

STORMWATER FACILITIES OPERATIONS AND MAINTENANCE MANUAL

MULTI-USE DEVELOPMENT
BLOCK 213.01, LOT 44
TOWNSHIP OF MARLBORO, MONMOUTH COUNTY, NEW JERSEY

MATRIX **NEW** WORLD

Engineering Progress

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1.0 INTRODUCTION

The development of this project will create the following Stormwater Management Facilities (SWMF):

1. Underground detention Basin-StormTank
2. Surface detention basin
3. Stormwater inlets
4. Stormwater Wet-Pond
5. Stormwater piping
6. Water quality treatment structure-Contech StormFilter

All maintenance shall be the responsibility of the property owner. The responsible party for maintenance listed herein shall evaluate the effectiveness of the maintenance plan at least once per year, and adjust the plan and the deed as needed. Adjustments may include frequency of inspection, sediment removal or any other item specifically outlined below.

2.0 DEFINITIONS/ABBREVIATIONS

Underground Detention Basin: A Stormwater Management Facility (SWMF) which provides temporary storage of stormwater runoff. It has an outlet structure that detains and attenuates runoff. An underground detention basin is normally designed as a multistage facility that provides runoff storage and attenuation for stormwater quantity management. This system is designed to hold stormwater for a specific duration of time after a rainfall event and should be dry during all other times.

Surface Detention Basin: A Stormwater Management Facility (SWMF) which provides temporary storage of stormwater runoff. It has an outlet structure that detains and attenuates runoff. A surface detention basin is normally designed as a multistage facility that provides runoff storage and attenuation for stormwater quantity management. This system is designed to hold stormwater for a specific duration of time after a rainfall event and should be dry during all other times.

N.J.A.C.: New Jersey Administrative Code.

Responsible Party: A person or persons responsible for the maintenance and proper function of the stormwater management facility.

Stormwater Inlet: An underground structure with a grate at grade, typically located at a low point, which collects stormwater runoff.

Stormwater Piping: An underground conduit which conveys stormwater runoff from one location to another.

Water Quality Treatment Structure – Contech StormFilter: An underground stormwater treatment device comprised of one structure that houses rechargeable, self-cleaning, media-filled cartridges that trap particulates and absorb pollutants.

3.0 PURPOSE

Stormwater Management Facilities are incorporated into the design of most land development projects to mitigate any adverse impacts from the increase in stormwater runoff, created by either a decrease in the time of concentration, or an increase in impervious surfaces or both. This document is created in order to ensure the proper function of the systems as designed, in order to minimize the potential for damage to property and/or infrastructure in the event of a system failure.

4.0 RESPONSIBLE PARTY

NAME: *William Greenberg – Marlboro Development Group*

ADDRESS: *317 Route 34, Colts Neck, NJ 07722*

TELEPHONE: *(732)-921-8886*

5.0 FUNCTION/OPERATION

5.1 UNDERGROUND DETENTION BASINS - STORMTANK

There are two underground detention basin associated with this development.

The underground detention basins are located under the Commercial Building #1 parking area and Affordable housing parking area. Both of these basins consist of StormTank modules. These basins accept flow from the entire commercial and affordable housing sections of the development.

The underground detention system is designed to collect and attenuate runoff from the proposed improvements. This is accomplished through the introduction of an outflow control structure which regulates flow leaving the system. The system is designed as a normally “dry” system and will convey the entire one-hundred (100) year storm event without overflow of the basin outflow structure when properly maintained.

5.2 SURFACE DETENTION BASIN

There are three surface detention basins associated with this development.

The surface detention basins are located in the Basin #1 is located in between Buildings #15 and #5 in the south-east section of the townhome section, Basin #2 is located in the Eastern Corner of the townhome section, and Basin #3 is located in the northern corner of the townhome section. These basins accept all runoff from the townhome section of the development, as well as a small amount of off-site area.

The surface detention basin is designed to collect and attenuate runoff from not only the proposed improvements but from existing features. This is accomplished through the introduction of an outflow control structure which regulates flow leaving the system. The system is designed as a normally "dry" system. Although these basins can convey the entire one-hundred (100) year storm event without overflow when properly maintained it would be inundated with flood water during a one-hundred (100) year storm event due to the elevation of the basin being below the one-hundred (100) year flood elevation.

5.3 CONTECH STORMFILTER

There is five (5) underground water quality treatment structures associated with this development.

In the commercial section, there is one (1) water quality treatment structure, Contech StormFilter, that is located on the northern side of the building within the lawn area and consists of one 9'x14' structure. The StormFilter accepts all of the flow discharged from the underground detention basin. Stormwater passes through the filtration media and filtered water then discharges out of the structure into a proposed manhole downstream, and ultimately discharges to the existing inlet located at the intersection of Route 79 and Stevenson Drive.

In the affordable housing section, there are two (2) Contech Stormfilter water quality treatment structures aligned in parallel on the eastern side of the building within the parking area and consists of two (2) 8'x16' structures. The StormFilters will accept all of the flow generated from the parking area and connected entrance from Route 79. The stormwater will pass through the Stormfilters, directly into the underground StormTank system, where it will eventually discharge to the existing inlet located at the intersection of Route 79 and Stevenson Drive.

In the townhome section, there are two (2) Contech Stormfilter water quality treatment structures aligned in parallel in the eastern corner of the development adjacent to Stormwater Basin #2 and consists of two (2) 8'x16' structures. The Stormfilters will accept all of the flow generated in the townhome section of the development and are immediately connected to the Stormwater Basin. The stormwater will pass through the Stormfilters, directly into the existing inlet located on Stevenson Drive.

5.4 STORMWATER WET POND

There is one (1) stormwater wet pond associated with this development.

The proposed stormwater wet pond is located within the townhome section of the development in the center of Loop Road. This wet pond is proposed for mainly aesthetic purposes but does attenuate a small portion of stormwater quantity. Discharge generated from the wet pond will flow to Stormwater Basin #2.

6.0 INSPECTION FREQUENCY

6.1 UNDERGROUND DETENTION BASIN

The underground system shall be inspected at least once monthly with additional inspections after rainfall events which generate greater than one inch of rainfall in twenty-four hours, additionally, follow inspection frequency recommendations contained within the StormTank Maintenance Guide in Appendix D. Inspection reports as provided in Appendix A of this manual, shall be maintained and shall be made readily available to all municipal officials requesting same.

The inspection form shall be completed in its entirety by the responsible party with minimal assistance from outside sources.

6.2 SURFACE DETENTION BASIN

The surface detention basins shall be inspected at least once monthly with additional inspections after rainfall events which generate greater than one inch of rainfall in twenty-four hours. Inspection reports as provided in Appendix A of this manual, shall be maintained and shall be made readily available to all municipal officials requesting same.

The inspection form shall be completed in its entirety by the responsible party with minimal assistance from outside sources.

6.3 DRAINAGE STRUCTURES

The stormwater drainage structures such as inlets, manholes and outlet structures shall be inspected at least once monthly with additional inspections after rainfall events, which generate greater than one inch of rainfall in twenty-four hours.

6.4 CONTECH STORMFILTER

Please refer to the Contech StormFilter Inspection and Maintenance Procedures Manual in Appendix E for the inspection frequency of the StormFilter.

6.5 STORMWATER WET POND

The stormwater wet pond shall be inspected at least once monthly with additional inspections after rainfall events which generate greater than one inch of rainfall in twenty-four hours. Inspection reports as provided in Appendix A of this manual, shall be maintained and shall be made readily available to all municipal officials requesting same.

The inspection form shall be completed in its entirety by the responsible party with minimal assistance from outside sources.

7.0 MAINTENANCE

The maintenance procedures normally required vary in complexity, frequency, and cost. In general, SWMF maintenance procedures can be categorized as two types:

1. Functional Maintenance
2. Aesthetic Maintenance

Definitions of each type of maintenance are presented below:

Functional Maintenance: The maintenance required to keep SWMF functional or operational at all times. Functional Maintenance includes both Preventative (routine) Maintenance and Corrective (emergency) Maintenance.

Aesthetic Maintenance: The maintenance required to enhance or maintain the visual appeal of a facility. While Aesthetic Maintenance is not required for assuring the intended operation of a SWMF, it can improve the quality of life in the community and reduce the amount of required Functional Maintenance.

Functional Maintenance can be further divided into two types:

1. Preventative Maintenance
2. Corrective Maintenance

Preventative Maintenance: Functional Maintenance procedures that are required to maintain an intended operation and safe condition by preventing the occurrence of problems and malfunctions. To be effective, Preventative Maintenance should be performed on a regularly scheduled basis and includes such routine procedures as silt and debris removal. Since it is performed on a regular basis, Preventative Maintenance is simpler to schedule and budget for and is easier/less expensive to perform than Corrective Maintenance.

Corrective Maintenance: Functional Maintenance procedures that are required to correct a problem or malfunction at a SWMF and to restore the facility's intended operation and safe condition. Based upon the severity of the problem, Corrective Maintenance must be performed on an as-needed or emergency basis and includes such procedures as structural and equipment repair and mosquito control. By its nature, Corrective Maintenance is much more difficult to schedule and budget and is more difficult/expensive to perform than Preventative Maintenance.

Presented below are detailed descriptions of typical maintenance procedures that are generally applicable to the proposed facilities as part of this project. Aesthetic Maintenance should also play a key role in any SWMF maintenance program. As shown below, Aesthetic Maintenance procedures are incorporated into the Preventative Maintenance schedule. When performed regularly, Aesthetic Maintenance can also help reduce the required amount of both Preventative and Corrective SWMF maintenance. It will help maintain the visual appeal of the SWMF and allow it to reflect positively on the maintenance staff, owner, and community.

7.1 PREVENTATIVE MAINTENANCE

Preventative Maintenance of stormwater management facilities are those tasks required to ensure that the system operates in the manner in which it is intended to and to minimize the need for emergency corrective measures.

Tasks associated with this include, but are not limited to the following:

1. **Removal of Trash and Debris:** A routine program for the removal of accumulated trash and debris from the inlet grates, trash racks and outlet structures shall be provided to ensure runoff will be able to enter the system and to minimize the accumulation of sediment and debris within the system. Disposal of all debris shall be in accordance with applicable codes;
2. **Sediment Removal/Disposal:** Accumulated sediment within the inlets and the detention systems shall be removed and disposed of in accordance with all applicable regulations including, but not limited to NJDEP and OSHA regulations. Sediment shall be removed when the StormTank system as discussed within the StormTank Maintenance Guidelines in Appendix D. Sediment shall be removed when the accumulated depth is less than or equal to (3) three inches within the inlet systems and within the detention systems.

7.2 CORRECTIVE MAINTENANCE

Corrective Maintenance of stormwater management facilities are those tasks which are required on an emergency or non-routine basis to correct problems or malfunctions. These tasks may be completed by the responsible party but will more than likely require professional assistance in the form of a contractor or other source.

Tasks associated with this include, but are not limited to the following:

1. **Removal of Debris and Sediment:** Sediment and debris which prevents or diminishes the ability of runoff from entering the system should be removed and disposed of in a timely manner in accordance with applicable regulations;
2. **Structural Repairs:** Structural damage to the drainage structures or the underground conduits must be repaired promptly. Equipment, personnel, and materials must be available on short notice to complete the repair. The immediacy of the repair will depend on the on the effects to safety and operation of the facility;
3. **Erosion Repair:** Areas subject to erosion due to wind or water shall be repaired immediately. If some event has exposed soils to erosion, corrective steps should be initiated to prevent further loss of soil and any subsequent danger to the stability of the facility;
4. **Snow and Ice Removal:** In the event that snow or ice prevents or limits the amount of runoff from entering the system, same shall be removed to ensure proper function.
5. **Dewatering:** standing water within the detention basins or outlet structures should be inspected immediately to determine the repair required. There is a potential for blockages at the trash rack, orifices and downstream pipes. Any blockages should be removed immediately.

6. Control of Mosquitos: the basins are not intended to hold any water for extended times, so they are not areas for potential mosquito problems. A mosquito control program should be established if mosquitos are encountered in the areas of the basins.

7.3 AESTHETIC MAINTENANCE PROCEDURES

Aesthetic Maintenance, although not required to keep a SWMF operational, will maintain the visual appeal of a facility and will benefit everyone within the local community. Aesthetic Maintenance can also reduce the amount of required Preventative and Corrective Maintenance.

Aesthetic Maintenance may include the following:

1. Details: Careful, meticulous, and frequent attention to the performance of maintenance items such as painting, tree pruning, leaf collection, debris removal, and grass cutting will result in SWMF that remains both functional and attractive.

7.4 CONTECH STORMFILTER MAINTENANCE

Please refer to the Contech StormFilter Inspection and Maintenance Procedures in Appendix E for the required maintenance for the StormFilter Unit.

APPENDIX A – INSPECTION CHECKLIST FOR STORMWATER MANAGEMENT SYSTEMS

Inspection Checklist for Stormwater Management Facilities

Name of Facility: Mixed Use Development - Marlboro

Location: Stevenson Drive, Marlboro, New Jersey

Date: _____

Weather: _____

Facility Item	O.K. ¹	Routine ²	Urgent ³	Comments ⁴
1. Bottoms (Below Ground Detention)				
A. Vegetation				
B. Erosion				
C. Standing Water				
D. Settlement				
E. Trash and Debris				
F. Sediment				
G. Aesthetics				
H. Other:				
2. Inlet Structure				
A. Condition of Structure				
B. Erosion				
C. Trash & Debris				
D. Sediment				
E. Aesthetics				
F. Other:				
3. Outlet Structure				
A. Condition of Structure				
B. Erosion				
C. Trash & Debris				
D. Sediment				
E. Mechanical Components				
F. Aesthetics				
G. Other:				
4. Perimeter				
A. Vegetation				
B. Erosion				
C. Trash & Debris				
D. Fences & Gates				
E. Aesthetics				
F. Other:				

Facility Item

O.K.¹ Routine² Urgent³ Comments⁴

5. Access Roads

A. Vegetation				
B. Road Surface				
C. Fence & Gates				
D. Erosion				
E. Aesthetics				
F. Other:				

6. Miscellaneous

Effectiveness of Existing				
A. Maintenance Program				
B. Dam Inspections				
C. Potential Mosquito Habitats				
D. Mosquitoes				
E. Mechanical Treatment Devices				
F. Other				

¹ The item checked is in good condition and the maintenance program is adequate

² The item checked required attention, but does not present an immediate threat

³ The item checked requires immediate attention

⁴ Provide explanation and details if column 2 or 3 are checked.

APPENDIX B – MAINTENANCE LOG FOR STORMWATER MANAGEMENT FACILITIES

APPENDIX C – MAINTENANCE COSTS

MAINTENANCE COSTS

Routine preventative maintenance of the systems consists of removal of sediment. The range of cost for this task is as follows:

Sediment Removal	\$1,000.00 each occurrence	to	\$5,000 each occurrence
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Corrective maintenance costs associated with the systems are as follows:

Inlet Repair	\$50.00 each	to	\$750.00 each
Control Structure Repair	\$500 each	to	\$5,000 each
Underground Detention System Module Replacement	\$7,000 each	to	\$20,000 each

APPENDIX D – STORMTANK MAINTENANCE GUIDELINES



Maintenance Guidelines

General:

The StormTank™ Stormwater Storage Module is a component in a stormwater collection system, providing storage for the detention or infiltration of runoff. No two systems are the same; with varying shapes, sizes and configurations. Some include pre-treatment to remove sediment and/or contaminants prior to entering the storage area and some do not. Systems without pre-treatment require greater attention to system functionality and may require additional maintenance.

In order to sustain system functionality Brentwood offers the following general maintenance guidelines.

Precautions:

1. Prior to & During Construction - Siltation prevention of the stormwater system.
 - a. Conform to all local, state and federal regulations for sediment and erosion control during construction.
 - b. Install site erosion and sediment BMP's (Best Management Practices) required to prevent siltation of the stormwater system.
 - c. Inspect and maintain erosion and sediment BMP's during construction.
2. Post Construction - Prior to commissioning the StormTank™ system.
 - a. Remove and properly dispose of construction erosion and sediment BMP's per all local, state and federal regulations. Care should be taken during removal of the BMP's as not to allow collected sediment or debris into the stormwater system.
 - b. Flush the StormTank™ system to remove any sediment or construction debris immediately after the BMP's removal. Follow the maintenance procedure outlined.

Inspections:

Follow all local, state, and federal regulations regarding stormwater BMP inspection requirements.

Brentwood Industries makes the following recommendations:

1. Frequency
 - a. During the first service year a visual inspection should be completed during and after each major rainfall event, in addition to semi-annually, to establish a pattern of sediment and debris buildup.
 - i. Each stormwater system is unique and multiple criteria can affect maintenance frequency such as:



610 Morgantown Road, Reading, PA 19611

Revision:
7/26/12

P: 610-374-5109 F: 610-736-1280 Email: Stormwater@brentwoodindustries.com

- a) System Design: pre-treatment/no-pretreatment, inlet protection, stand alone device.
 - b) Surface Area Collecting From: hardscape, gravel, soil.
 - c) Adjacent Area: soil runoff, gravel, trash.
 - d) Seasonal Changes: fall-leaves, winter-salt/cinders.
- b. Second year plus; establish an annual inspection frequency based on the information collected during the first year. At a minimum an inspection should be perform semi-annually.
 - c. Seasonal change; regional areas affected by seasonal change (spring, summer, fall, winter) may require additional inspections at the change of seasons in addition to semi-annually.
2. Inspect:
 - a. Inspection ports.
 - b. Inflow and outflow points including the inlet/manhole and pipes.
 - c. Discharge area.
 3. Identify and Report maintenance required:
 - a. Sediment and debris accumulation.
 - b. System backing up.
 - c. Flow rate change.

Maintenance Procedures:

1. Conform to all local, state and federal regulations.
2. Determine if maintenance is required. If a pre-treatment device is installed, follow manufacturer recommendations.
3. Using a vacuum pump truck evacuate debris from the inflow and outflow points.
4. Flush the system with clean water forcing debris from the system. Take care to avoid extreme direct water pressure when flushing the system.
5. Repeat steps 3 and 4 until no debris is evident.

These maintenance guidelines were written by Brentwood Industries, Inc. with the express purpose of providing helpful hints. These guidelines are no to be construed as the only Brentwood approved methods for StormTank™ system maintenance or the final authority in system maintenance. Check with the stormwater system owner/project engineer for their contract/specification requirements and or recommendations. Contact your local StormTank™ distributor or Brentwood Industries for additional technical support if required.



APPENDIX E – CONTECH STORMFILTER INSPECTION AND MAINTENANCE PROCEDURES

StormFilter Inspection and Maintenance Procedures



Maintenance Guidelines

The primary purpose of the Stormwater Management StormFilter[®] is to filter and prevent pollutants from entering our waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the StormFilter to its full efficiency and effectiveness.

Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site. Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. It is a good practice to inspect the system after major storm events.

Maintenance Procedures

Although there are many effective maintenance options, we believe the following procedure to be efficient, using common equipment and existing maintenance protocols. The following two-step procedure is recommended::

1. Inspection

- Inspection of the vault interior to determine the need for maintenance.

2. Maintenance

- Cartridge replacement
- Sediment removal

Inspection and Maintenance Timing

At least one scheduled inspection should take place per year with maintenance following as warranted.

First, an inspection should be done before the winter season. During the inspection the need for maintenance should be determined and, if disposal during maintenance will be required, samples of the accumulated sediments and media should be obtained.

Second, if warranted, a maintenance (replacement of the filter cartridges and removal of accumulated sediments) should be performed during periods of dry weather.



In addition to these two activities, it is important to check the condition of the StormFilter unit after major storms for potential damage caused by high flows and for high sediment accumulation that may be caused by localized erosion in the drainage area. It may be necessary to adjust the inspection/maintenance schedule depending on the actual operating conditions encountered by the system. In general, inspection activities can be conducted at any time, and maintenance should occur, if warranted, during dryer months in late summer to early fall.

Maintenance Frequency

The primary factor for determining frequency of maintenance for the StormFilter is sediment loading.

A properly functioning system will remove solids from water by trapping particulates in the porous structure of the filter media inside the cartridges. The flow through the system will naturally decrease as more and more particulates are trapped. Eventually the flow through the cartridges will be low enough to require replacement. It may be possible to extend the usable span of the cartridges by removing sediment from upstream trapping devices on a routine as-needed basis, in order to prevent material from being re-suspended and discharged to the StormFilter treatment system.

The average maintenance lifecycle is approximately 1-5 years. Site conditions greatly influence maintenance requirements. StormFilter units located in areas with erosion or active construction may need to be inspected and maintained more often than those with fully stabilized surface conditions.

Regulatory requirements or a chemical spill can shift maintenance timing as well. The maintenance frequency may be adjusted as additional monitoring information becomes available during the inspection program. Areas that develop known problems should be inspected more frequently than areas that demonstrate no problems, particularly after major storms. Ultimately, inspection and maintenance activities should be scheduled based on the historic records and characteristics of an individual StormFilter system or site. It is recommended that the site owner develop a database to properly manage StormFilter inspection and maintenance programs..



Inspection Procedures

The primary goal of an inspection is to assess the condition of the cartridges relative to the level of visual sediment loading as it relates to decreased treatment capacity. It may be desirable to conduct this inspection during a storm to observe the relative flow through the filter cartridges. If the submerged cartridges are severely plugged, then typically large amounts of sediments will be present and very little flow will be discharged from the drainage pipes. If this is the case, then maintenance is warranted and the cartridges need to be replaced.

Warning: In the case of a spill, the worker should abort inspection activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct an inspection:

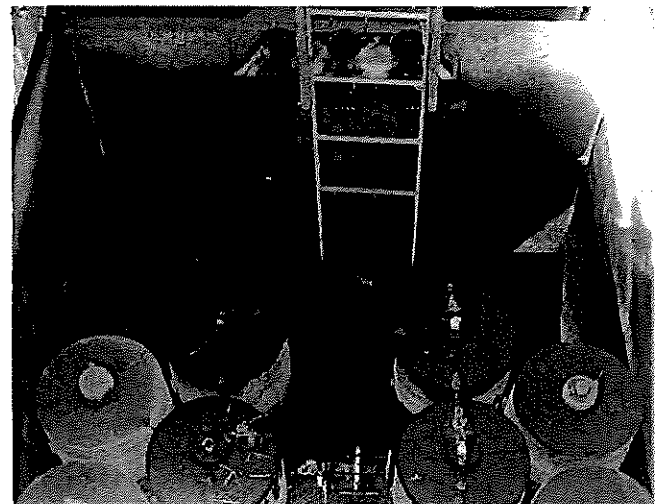
Important: Inspection should be performed by a person who is familiar with the operation and configuration of the StormFilter treatment unit.

1. If applicable, set up safety equipment to protect and notify surrounding vehicle and pedestrian traffic.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the access portals to the vault and allow the system vent.
4. Without entering the vault, visually inspect the inside of the unit, and note accumulations of liquids and solids.
5. Be sure to record the level of sediment build-up on the floor of the vault, in the forebay, and on top of the cartridges. If flow is occurring, note the flow of water per drainage pipe. Record all observations. Digital pictures are valuable for historical documentation.
6. Close and fasten the access portals.
7. Remove safety equipment.
8. If appropriate, make notes about the local drainage area relative to ongoing construction, erosion problems, or high loading of other materials to the system.
9. Discuss conditions that suggest maintenance and make decision as to whether or not maintenance is needed.

Maintenance Decision Tree

The need for maintenance is typically based on results of the inspection. The following Maintenance Decision Tree should be used as a general guide. (Other factors, such as Regulatory Requirements, may need to be considered)

1. Sediment loading on the vault floor.
 - a. If >4 " of accumulated sediment, maintenance is required.
2. Sediment loading on top of the cartridge.
 - a. If $>1/4$ " of accumulation, maintenance is required.
3. Submerged cartridges.
 - a. If >4 " of static water above cartridge bottom for more than 24 hours after end of rain event, maintenance is required. (Catch basins have standing water in the cartridge bay.)
4. Plugged media.
 - a. If pore space between media granules is absent, maintenance is required.
5. Bypass condition.
 - a. If inspection is conducted during an average rain fall event and StormFilter remains in bypass condition (water over the internal outlet baffle wall or submerged cartridges), maintenance is required.
6. Hazardous material release.
 - a. If hazardous material release (automotive fluids or other) is reported, maintenance is required.
7. Pronounced scum line.
 - a. If pronounced scum line (say $\geq 1/4$ " thick) is present above top cap, maintenance is required.



Maintenance

Depending on the configuration of the particular system, maintenance personnel will be required to enter the vault to perform the maintenance.

Important: If vault entry is required, OSHA rules for confined space entry must be followed.

Filter cartridge replacement should occur during dry weather. It may be necessary to plug the filter inlet pipe if base flows is occurring.

Replacement cartridges can be delivered to the site or customers facility. Information concerning how to obtain the replacement cartridges is available from Contech Engineered Solutions.

Warning: In the case of a spill, the maintenance personnel should abort maintenance activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct cartridge replacement and sediment removal maintenance:

1. If applicable, set up safety equipment to protect maintenance personnel and pedestrians from site hazards.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the doors (access portals) to the vault and allow the system to vent.
4. Without entering the vault, give the inside of the unit, including components, a general condition inspection.
5. Make notes about the external and internal condition of the vault. Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.
6. Using appropriate equipment offload the replacement cartridges (up to 150 lbs. each) and set aside.
7. Remove used cartridges from the vault using one of the following methods:

Method 1:

- A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

Using appropriate hoisting equipment, attach a cable from the boom, crane, or tripod to the loose cartridge. Contact Contech Engineered Solutions for suggested attachment devices.

- B. Remove the used cartridges (up to 250 lbs. each) from the vault.



Important: Care must be used to avoid damaging the cartridges during removal and installation. The cost of repairing components damaged during maintenance will be the responsibility of the owner.

- C. Set the used cartridge aside or load onto the hauling truck.
- D. Continue steps a through c until all cartridges have been removed.

Method 2:

- A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.
- B. Unscrew the cartridge cap.
- C. Remove the cartridge hood and float.
- D. At location under structure access, tip the cartridge on its side.
- E. Empty the cartridge onto the vault floor. Reassemble the empty cartridge.
- F. Set the empty, used cartridge aside or load onto the hauling truck.
- G. Continue steps a through e until all cartridges have been removed.

8. Remove accumulated sediment from the floor of the vault and from the forebay. This can most effectively be accomplished by use of a vacuum truck.
9. Once the sediments are removed, assess the condition of the vault and the condition of the connectors.
10. Using the vacuum truck boom, crane, or tripod, lower and install the new cartridges. Once again, take care not to damage connections.
11. Close and fasten the door.
12. Remove safety equipment.
13. Finally, dispose of the accumulated materials in accordance with applicable regulations. Make arrangements to return the used **empty** cartridges to Contech Engineered Solutions.

Related Maintenance Activities - Performed on an as-needed basis

StormFilter units are often just one of many structures in a more comprehensive stormwater drainage and treatment system.

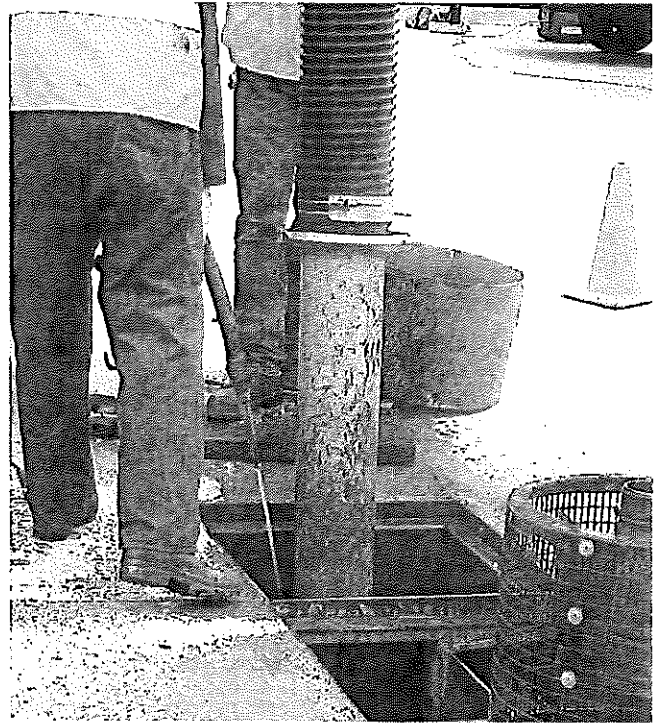
In order for maintenance of the StormFilter to be successful, it is imperative that all other components be properly maintained. The maintenance/repair of upstream facilities should be carried out prior to StormFilter maintenance activities.

In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil loading, and discharges of inappropriate materials.

Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in accordance with regulatory protocols. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily traveled roads.

Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. This typically requires coordination with a local landfill for solid waste disposal. For liquid waste disposal a number of options are available including a municipal vacuum truck decant facility, local waste water treatment plant or on-site treatment and discharge.



Inspection Report

Date: _____ Personnel: _____

Location: _____ System Size: _____

System Type: Vault Cast-In-Place Linear Catch Basin Manhole Other

Sediment Thickness in Forebay: _____ Date: _____

Sediment Depth on Vault Floor: _____

Structural Damage: _____

Estimated Flow from Drainage Pipes (if available): _____

Cartridges Submerged: Yes No Depth of Standing Water: _____

StormFilter Maintenance Activities (check off if done and give description)

Trash and Debris Removal: _____

Minor Structural Repairs: _____

Drainage Area Report _____

Excessive Oil Loading: Yes No Source: _____

Sediment Accumulation on Pavement: Yes No Source: _____

Erosion of Landscaped Areas: Yes No Source: _____

Items Needing Further Work: _____

Owners should contact the local public works department and inquire about how the department disposes of their street waste residuals.

Other Comments:

Review the condition reports from the previous inspection visits.

StormFilter Maintenance Report

Date: _____ Personnel: _____

Location: _____ System Size: _____

System Type: Vault Cast-In-Place Linear Catch Basin Manhole Other

List Safety Procedures and Equipment Used: _____

System Observations

Months in Service: _____

Oil in Forebay (if present): Yes No

Sediment Depth in Forebay (if present): _____

Sediment Depth on Vault Floor: _____

Structural Damage: _____

Drainage Area Report

Excessive Oil Loading: Yes No Source: _____

Sediment Accumulation on Pavement: Yes No Source: _____

Erosion of Landscaped Areas: Yes No Source: _____

StormFilter Cartridge Replacement Maintenance Activities

Remove Trash and Debris: Yes No Details: _____

Replace Cartridges: Yes No Details: _____

Sediment Removed: Yes No Details: _____

Quantity of Sediment Removed (estimate?): _____

Minor Structural Repairs: Yes No Details: _____

Residuals (debris, sediment) Disposal Methods: _____

Notes:



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