impervious coverage = 219,627 sf(89.6%) - 90% max. allowed

2. STORMWATER MANAGEMENT MAINTENANCE PLAN

This stormwater maintenance plan has been prepared in accordance with the City of Plainfield's municipal, Stormwater Management ordinance and applicable chapters of the NJDEP Stormwater BMP Manual. The site's stormwater management measures shall be maintained in accordance with the NJDEP Stormwater Management BMP Manual and the Standards for SESC in New Jersey, and any manufacturer's specifications.

Underground Stormwater Detention Chambers

To meet the NJDEP Stormwater Management Quantity Requirements, an underground stormwater detention system has been designed for the site.

Inspection Notes

- During the first service year a visual inspection should e completed during and after each major rainfall event, in addition to semi-annually, to establish a pattern of sediment and debris build up.
- Second year plus; establish an annual inspection frequency based on the information collected during the first year. At a minimum an inspection should be performed semi-annually.
- Inspect inspection ports, inflow/outflow points, including inlet/manhole pipes and discharge area.
- Identify and report maintenance required, including sediment and debris accumulation, system backing up, and flow rate change.

Maintenance Procedures

- Conform to all local, state and federal regulations.
- Determine if maintenance is required.
- Use a vacuum pump truck to evacuate debris from the inflow and outflow points.
- Flush the system with clean water forcing debris from the system. Take care to avoid extreme direct water pressure when flushing the system.

Vegetation

The prescribed MTDs will not utilize vegetation.

Structural Components

All structural components must be inspected for cracking, subsidence, spalling, erosion and deterioration at least annually and per manufacturer's specifications.

<u>Other</u>

- Maintenance plan must indicate the maximum level of oil, sediment, and debris accumulation allowed before removal is required.
- Removal levels should be monitored during device inspections to help determine the need for removal and other device maintenance.

Debris and Sediment Disposal

All removed debris and sediment shall be disposed in a legal manner in accordance with all applicable local, county and state agencies having jurisdiction.

State Plane Co-Ordinates

Site Centroid Location:	Northing:	511,155	Easting:	647,875
Underground Detention Facility:	Northing:	511,016	Easting:	647,820

Maintenance Cost Estimate

Task	Cost
Removal of accumulated sediment, trash and debris	\$100 per inlet
	\$1,000 for detention facility
Mowing, pruning and restoration of vegetation	\$250 - \$750
Restoration of eroded areas	\$250 - \$750
Elimination of mosquito breeding areas	\$250 - \$1,000
Control of aquatic vegetation	\$500 - \$1,000
Repair or replacement of damaged or deteriorated components	\$250 - \$4,000

Log Records for Annual Evaluation

Sample Record Keeping Form provided in Appendix A.

The responsible party shall maintain records documenting the condition of the stormwater management system, maintenance work performed and maintenance work necessary, and any safety hazards. The records shall include a schedule for performing needed maintenance, repairs or safety improvements.

Written maintenance and repair records for all components of the stormwater management system must be maintained for at least five (5) years by the responsible party. Copies of these documents must be submitted to the Township Engineer by April 1st every five (5) years. This should include all receipts for materials and labor purchased. Manufacturer's documents, including warranty information, shall also be retained.

Appendix A: Stormwater Detention Basin Maintenance Manual



STORMTRAP MAINTENANCE MANUAL

1. Introduction

Regular inspections are recommended to ensure that the system is functioning as designed. Please call your Authorized StormTrap Representative if you have questions in regards to the inspection and maintenance of the StormTrap system. Prior to entry into any underground storm sewer or underground detention systems, appropriate OSHA and local safety regulations and guidelines should be followed.

2. Inspection Schedules for Municipalities

StormTrap Stormwater Management Systems are recommended for inspection whenever the upstream and downstream catch basins and stormwater pipes of the stormwater collection system are inspected or maintained. This will economize the cost of the inspection if it is done at the same time the Municipal crews are visiting the area.

3. Inspection Schedules for Private Development

StormTrap Stormwater Mangement Systems, for a private development, are recommended for inspection after each major storm water event. At a minimum, until a cleaning schedule can be established, an annual inspection is recommended. If inspected on an annual basis, the inspection should be conducted before the stormwater season begins to be sure that everything is functioning properly for the upcoming storm season.

4. Inspection Process

Inspections should be done such that at least 2-3 days has lapsed since the most recent rain event to allow for draining. Visually inspect the system at all manhole locations. Utilizing a sediment pole, measure and document the amount of silt at each manhole location (Figure 1). Inspect each pipe opening to ensure that the silt level or any foreign objects are not blocking the pipes. Be sure to inspect the outlet pipe(s) because this is typically the smallest



pipe in the system. It is common that most of the larger materials will be collected upstream of the system in catch basins, and it is therefore important at time of inspections to check these structures for large trash or blockages.

Remove any blockages if you can during the inspection process only if you can do so safely from the top of the system without entering into the system. **Do not go into the system under any circumstances** without proper ventilation equipment and training. Pass any information requiring action onto the appropriate maintenance personnel if you cannot remove the blockages from above during the inspection process. Be sure to describe the location of each manhole and the type of material that needs to be removed.

The sediment level of the system should also be measured and recorded during the inspection process. Recording the sediment level at each manhole is very important in order get a history of sediment that can be graphed over time (i.e. years) in order to estimate when the system will need to be maintained next. It is also important to keep these records to verify that the inspection process was actually performed if anyone asks for your records in the future.

The sediment level in the underground detention system can be determined from the outside of the system by opening up all the manholes and using a sediment pole to measure the amount of sediment at each location. Force the stick to the bottom of the system and then remove it and measure the amount of sediment at that location. Again, do not go into the system under any circumstances without proper ventilation equipment and training.

5. When to Clean the System

Any blockages should be safely removed as soon as practical so that the Stormwater detention system will fill and drain properly before the next stormwater event.

The Dry Detention System should be completely cleaned whenever the sediment occupies more than 10% to 15% of the originally designed system's volume. The Wet Detention System should be cleaned when the sediment occupies more than 30% or 1/3rd of the originally designed system's volume. NOTE: Check with your municipality in regards to



cleaning criteria, as the allowable sediment before cleaning may be more or less then described above.

6. How to Clean the StormTrap

The system should be completely cleaned back to 100% of the originally designed storage volume whenever the above sediment levels have been reached. Be sure to wait at least 3 days after a stormwater event to be sure that the system is completely drained (if it is a Dry Detention System), and all of the sediments have settled to the bottom of the system (if it is a Wet Detention System).

Do not enter the System unless you are properly trained, equipped, and qualified to enter a confined space as identified by local occupational safety and health regulations.

There are many maintenance companies that are in business to help you clean your underground stormwater detention systems and water quality units. Please call your StormTrap representative for referrals in your area.

A. Dry Detention System Cleaning

Maintenance is typically performed using a vacuum truck. Sediment should be flushed towards a vacuum hose for thorough removal. For a Dry Detention System, remove the manhole cover at the top of the system and lower a vacuum hose into one of the rows of the StormTrap system. Open up the manhole at the opposite end of the StormTrap and use sewer jetting equipment to force water in the same row from one end of the StormTrap row to the opposite side. The rows of the StormTrap are completely open in one contiguous channel from one end to the other for easy cleaning.

Place the vacuum hose and the sewer jetting equipment in the next row and repeat the process until all of the rows have been cleaned.

When finished, replace all covers that were removed and dispose of the collected material properly.



B. Wet Detention System Cleaning

If the system was designed to maintain a permanent pool of water, floatables and any oil should be removed in a separate procedure prior to the removal of all sediment.

The floatable trash is removed first by using a bucket strainer to capture and remove any floating debris.

The floatable oils are then removed off the top of the water by using the vacuum truck to suck off any floatable fluids and liquids.

The next step is to use the vacuum truck to gently remove the clarified water above the sediment layer.

The final step is to clean the sediment for each row as described above in the paragraph "A. Dry Detention System Cleaning". For smaller systems, the vacuum truck can remove all of the sediment in the basin without using the sewer jetting equipment because of the smaller space.

7. Inspection Reports

Proof of these inspections is the responsibility of the property owner. All inspection reports and data should be kept on site or at a location where they will be accessible for years in the future. Some municipalities require these inspection and cleaning reports to be forwarded to the proper governmental permitting agency on an annual basis.

Refer to your local and national regulations for any additional maintenance requirements and schedules not contained herein. Inspections should be a part of your standard operating procedure.





Figure 1. During inspection, measure the distance from finished grade to the top of the sediment inside the system.

Sample inspection and maintenance log

Date	Depth of Sediment	Accumulated Trash	Maintenance Performed	Maintenance Personnel	Comments
2/5/2012	3" ∗□	None	Sediment Removal/Vac	B. Johnson	





Operation and Maintenance Manual

Stormwater Solutions

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www.hydro-int.com

Up-Flo[®] Filter

Filtration System for Stormwater Treatment

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IMPORTANT - ORDER REPLACEMENT PARTS FOR MAINTENANCE - **IMPORTANT**

Annual maintenance requires replacement of the Media Packs and the Drain Down Filter. Contact Hydro International to order replacements. Allow 2-4 weeks for delivery.

Office hours Monday thru Friday 8:00 A.M. to 5:00 P.M. EST Toll free: 1-888-382-7808 Phone: 207-756-6200 Fax: 207-756-6212 Email: services@hydro-int.com

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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 Up-Flo®Filter. No warranty is given nor can liability be accepted for use of this information for any other purpose. Hydro International plc have a policy of continuous product development and reserve the right to amend specifications without notice.

OVERVIEW & PRODUCT DESCRIPTION

The Up-Flo® Filter is a modular high-rate stormwater filtration device designed to capture trash, oil, sediment and remove fine pollutants such as dissolved and particulate metals and nutrients from stormwater runoff. Designed with efficiency, longevity and upkeep in mind, this high performance, low maintenance filter option that offers higher loading rates and longer media life for higher quality stormwater for longer periods between servicings.

In general, a minimum of two inspections are required per year to monitor sediment and gross pollutant accumulations. In order to achieve an annual TSS removal rate of 80% for the Up-Flo[®] Filter, the minimum maintenance frequency specified in the maintenance section for replacement of the Media Pack and removal of accumulated sediment from the sump is mandatory.



PRODUCT CONFIGURATIONS



a. Manhole

Fig.2 The Up-Flo[®] Filter is installed in a) 4-ft (1.2m) round manholes or b) in rectangular precast vaults. Both configurations have a wide central opening in the Up-Flo[®] Filter.

HYDRO MAINTENANCE SERVICES

Hydro International has been engineering stormwater treatment systems for over 30 years. We understand the mechanics of removing pollutants from stormwater and how to keep systems running at an optimal level.

NOBODY KNOWS OUR SYSTEMS BETTER THAN WE DO



AVOID SERVICE NEGLIGENCE

Sanitation services providers not intimately familiar with stormwater treatment systems are at risk of the following:

- Inadvertently breaking parts or failing to clean/replace system components appropriately.
- Charging you for more frequent maintenance because they lacked the tools to service your system properly in the first place.
- Billing you for replacement parts that might have been covered under your Hydro warranty plan
- · Charging for maintenance that may not yet have been required.

LEAVE THE DIRTY WORK TO US

Trash, sediment and polluted water is stored inside treatment systems until they are removed by our team with a vactor truck. Sometimes teams must physically enter the system chambers in order to prepare the system for maintenance and install any replacement parts. Services include are are not limited to:

- · Solids removal
- · Removal of liquid pollutants
- · Replacement media installation (when applicable)



BETTER TOOLS, BETTER RESULTS

Not all vactor trucks are created equal. Appropriate tools and suction power are needed to service stormwater systems appropriately. Companies who don't specialize in stormwater treatment won't have the tools to properly clean systems or install new parts.



SERVICE WARRANTY

Make sure you're not paying for service that is covered under your warranty plan. Only Hydro International's service teams can identify tune-ups that should be on us, not you.

TREATMENT SYSTEMS SERVICED BY HYDRO:

- Stormwwater filters
- Stormwater separators
- Baffle boxes
- Biofilters/biorention systems
- Storage structures
- Catch basins
- Stormwater ponds
- Permeable pavement



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OPERATION

INTRODUCTION

The Up-Flo[®] Filter operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirements and is fabricated with durable non-corrosive components. Personnel are not required to operate the unit and maintenance is limited to periodic inspections, sediment and floatables removal, Media Pack replacement and Drain Down Filter replacement.

POLLUTANT CAPTURE

The Up-Flo[®] Filter is designed to operate as a "treatment train" by incorporating multiple treatment technologies into a single device. Trash and gross debris are removed by sedimentation and screening before they are introduced to the filtration media, preventing surface blinding of the filter media. The Up-Flo[®] Filter is a wet-sump device. Between storm events, oil and floatables are stored on the water surface separate from the sediment storage volume in the sump (see **Fig.1**). The high-capacity bypass siphon acts as a floatables baffle to prevent washout of captured floatable pollutants during high intensity events.

REDUCED CLOGGING

The Up-Flo[®] Filter has been designed to minimize the occurrence of clogging and blinding and employs a unique Drain Down Filter that allows the water level in the chamber to drop below the filter media between events. The Drain Down Filter mechanism creates a reverse flow that flushes captured pollutants off the surface of the Media Bag, helping to prevent blinding. By allowing the water to drain out, the Drain Down Filter also reduces the weight of the Media Bags. This makes the bags easier and safer to remove during maintenance operations.

OVERFLOW PROTECTION

The Angled Screens are designed to prevent ragging and blinding and are situated below the Filter Modules, sheltering them from the direct path of the influent. Coarse debris settles in the sump before the runoff flows up through the screens, protecting them from blinding. In the unlikely event of a blockage, the high capacity siphonic Bypass Hood is designed to convey high enough flow to minimize the risk of large storm creating upstream flooding.

BEST PRACTICES

Good housekeeping upstream of the Up-Flo[®] Filter can significantly extend Media Bag life. For example, sweeping paved surfaces, collecting leaves and grass trimmings, and protecting bare ground from erosion will reduce loading to the system. Media Packs should not be installed in the Filter Modules until construction activities are complete and site stabilization is effective.

DAMAGE DUE TO LACK OF MAINTENANCE

Delayed maintenance would result in clogged Media Bags and/or blinded Angled Screens. In that situation, the Up-Flo[®] Filter would go into bypass and there would be no treatment of the incoming stormwater. Because the Bypass Weir can easily convey all of the flow to the Outlet Module, there would be no lasting damage to the system. Replacement of the Media Bags and removal of sediment from the sump would restore the Up-Flo[®] Filter to its original treatment efficiency. Establishing and adhering to a regular maintenance schedule ensures optimal performance of the system.



Fig.3 a) The water level in a properly functioning Up-Flo® Filter will drain down to the base of the Filter Modules. b) When the Drain Down Filter becomes clogged, the base of the Filter Modules will be submerged in standing water. Note, above right, that the Drain Down Filter is submerged in standing water.

INSPECTION & MAINTENANCE

OVERVIEW

The Up-Flo[®] Filter protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the proper functioning of the Up-Flo[®] Filter.

Maintenance activities can be categorized as those that may be performed from outside the Up-Flo® vessel and those that are performed inside the vessel. Maintenance performed from outside the modules includes removal of floatables and oils that have accumulated on the water surface and removal of sediment from the sump. Maintenance performed inside the vessel includes removal and replacement of Media Bags, Flow Distribution Media and the Drain Down Filter. A vactor truck is required for removal of oils, water, sediment, and to completely pump out the vessel to allow for maintenance inside. If you are not using Hydro Internatioanl or a trained servcie provider you must follow OSHA Confined Space Entry procedures when entering the Up-Flo® vessel.

The Up-Flo[®] Filter design has a wide central opening between the Filter Modules for easy access to all of the components (see **Fig.3**). In the case of inspection and floatables removal, a vactor truck is not required. Otherwise, a vactor truck is normally required for oil removal, removal of sediment from the sump, and replacement of the Media Packs and Drain Down Filter. In most cases, entry into the Up-Flo[®] Filter vessel is required for replacement of the Media Packs and Drain Down Filter.

The minimum required frequency for replacement of the Media Pack is annually, whereas the minimum required frequency for removal of accumulated sediment from the sump is dependent on the Up-Flo® Filter configuration. Configurations with a larger sediment storage volume per module will require less frequent removal of accumulated sediment. Regardless, whenever sediment depth in the sump is found to be greater than 16 inches, sediment removal is required.



AT A MINIMUM, MEDIA BAGS MUST BE REPLACED AT LEAST ONCE A YEAR.

Fig.4 a) A new Media Bag of Hydro Filter Sand. b) A spent media bag of Hydro Filter Sand.

MAKE SURE YOUR SYSTEM WAS INSTALLED CORRECTLY

First Year Inspection and Maintenance

The frequency of inspection and maintenance can be determined in the field after installation. The frequency of ongoing maintenance needs is based on site characteristics such as contributing area, types of surfaces (e.g., paved and/or landscaped), site activities (e.g., short-term or long-term parking), and other site maintenance (e.g., sanding and sweeping). At a minimum, inspection and maintenance should be conducted at intervals of no more than six months during the first year of operation. Maintenance personnel should observe and record pollutant accumulations during the first year of service in order to benchmark the maintenance intervals that will later be established for the site. Pollutant accumulations should be measured or monitored using the following procedures:

- Measurement of sediment depth in the sump: A minimum of 8 inches (20 cm) should separate the Drain Down Filter inlet from stored sediment in the sump in order to minimize sediment migration into the Drain Down Filter. A simple probe, such as the Sludge-Judge[®], can be used to determine the depth of the solids in the sump. In a typical 4-ft (1.2m) diameter manhole installation, the sediment depth should be no more than 16 inches (41 cm).
- Maintenance personnel should then enter the structure, remove the Media Pack from one of the Filter Modules, and weigh the Media Bags. Media Bags with a wet weight of approximately 40 lbs (18 kg) or more are an indication that the filter media has become full and that the Media Packs in all of the Filter Modules will require replacement (Fig.4). Minimum filtration rate is generally reached when the Media Bags have accumulated approximately 20 lbs (9 kg) of sediment. Determining the amount of accumulated sediment will be accomplished by removing both of the Media Bags from one of the Media Packs and weighing the bags separately. Since a new Media Bag weighs approximately 30 lbs (14 kg) wet, the difference in weight will approximately equal the weight of solids that have accumulated in the bag. A spent Media Bag weighs approximately 50 lbs (23 kg) wet.
- Measurement of oil layer on water surface: Since water in the Up-Flo[®] vessel drains down to an elevation below the bottom of the
 Filter Modules when the system is idle, the amount of accumulated oil must be minimized so that oil is not entrained in the Media
 Pack when stormwater begins to fill the vessel at the start of a storm event. Oil accumulation should be limited to 1.5 inches (4 cm)
 or less. Probes can be used to measure oil thickness.
- Monitoring for Drain Down Filter clogging: The water level in the Up-Flo® Filter should be monitored to ensure that the Drain Down Filter is operating properly. The Drain Down Filter is designed to lower the water level in the Up-Flo® vessel to an elevation below the bottom of the Filter Modules between storm events. Periodically conduct an inspection one to two days after a storm event during the first year of operation. Approximately 36 hours after a 1-in (2.5-cm) rainfall, the water level inside the vessel should have dropped to a point where it is equal with the base of the Filter Modules. If the water level has not reached that point, then the Drain Down Filter has either become clogged or blinded by trash or debris (Fig.5 a and b). If there is no evidence of trash or debris around the Drain Down Filter inlet, then it has likely become clogged with particles.
- Monitoring for slime and debris covering the Flow Distribution Media or Angled Screens: After removal of the Media Bags, the bottom Flow Distribution Media should be removed and inspected to determine if it is coated with slime or debris. Similarly, the Angled Screen should be inspected for blockages and ragging.

FIND OUT HOW FREQUENTLY YOUR SYSTEM NEEDS MAINTENANCE

Monitoring for floatables on the water surface: Similar to oil, the amount of accumulated floatables must be minimized to prevent trash and loose debris from becoming trapped on the Angled Screens when stormwater begins to fill the Up-Flo[®] vessel at the start of a storm event. Visual inspection is adequate to determine the amount of floatables. Floatables should be removed before they form a mat on the surface of the water.

The solids loading rate in the sump will be calculated by measuring the sediment depth in the sump and dividing the depth by the correlating interval of time since the sump was last cleaned. Similarly, starting with fresh Media Bags, the solids loading rate in the Media Packs will be calculated by weighing the Media Bags and dividing the weights by the correlating interval of time since they were installed. The wet weight of the heaviest bag will be used to determine the loading rate. As previously mentioned, a spent Media Bag weighs approximately 50 lbs (23 kg) wet. The spent Media Bag weight estimate was based on calculations of sediment loading in an Up-Flo[®] Filter that was run to exhaustion during laboratory testing.

The rate of oil accumulation will be calculated by measuring the thickness of the oil layer and dividing the thickness by the correlating interval of time since the sump was last cleaned. Ordinarily, oil thickness will not be measurable unless a spill has occurred. Consequently, any oil will typically be removed along with water when cleaning the sump.

Monitoring the Drain Down Filter for clogging, monitoring the Flow Distribution Media and Angled Screens for slime and debris, and monitoring the accumulation of floatables will provide an estimate of how long the Up-Flo® Filter can operate before its performance can become impaired by one of these factors.

Routine Inspection and Maintenance

After completion of the first year of operation, determining and then following the established inspection and maintenance intervals will keep pollutant loadings within their respective limits. Removal of oils and floatables, replacement of the Drain Down Filter, replacement of Flow Distribution Media (see Fig.9, pg 11), and cleaning of Angled Screens will occur at the same frequency as cleaning of the sump and replacement of Media Bags unless the first year of operation indicates otherwise. Keeping to the established maintenance intervals will keep treatment flow rates at, or above, the design flow rate. Typically, annual maintenance is adequate.

In addition to scheduled maintenance, occasional checks for Up-Flo[®] Filter clogging can be performed by removing the manhole cover during a storm, monitoring the water level in the manhole or vault, and determining whether the filter is in bypass. A properly-sized filter (on-line or off-line) that is in bypass during a storm that is producing runoff at, or below, the filter's design filtration rate needs maintenance.

DON'T WANT TO GO IT ALONE? CALL HYDRO AND WE'LL TAKE CARE OF INSPECTION, REPLACEMENT MEDIA AND CLEANOUT.

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INSPECTION & MAINTENANCE

ROUTINE INSPECTION

Inspection is a simple process that requires monitoring pollutant accumulations. Maintenance crews should be familiar with the Up-Flo[®] Filter and its components prior to inspection.

THE FOLLOWING INSTRUCTIONS ARE INTENDED FOR NON-HYDRO MAINTENANCE SERVICE PROVIDERS AND/OR THOSE INTENDING TO MAINTAIN THIER OWN UP-FLO[®] FILTER:

Scheduling

• Inspection may be conducted during any season of the year but should occur shortly after a predicted rainfall to ensure components are operating properly.

NECESSARY EQUIPMENT

- Safety Equipment and Personal Protective Equipment (traffic cones, work gloves, etc.)
- · Scale to measure the weight of the Media Bags
- · Crow bar to remove grate or lid
- · Pole with skimmer or net
- Sediment probe (such as a Sludge-Judge[®])
- Hydro International Up-Flo® Filter Maintenance Log
- Trash bags for removed floatables

ROUTINE INSPECTION PROCEDURES

- Set up any necessary safety equipment (such as traffic cones) to provide access to the Up-Flo[®] Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.
- 2. Remove the grate or lid to the manhole or vault.
- Without entering the vessel, look down into the chamber to inspect the inside and to determine whether the high-water level indicator has been activated. Make note of any irregularities. See Fig.6 for a typical Inspection View.
- **4.** Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the chamber.
- Using a sediment probe such as a Sludge-Judge[®], measure the depth of sediment that has collected in the sump of the vessel.
 Maximum sediment depth is 16 inches (41 cm).
- 6. If the high-water level indicator has been activated after two consecutive storms, remove the Filter Module lid by turning the cam latch and remove the Filter Media Pack (*refer to page 11 Replacement Procedures*). Weigh the Media Bags from one or two modules. Media Bags should be replaced if the wet weight exceeds 40 lbs (18 kg).
- 7. 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 or a high standing water level (see Fig.6 for the standard standing water level).
- 8. Securely replace the grate or lid.
- 9. Remove safety equipment.
- **10.** Contact Hydro International at (800) 848-2706 to discuss any irregularities noted during inspection.

Bypass siphon sits evenly on Outlet Module.

Standing water level is no higher than the base of the Filter Module. The Drain Down Filter will be visible if the water level is correct.

Filter Module Lids are closed.

Fig.6 Inspection view of the Up-Flo® Filter.

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



ROUTINE MAINTENANCE

Maintenance activities are grouped into two categories:

- Activities Not Requiring Man Entry Into the Up-Flo[®] Filter These activities include floatables removal, oil removal and removal of sediment from the sump.
- Activities Requiring Man Entry Into the Up-Flo[®] Filter Media Pack replacement and Drain Down Filter replacement.

Maintenance intervals are determined from monitoring the Up-Flo[®] Filter during its first year of operation. Depending on the site, some maintenance activities may have to be performed on a more frequent basis than others. In the case of floatables removal, a vactor truck is not required. Floatables and loose debris can be netted with a skimmer and pole.

A vactor truck is normally required for oil removal, removal of sediment from the sump, and to dewater the vessel for replacement of the Media Packs and Drain Down Filter (Fig.7). All inspection and maintenance activities would be recorded in an Inspection and Maintenance Log.

Completion of all the maintenance activities for a typical 4-ft (1.2m) diameter manhole installation takes less than one hour. Approximately 360 gallons of water and up to 0.6 yd³ (0.5 m³) of sediment may be removed in the process. In an installation equipped with six Filter Modules, 12 Media Bags (2 bags per module) would be removed and replaced. Assuming a spent Media Bag weight of 50 lbs (23 kg), up to 600 lbs (272 kg) of spent Media Bags would be removed. All consumables, including Media Bags, Flow Distribution Media, and replacement Drain Down Filters are supplied by Hydro International.

The access port located at the top of the manhole provides unobstructed access for a vactor hose and/or skimmer pole to be lowered to the base of the sump.

MAINTENANCE ACTIVITIES NOT REQUIRING MAN ENTRY

These activities include floatables removal, oil removal and removal of sediment from the sump.

SCHEDULING

• Floatables and sump cleanout may typically be done during any season of the year - before and after rainy season

• Floatables and sump cleanout should occur as soon as possible following a contaminated spill in the contributing drainage area

RECOMMENDED EQUIPMENT

- Safety Equipment (traffic cones, etc)
- · Crow bar 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 preferred)
- · Pressure nozzle attachment or other screen-cleaning device





Fig.7 Sediment is removed from the sump with a vactor hose. Man entry is not required for this step.

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Up-Flo® Filter Operation and Maintenance Manual

NO MAN ENTRY REQUIRED: FLOATABLES, OIL AND SEDIMENT:

- Set up any necessary safety equipment (such as traffic cones) around the access of the Up-Flo[®] Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.
- 2. Remove the grate or lid to the manhole or vault.
- 3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
- 4. If the standing water level in the sump is above the base of the Filter Modules (see Fig.8), tug the Pull Chain(s) to release the Drain Down Filter plug(s). Allow the excess water to drain out of the chamber.
- 5. Use the skimmer pole to fit the Drain Down Filter plug back into the open port.
- Once all floatables and oil have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris from the sump floor. Up to 0.3 yd³ (0.2 m³) of sediment and 360 gallons (1,363 L) of water will be removed from a typical manhole Up-Flo[®] Filter during this process.
- 7. Retract the vactor hose from the vessel.
- 8. Inspect the Angled Screens for blockages and ragging. If present, remove the obstruction or ragging materials from the surface using a hose or other screen-cleaning device.
- On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oils, and gross debris removed, and the depth of sediment measured. Note any apparent irregularities such as damaged components or blockages.
- 10. Securely replace the grate or lid. Remove safety equipment.
- 11. Dispose of sediment and gross debris following local regulations.
- 12. Dispose of oil and sump water at a licensed water treatment facility or following local regulations.
- 13. Contact Hydro International at (800) 848-2706 to discuss any irregularities noted during cleanout.

MAINTENANCE ACTIVITIES REQUIRING MAN ENTRY

These activities include replacement of the Media Packs and Drain Down Filter.

Unless the Up-Flo[®] Filter has been installed as a very shallow unit, it is necessary to have an OSHA-confined space entry trained person enter the vessel to replace Media Packs.

The access port located at the top of the manhole or vault provides access to the Up-Flo[®] vessel for maintenance personnel to enter the vessel and remove and replace Media Packs. The same access would be used for maintenance personnel working from the surface to net or skim debris and floatables or to vactor out sediment, oil, and water. Unless the Up-Flo[®] Filter has been installed in a very shallow configuration, it is necessary to have personnel with OSHA Confined Space Entry training performing the maintenance that occurs inside the vessel.

Scheduling

- Call Hydro International to order replacement Media Packs
 and Drain Down Filter prior to scheduling maintenance.
- Because Media Pack replacement requires entry into the Up-Flo[®] chamber, maintenance events should be scheduled during dry weather.
- Media Pack replacement should occur immediately after a contaminated spill in the contributing drainage area.



Fig.8 Cutaway view of the Filter Module

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

Recommended Equipment

- Safety Equipment (traffic cones, etc.)
- Crow bar to remove grate or lid
- Pole with skimmer or net (if floatables removal is not to be done with vactor hose)
- Sediment probe (such as a Sludge-Judge®)
- Vactor truck (flexible hose preferred)
- OSHA Confined Space Entry Equipment
- Up-Flo[®] Filter Replacement Media Packs (available from Hydro International)
- Hydro International Up-Flo® Filter Maintenance Log
- Screwdriver (flat head)
- Replacement Drain Down Filter components supplied by Hydro International

Man Entry Required: Media Pack and Drain Down Filter

- 1. Follow Floatables and Sump Cleanout Procedures, 1 13.
- 2. Following OSHA Confined Space Entry procedures, enter the

Up-Flo[®] Filter Chamber.

- Open the Filter Module by turning the three cam latches on the front and sides of the module. Remove the lid 1 to gain access to the Media Pack (Fig.9).
- 4. Remove and discard the spent Media Pack. The Media Pack contents include:
 - A top layer of A Flow Distributing Sheets
 - Two (2) Media Bags B equipped with nylon handles.
 - A bottom layer of **A** Flow Distributing Media.
- 5. Insert a new Media Pack, supplied by Hydro International.
 - First, insert a bottom layer of green Flow Distributing Media. Be sure that the media sits snugly and level at the bottom of the Filter Module.
 - Next, insert the first of two (2) replacement Media Bags. Smooth the bag out with your hands to make sure that the bag extends snugly to the walls and corners of the Filter Module.
 - Insert the second Media Bag, following the same procedure.
 - Insert the top layer of green Flow Distributing Media.



Be sure that the piece fits snugly against the walls and corners of the Filter Module.

- Put the lid on and secure the three latches. Check to make sure that the latches are closed properly.
- 6. Use a screwdriver to unscrew the Drain Down Filter from the face of the Outlet Module (see Fig.10). DO NOT DISCARD THIS PIECE.
- 7. Install new Drain Down Filter supplied by Hydro International.
- 8. Exit the Up-Flo[®] Filter chamber and securely replace the grate ____or lid.
- 9. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oil and gross debris removed, and the depth of sediment measured. Note the number of Media Packs replaced. Note any irregularities such as damaged components or blockages.

Fig.10 The Drain Down Filter.



- 10. Remove safety equipment.
- 11. Dispose of spent media packs at your local landfill, following local regulations.
- 12. Return the spent Drain Down Filter to Hydro International.
- 13. Contact Hydro International to discuss any irregularities noted during annual maintenance.

Solids Disposal

Sediment, floatables, gross debris, and spent Media Bags can generally be disposed of at the local landfill in accordance with local regulations. The toxicity of the residues captured will depend on the activities in the contributing drainage area, and testing of the residues may be required if they are considered potentially hazardous.

Sump water can generally be disposed of at a licensed water treatment facility but the local sewer authority should be contacted for permission prior to discharging the liquid. Significant accumulations of oil removed separately from sump water should be transported to a licensed hazardous waste treatment facility for treatment or disposal. In all cases, local regulators should be contacted about disposal requirements.

MAINTENANCE AT A GLANCE

Activity	Frequency
Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Floatables/Oils Removal	- Twice per year or as needed - Following a contaminated spill in the drainage area
Sediment Removal	 Every six to 12 months, depending on the Up-Flo[®] Filter Configuration The maximum allowable sediment depth in any Up-Flo Filter configuration is 16 inches (41 cm) Following a contaminated spill in the drainage area
Media Pack Replacement	 Once per year Replacement is required anytime inspection reveals that the high-water level indicator has been activated after two consecutive storms and the subsequent weighing of the Media Bags shows a wet weight greater than 40 lbs Following a contaminated spill in the drainage area
Drain Down Filter Replacement	 Once per year with Media Pack replacement Replacement is required anytime inspection reveals that the water level inside the vessel has not reached a level equal with the base of the Filter Modules approximately 36 hours after a 1-inch (2.5 cm) rainfall As needed, in the event of continuous base flow conditions

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

UP-FLO® FILTER INSTALLATION LOG



SITE REFERENCE NAME OR NUMBER FOR THIS UP-FLO® FILTER LOCATION:				
SITE NAME:				
SITE LOCATION:				
OWNER:	SITE CONTRACTOR:			
CONTACT NAME:	CONTACT NAME:			
COMPANY NAME:	COMPANY NAME:			
ADDRESS:	ADDRESS:			
TELEPHONE:	TELEPHONE:			
FAX:	FAX:			

INSTALLATION DATE: / /

CONFIGURATION (CIRCLE ONE): MANHOLE VA

VAULT SYSTEM

TOTAL NUMBER OF UP-FLO® FILTER MODULES:

UP-FLO® FILTER INSPECTION LOG

Site Name:				Owner Change since last inspection? Y N
Location:				
Owner Name:				
Address:				Phone Number:
Site Status:				
Date: Time:	Site *(St	conditions able, Unde	s*: er Construction,	Needing Maintenance, etc.)
Inspection Frequency Key: A=annual; M=mor	nthly; S=aft	er major s	torms	
Inspection Items	Inspection Frequency	Inspected? (Yes/No)	Maintenance Needed? (Yes/No)	Comments/Description
Debris Removal				
Adjacent area free of debris?	M			
Inlets and Outlets free of debris?	М			
Facility (internally) free of debris?	М	1		
Vegetation				·
Surrounding area fully stabilized? (no evidence of eroding material into Up-Flo [®] Filter)	A			
Grass mowed?	М	1		
Water retention where required				
Water holding chamber(s) at normal pool?	A			
Evidence of erosion?	A			
Sediment Deposition			· ·	·
Filtration Chamber free of sediments?	A			
Sedimentation sump not more than 50% full?	A			
Structural Components				
Any evidence of structural deterioration?	A			
Grates in good condition?	A			
Spalling or cracking of structural parts?	A			
Outlet/Overflow Spillway	A			
Other	<u>.</u>			
Noticeable odors?	A			
Any evidence of filter(s) clogging?	М			
Evidence of flow bypassing facility?	A			



Inspector Comments:						
Overall Condition of Up-Flo [®] Filter**:	Acceptable					
**"Acceptable" would mean properly functioning; "unacceptable" would mean damaged or required further maintenance.						

If any of the above Inspection Items are checked "Yes" for "Maintenance Needed", list Maintenance actions and their completion dates below or on the Maintenance Log provided on page 15 of the Up-Flo® Filter Operation & Maintenance Manual:

Maintenance Action Needed	Due Date

The next routine inspection is schedule for approximately: (date)

Inspected by: (signature)

Inspected by: (printed)

Hydro Solutional Solution

UP-FLO® FILTER MAINTENANCE LOG

Site Name:		Owner Change since last inspection? Y
Location:		
Owner Name: _		
Address:		Phone Number:
Site Status:		
Date:	Time:	Site conditions:
Estimated volun	ne of oil/floatable trash re	noved:
Sediment depth	measured in sump prior	o removal:
Number of Filter	r Modules fitted with new	nedia packs:
Inspector Comr	ments:	
Overall Conditio	on of Up-Flo [®] Filter: would mean properly func	Acceptable Unacceptable Unacceptable tioning; "unacceptable" would mean damaged or required further maintenance.
Maintained by:	(signature)	
Maintained by:	(printed)	

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CALL 1 (888) 382-7808 TO SCHEDULE AN INSPECTION

Stormwater Solutions

94 Hutchins Drive Portland, ME 04102

Tel: (207) 756-6200 Fax: (207) 756-6212 stormwaterinquiry@hydro-int.com

www.hydro-int.com





State of New Jersey

Division of Water Quality Bureau of Nonpoint Pollution Control 401 East State Street P.O. Box 420 Mail Code 401-02B Trenton, New Jersey 08625-0420 Phone: 609-633-7021 / Fax: 609-777-0432 http://www.state.nj.us/dep/dwq/bnpc_home.htm CATHERINE R. McCABE Commissioner

February 10, 2020

Jeremy Fink, P.E. Principal Product Development Engineer Hydro International 94 Hutchins Drive Portland, ME 04102

Re: MTD Laboratory Certification Up-Flo[®] Filter EMC (Extended Maintenance Cartridge) Off-line Installation

TSS Removal Rate 80%

Dear Mr. Fink:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Hydro International has requested a Laboratory Certification for the Up-Flo[®] Filter EMC.

This project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated January 2020) for this device is published online at http://www.njcat.org/uploads/newDocs/NJCATUPFLOFILTERwithEXTMAINTCARTFINAL.pdf.

PHILIP D. MURPHY Governor

SHEILA Y. OLIVER Lt. Governor The NJDEP certifies the use of the Up-Flo[®] Filter EMC by Hydro International at a TSS removal rate of 80%, when designed, operated and maintained in accordance with the information provided in the Verification Appendix and subject to the following conditions:

- 1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5. The MTFR is calculated based on a verified loading rate of 0.96 gpm/sf of effective filtration treatment area.
- 2. The Up-Flo[®] Filter EMC shall be installed using the same configuration as the unit verified by NJCAT and sized in accordance with the criteria specified in item 6 below.
- 3. This device cannot be used in series with another MTD or a media filter (such as a sand filter), to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.
- 4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at <u>www.njstormwater.org</u>.
- 5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the Up-Flo[®] Filter EMC, which is attached to this document. However, it is recommended to review the maintenance website at https://www.hydro-int.com/sites/default/files/up-flo_filter_emc_operation_maintenance_manual.pdf for any changes to the maintenance requirements.
- 6. Sizing Requirements:

The example below demonstrates the sizing procedure for an Up-Flo[®] Filter EMC. After determining the number of filter modules necessary, the corresponding model selection must be appropriate to hold at least that minimum number of filters.

Example: A 0.25-acre impervious site is to be treated to 80% TSS removal using an Up-Flo[®] Filter EMC. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs or 354.58 gpm.

The selection of configuration for use in the Up-Flo[®] Filter EMC is based upon both the MTFR and the maximum inflow drainage area. It is necessary to select the configuration using both methods and to rely on the method that results in the larger configuration determined by the two methods.

Inflow Drainage Area Evaluation:

The drainage area to the Up-Flo[®] Filter EMC in this example is 0.25 acres. Based upon the information in Tables 1 and 2 below, the following minimum

configuration is required for an Up-Flo[®] Filter EMC to treat the impervious area without exceeding the maximum drainage area:

Using Table 2, all vault sizes for the 18", 27", 36" and 48" cartridges would be able to treat runoff without exceeding the maximum allowable drainage area. A minimum of 5, 4, 3, or 2 cartridges for the 18", 27", 36", or 48" cartridge sizes, respectively, would be required to avoid exceeding the maximum allowable drainage area.

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was determined based on the following: time of concentration = 10 minutes i = 3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual) c = 0.99 (runoff coefficient for impervious) Q = ciA = 0.99 x 3.2 x 0.25 = 0.79 cfs = 0.79 x 448.83 gpm/cfs = 354.58 gpm

Based on a flow rate of 354.58 gpm, the following minimum configurations are required for an Up-Flo[®] Filter EMC to treat the impervious area without exceeding the MTFR:

For 18" cartridge: 8 x 18.5 ft. vault size with 66 cartridges For 27" cartridge: 8 x 10 ft. or 6 x 14 ft. vault size with 40 cartridges For 36" cartridge: 8 x 8 ft. or 6 x 10 ft. vault size with 29 cartridges For 48" cartridge: 6 x 8 ft. vault size with 21 cartridges

The MTFR evaluation results will be used since that method results in the higher minimum configuration determined by the two methods.

The sizing table corresponding to the available system models are noted in the Design Specifications and Vault Arrangements noted below.

Individual Cartridge Height (inches)	MTFR (gpm)	MTFR (cfs)	Max Drainage Area Per Cartridge (acre)
18	5.40	0.012	0.05
27	8.90	0.020	0.08
36	12.4	0.028	0.12
48	17.0	0.038	0.16

 Table 1: Up-Flo[®] Filter EMC Cartridge Design Specifications

		18-inch Cartridge		27-inch Cartridge			36-inch Cartridge			48-inch Cartridge				
					Max			Max			Max			Max
Vault		Vault	Max.		Drain	Max.		Drain			Drain	Max.		Drain
Size	Width	Length	No.	MTFR	Area	No.	MTFR	Area	No.	MTFR	Area	No.	MTFR	Area
(ft.)	(ft.)	(ft.)	Carts.	(cfs)	(ac)	Carts.	(cfs)	(ac)	Carts.	(cfs)	(ac)	Carts.	(cfs)	(ac)
4x4	4	4	6	0.071	0.31	6	0.118	0.51	6	0.165	0.71	6	0.227	0.97
4x6	4	6	11	0.134	0.57	11	0.218	0.93	11	0.303	1.29	11	0.417	1.78
4x8	4	8	15	0.180	0.77	15	0.296	1.27	15	0.412	1.76	15	0.568	2.43
6x6	6	6	17	0.205	0.87	17	0.336	1.44	17	0.468	2.00	15	0.568	2.43
6x8	6	8	24	0.290	1.23	24	0.475	2.03	23	0.633	2.70	23	0.871	3.72
6x10	6	10	31	0.374	1.59	30	0.595	2.54	30	0.827	3.53	28	1.061	4.53
6x12	6	12	38	0.459	1.95	37	0.733	3.13	35	0.965	4.12	34	1.288	5.50
6x14	6	14	45	0.541	2.31	44	0.871	3.72	41	1.130	4.82	39	1.477	6.31
8x8	8	8	32	0.385	1.65	31	0.613	2.62	30	0.827	3.53	29	1.098	4.69
8x10	8	10	41	0.495	2.11	40	0.791	3.38	38	1.047	4.47	36	1.364	5.82
8x13	8	13	55	0.664	2.83	49	0.970	4.14	50	1.377	5.88	46	1.742	7.44
8x14	8	14	59	0.711	3.03	57	1.130	4.82	53	1.459	6.23	49	1.856	7.92
8x15	8	15	63	0.760	3.24	61	1.208	5.15	57	1.571	6.70	53	2.007	8.57
8x18.5	8	18.5	80	0.965	4.12	75	1.484	6.34	70	1.927	8.23	64	2.424	10.35
8x24	8	24	102	1.230	5.25	96	1.900	8.11	87	2.397	10.23	79	2.992	12.77

Table 2: Up-Flo® Filter EMC Typical Vault Arrangements*

*-Vault sizes are noted with the maximum number of cartridges.

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Management Measures.

If you have any questions regarding the above information, please contact Anthony Robalik or Minesh Patel of my office at (609) 633-7021.

Sincerely,

abiel Mahon

Gabriel Mahon, Chief Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File Richard Magee, NJCAT Vince Mazzei, NJDEP - DLUR James Murphy, NJDEP - BNPC Anthony Robalik NJDEP – BNPC Minesh Patel NJDEP – BNPC



Up-Flo Filter Extended Maintenance Cartridge Operation and Maintenance Manual

October 2019 Rev. A



hydro-int.com



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Overview and Product Description

The Up-Flo[®] Filter is a modular high-rate stormwater filtration device designed to capture trash, oil, sediment and remove fine pollutants such as particulate metals and nutrients from stormwater runoff. Designed with efficiency, longevity and upkeep in mind, this high performance, low maintenance filter option that offers higher loading rates and longer membrane life for higher quality stormwater for longer periods between servicing. In general, a minimum of two inspections are required per year to monitor sediment and gross pollutant accumulations. In order to achieve an annual TSS removal rate of 80% for the Up-Flo[®] Filter, the minimum maintenance frequency specified in the maintenance section for replacement of the filter inserts and removal of accumulated sediment from the sump is mandatory.





System Components							
Α.	Underdrain Coupling	F .	Underdrain				
В.	Outlet Pipe	G.	Cartridge Restraining Cord				
C.	Outlet Bay	Η.	Cartridge Connection Boot				
D.	Inlet Bay	Ι.	Filter Cartridge				
E.	Inlet Pipe						

Figure 1: The Up-Flo® Filter EMC



Operation

Introduction

The Up-Flo[®] Filter operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirements and is fabricated with durable non-corrosive components. Personnel are not required to operate the unit and maintenance is limited to periodic inspections, sediment and floatables removal and cartridge replacement.

Pollutant Capture

The Up-Flo[®] Filter is designed to operate as a "treatment train" by incorporating multiple treatment technologies into a single device. Trash and gross debris are removed by sedimentation and screening before they are introduced to the filtration membranes, delaying surface blinding. The Up-Flo[®] Filter is a wet-sump device. Between storm events, oil and floatables are stored on the water surface separate from the sediment storage volume in the sump.

Best Practices

Good housekeeping upstream of the Up-Flo[®] Filter can significantly extend maintenance interval. For example, sweeping paved surfaces, collecting leaves and grass trimmings, and protecting bare ground from erosion will reduce loading to the system. The filter cartridges should not be installed until construction activities are complete and site stabilization is effective.

Damage Due to Lack of Maintenance

Delayed maintenance would result in clogged filters. In that situation, an Up-Flo[®] Filter could go into bypass and there would be no treatment of the incoming stormwater. Replacement of the filter cartridges and removal of sediment from the sump would restore the Up-Flo[®] Filter to its original treatment efficiency. Establishing and adhering to a regular maintenance schedule ensures optimal performance of the system.

Inspection & Maintenance

Overview

The Up-Flo[®] Filter protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the proper functioning of the Up-Flo[®] Filter.

Replacement of filter cartridges must be performed inside the vessel. A vactor truck is required for removal of oils, water, sediment, and to completely pump out the vessel to allow for maintenance inside. If you are not using Hydro International or a trained service provider, you must follow OSHA (or other regional) Confined Space Entry procedures when entering the Up-Flo[®] vessel.

The minimum required frequency for replacement of the filter cartridges is annually, whereas the minimum required frequency for removal of accumulated sediment from the sump is dependent on the Up-Flo[®] Filter configuration. Configurations with a larger sediment storage volume per module will require less frequent removal of accumulated sediment. Regardless, whenever sediment depth in the sump is found to be greater than 6 inches (15 cm), sediment removal is required.



Inspection and Maintenance

Routine Inspection

Inspection is a simple process that requires monitoring pollutant accumulations. Maintenance crews should be familiar with the Up-Flo[®] Filter and its components prior to inspection.

The following instructions are intended for non-Hydro maintenance service providers and/or those intending to maintain their own Up-Flo[®] Filter:

Routine Inspection Procedures

- 1. Set up any necessary safety equipment (such as traffic cones) to provide access to the Up-Flo[®] Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.
- 2. Remove the grate or lid to the manhole or vault.
- **3.** Without entering the vessel, look down into the chamber to inspect the inside and to make note of any irregularities.
- **4.** Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the chamber.
- **5.** Using a sediment probe such as a Sludge-Judge[®], measure the depth of sediment that has collected in the sump of the vessel. Maximum sediment depth is 6 inches (15 cm).
- 6. 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 or a high standing water level.
- 7. Securely replace the grate or lid.
- 8. Remove safety equipment.
- 9. Contact Hydro International to discuss any irregularities noted during inspection.

Routine Maintenance

The access port located at the top of the manhole or vault provides access to the Up-Flo[®] vessel for maintenance personnel to enter the vessel and remove and replace filter cartridges. The same access would be used for maintenance personnel working from the surface to vactor out sediment, oil, and water (Figure 2). Unless the Up-Flo[®] Filter has been installed in a very shallow configuration, it is necessary to have personnel with OSHA Confined Space Entry training performing the maintenance that occurs inside the vessel.

Maintenance intervals are determined from monitoring the Up-Flo[®] Filter during its first year of operation. Depending on the site, some maintenance activities may have to be performed on a more frequent basis than others.

A vactor truck is normally required for oil removal, removal of sediment from the sump, and to dewater the vessel for replacement of the filter cartridges. All inspection and maintenance activities would be recorded in an Inspection and Maintenance Log.

The access port located at the top of the manhole provides unobstructed access for a vactor hose and/or skimmer pole to be lowered to the base of the sump.





Figure 2: Sediment is removed from the sump with a vactor hose. Confined space entry is not required for this step.

Maintenance Scheduling

- Call Hydro International to order replacement filter cartridges prior to scheduling maintenance.
- Because filter cartridge replacement requires entry into the Up-Flo[®] chamber, maintenance events should be scheduled during dry weather.
- Filter cartridge replacement should occur immediately after a contaminated spill in the contributing drainage area.

Recommended Equipment

- Safety Equipment (traffic cones, etc.)
- Crow bar to remove grate or lid
- Vactor truck (flexible hose preferred)
- Pressure nozzle attachment
- OSHA Confined Space Entry Equipment
- Replacement Up-Flo[®] Filter Cartridges (available from Hydro International)
- Hydro International Up-Flo® Filter Maintenance Log
- Screwdriver (flat head)

Surface Maintenance Procedure

- 1. Set up any necessary safety equipment (such as traffic cones) around the access of the Up-Flo[®] Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.
- 2. Remove the grate or lid to the manhole or vault.
- 3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
- 4. Once all floatables and oil have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris from the sump floor.



- 5. Retract the vactor hose from the vessel.
- 6. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oils, and gross debris removed, and the depth of sediment measured. Note any apparent irregularities such as damaged components or blockages.
- 7. Securely replace the grate or lid. Remove safety equipment.
- 8. Dispose of sediment and gross debris following local regulations.
- 9. Dispose of oil and sump water at a licensed water treatment facility or following local regulations.
- 10. Contact Hydro International to discuss any irregularities noted during cleanout.

Filter Cartridge Replacement

- 1. Following OSHA or region specific Confined Space Entry procedures, enter the Up-Flo[®] Filter Chamber.
- 2. Starting at the end of the filter cartridge row furthest from the Outlet Bay (Figure 1, Item C) remove each Filter Cartridge (Figure 1, Item I) from the Underdrain (Figure 1, Item A) as described below:
 - a. Unfasten Cartridge Restraining Cord (Figure 1, Item G)
 - b. Loosen Cartridge Connection Boot (Figure 1, Item H) using flathead screwdriver
 - c. Remove Filter Cartridge and transfer to surface.
- 3. Starting at the end of the Underdrain closest to the Outlet Bay, install new Filter Cartridges, supplied by Hydro International.
 - Orient Filter Cartridge with the labeled "Pipe Side" facing away from the Outlet Bay.
 - Tighten Cartridge Connection Boot using flathead screwdriver
 - Fasten Cartridge Restraining Cord
- 4. Exit the Up-Flo[®] Filter chamber and securely replace the grate or lid.
- 5. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oil and gross debris removed, and the depth of sediment measured. Note the number of filter cartridges replaced. Note any irregularities such as damaged components or blockages.
- 6. Remove safety equipment.
- 7. Return spent filter cartridges to Hydro International for refurbishment.
- 8. Contact Hydro International to discuss any irregularities noted during annual maintenance.



Up-Flo[®] Filter Installation Log

SITE REFERENCE NAME OR NUMBER FOR THIS UP-FLO® FILTER LOCATION:					
SITE NAME:					
SITE LOCATIONS:					
OWNER:	SITE CONTRACTOR:				
CONTACT NAME:	CONTACT NAME:				
COMPANY NAME:	COMPANY NAME:				
ADDRESS:	ADDRESS:				
TELEPHONE:	TELEPHONE:				
FAX:	FAX:				

INSTALLATION DATE: _____ /____/

TOTAL NUMBER OF UP-FLO® FILTER CARTRIDGES: _____



Up-Flo® Filter Inspection Log

Site Name:								
Location:								
Owner Name:								
Address:	Address: Phone Number:							
Site Status:								
Date:	Time:*(Sta	_ Site Conditions*: able, Under Construction, Needing Maintenance, etc.)						
Inspection Freq	uency Key: A=annual; M=Mo Inspection Items	spection squency	spected ? N)	aintenance eded? (Y/N)	ms Comments/ Description			
Debris Removal	Adjacent area free of debris? Inlets and outlets free of debris? Facility (internally) free of debris?	En la	<u>ع</u> ک					
Vegetation	Surrounding area fully stabilized? Grass mowed?							
Water retention where required	Water holding chamber(s) at normal pool Evidence of erosion?							
Sediment deposition	Filtration chamber free of sediments? Sedimentation sump not more than 50% full?							
Structural components	Any evidence of structural deterioration? Grates in good condition? Spalling or cracking of structural parts? Outlet/overflow spillway							
Other	Noticeable odors? Any evidence of filter(s) clogging? Evidence of flow bypassing facility?							

Inspection Log Page 1 of 2



Inspector Comments:

Overall Condition of Up-Flo® Filter**: Acceptable / Unacceptable

**Acceptable would mean properly functioning; unacceptable would mean damaged or required further maintenance

If any of the above Inspection Items are checked "Yes" for "Maintenance Needed", list Maintenance actions and their completion dates below or on the Maintenance Log provided on page 11 of the Up-Flo[®] Filter Operation & Maintenance Manual:

Maintenance Action Needed	Due Date

The next routine inspection is scheduled for approximately: (date)

Inspected by: (signature)

Inspected by: (printed) _____

Inspection Log Page 2 of 2



Up-Flo[®] Filter Maintenance Log

Site Name:							
Location:							
Owner Name:							
Address: Phone Number:							
Site Status:							
Date: Time: Site Conditions*: *(Stable, Under Construction, Needing Maintenance, etc.)							
Estimated volume of oil/floatable trash removed:							
Sediment depth measured in sump prior to removal:							
Number of Filter Cartridges replaced:							
Inspector Comments:							
Overall Condition of Up-Flo [®] Filter**: Acceptable / Unacceptable							
**Acceptable would mean properly functioning; unacceptable would mean damaged or required further maintenance							
Maintained by: (signature)							
Maintained by: (printed)							

Appendix B: Sample Maintenance Log

Sample Record Keeping Form

for

Stormwater Management Facilities

Block 233, Lots 2, 3, 7 & 12

West Front Street, Plainfield, NJ

This form is intended for maintaining a rrecord of inspections and maintenance activies for the stormwater management facilities located on Block 233, Lots 2, 3, 7, & 12 in accordance with the approved Stormwater Management Facilities Operation and Maintenance Plan.

Date Completed:

Completed By:

Date of Last Rainfall and Rainfall Amount:

Stormwater Component	Type of Inspection	Overall Condition	Routine Maintenance Performed	Maintenance /Repair Work Needed*
Underground Detention				
Outlet Control Structure				
Inlets & Manholes				
Pump Tank				

* Provide a schedule for the completion of the action

General Comments