

MFS Inspection and Maintenance Procedures



Maintenance Guidelines

The primary purpose of the MFS system is to filter out and prevent pollutants from entering our waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the MFS 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 likely many effective maintenance options, we believe the following procedure is efficient and can be implemented using common equipment and existing maintenance protocols. A two step procedure is recommended as follows:

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 MFS 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, in late summer to early fall when flows into the system are not likely to be present.

Maintenance Frequency

The primary factor controlling timing of maintenance of the MFS system 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 MFS treatment system.

Site conditions greatly influence maintenance requirements. MFS 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.

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 MFS system or site. It is recommended that the site owner develop a database to properly manage MFS inspection and maintenance programs.

Prior to the development of the maintenance database, the following maintenance frequencies should be followed:

Inspection

One time per year

After major storms

Maintenance

As needed, based on results of inspection (The average maintenance lifecycle is approximately 1-3 years)

Per Regulatory requirement

In the event of a chemical spill

Frequencies should be updated as required. The recommended initial frequency for inspection is one time per year. MFS units should be inspected after major storms.

Sediment removal and cartridge replacement on an as needed basis is recommended unless site conditions warrant.

Once an understanding of site characteristics has been established, maintenance may not be needed for one to three years, but inspection is warranted and recommended annually.

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 Stormwater Solutions immediately.

To conduct an inspection:

Important: Inspection should be performed by a person who is familiar with the operation and configuration of the MFS 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 >12" of accumulated sediment, maintenance is required.
2. Plugged media.
 - a. If pore space between media granules is absent, maintenance is required.
3. Bypass condition.
 - a. If inspection is conducted during an average rain fall event and MFS system remains in bypass condition (water over the internal outlet baffle wall or submerged cartridges), maintenance is required.
4. Hazardous material release.
 - a. If hazardous material release (automotive fluids or other) is reported, maintenance is required.
5. Pronounced scum line.
 - a. If pronounced scum line (say $\geq 1/4$ " thick) is present above top cap, maintenance is required.
6. Calendar Lifecycle.
 - a. If system has not been maintained for 3 years maintenance is required.

Assumptions

- No rainfall for 24 hours or more
- No upstream detention (at least not draining into MFS)
- Structure is online
- Outlet pipe is clear of obstruction
- Construction bypass is plugged

Maintenance

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

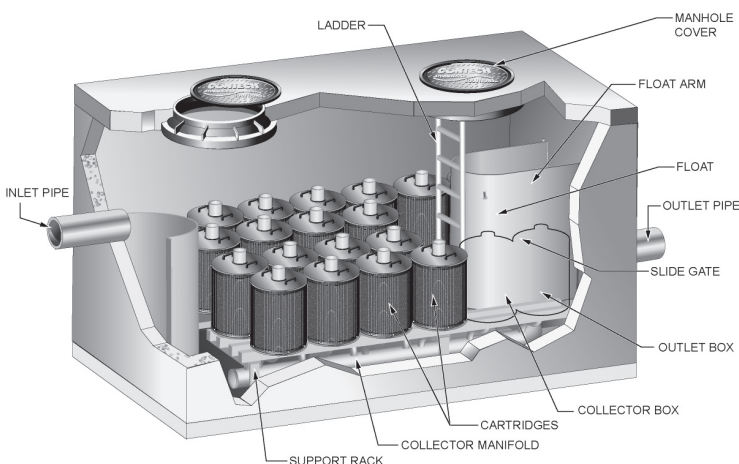
Important: If vault entry is required, OSHA rules for confined space entry must be followed.

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 Stormwater 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 Stormwater 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. Entrance into the vault can occur by stepping down the ladder or steps to gain access to the floor of the vault (the sediment storage bay). The support rack is also an available place to

stand. The sediment storage bay may have up to 21-in of standing water. Wader or hip boots are recommended.

6. Using the pool net to scoop floatables, trash and debris from the surface and dispose them in the trash bag. Removing these items will allow better access to the cartridge filters.
7. Using appropriate equipment offload the replacement cartridges (up to 150 lbs. each) and set aside.
8. Remove used cartridges from the vault using one of the following methods:



Figure 1. 12"-22" Tall cartridges



Figure 2. Perlite Media cartridge



Figure 3. Cartridge support rack Down (Operation Position)



Figure 4. Cartridge support rack Up (Maintenance position)



Figure 5. Cartridge clip in unlocked position (Maintenance)



Figure 6. Cartridge clip in locked position (Operation)

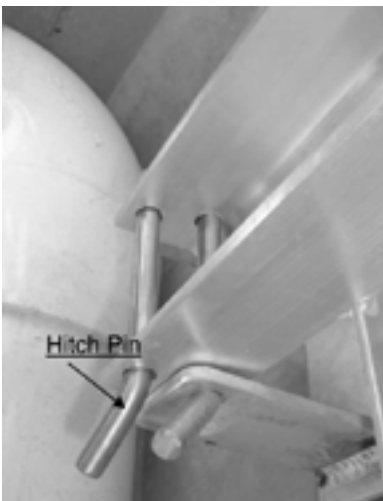


Figure 7. Multiple cartridge hinged support rack connected to the wall with hitch pin securing rack in the Up (Maintenance position)



Figure 8. Single cartridge rack (hinge pin is inserted at the wall – remove to rotate rack into Up (Maintenance position)



Figure 9. O Ring Gasket

Method 1:

- A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the support rack and place them under the vault opening for lifting (removal). It is suggested to start cartridge maintenance from the cartridge filter closest to the center of the vault.
- B. Turn the cartridge by grabbing the cartridge near the top and twisting $\frac{1}{4}$ turn to release them from the locked position on the support rack. The handles are not intended to help twist the cartridge. (Figure 5 & 6)
- C. Each of the cartridges should be lifted using the handles on top of the cartridges.
- D. Alternatively, if a vacuum truck is on site, the tops of the cartridges may be removed and the media can be vacuumed from the cartridges before they are lifted out of the vault. This will reduce the lifting weight.
- E. Each cartridge can be removed by hand or via a small crane.
- F. Multiple Cartridge Support Racks or Single Cartridge Support Racks: The cartridges will be installed in the catch basin, manhole, vault or cast in place structure with either a multiple cartridge support rack as shown in Figure 3 and Figure 4, or on single cartridge support racks as shown in Figures 5 and 6.
- G. If multiple Cartridge support racks are installed these support racks should be rotated into position against the wall to provide full access to the floor of the vault. As shown in Figure 4. There is a hitch pin that is used to hold the rack in the down or up position. As shown in Figure 7, the removable hitch pin is the one that extends only through the support rack. **DO NOT REMOVE THE CONNECTION PIN HOLDING THE SUPPORT RACK TO THE WALL.**

Removal of the hitch pin as indicated in Figure 7 at each hinge location allows the support rack to rotate into the up position, or the Maintenance position. This pin should then be inserted back into the holes on the rack to secure the rack in the up position during maintenance. A cotter

pin is installed on the end of the hitch pin to lock the hitch pin in place.

- H. If single cartridge support racks are installed, the single rack can be rotated by removing the hinge pin at the wall. When the rack is raised up (Maintenance position) it will drop down $\frac{1}{2}$ -inch and secure itself in the up position.
- I. If the forbay area is with accumulated sediment exceeding 12-in, these sediments needs to be removed by a vacuum truck. Flushing of the vault floor may be necessary.
- J. 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 unless CONTECH Stormwater Solutions performs the maintenance activities and damage is not related to discharges to the system.

- K. Set the used cartridge aside or load onto the hauling truck.
- L. Once vacuuming is completed, the support racks should be lowered back in to the down position, as shown in Figure 3 for multiple cartridge rack or Figure 9 for single cartridge rack, and the hitch pin inserted into the holes on the support rack.
- M. Once new cartridges are on site, they can be lowered into the vault. New cartridges are delivered wrapped in shrink wrap. The shrink should be removed when the system is ready to go on line.
- N. The slip connection on the bottom of the cartridge should be installed over the aluminum nipple on the support rack. Inspect the O Ring on the nipple of the support rack to insure it is installed in the gasket groove before securing the cartridge into place. The black O Ring gasket is shown in Figure 8. It is suggested to use silicone or pipe slick to lube the O Ring.
- O. Be sure to shut and lock the access doors, and clean the job site if necessary.



Related Maintenance Activities –

Performed on an as-needed basis

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

In order for maintenance of the MFS 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 MFS 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.



800.925.5240

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Support

- Drawings and specifications are available at contechstormwater.com.
- Site-specific design support is available from our engineers.

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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: _____

MFS 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:

