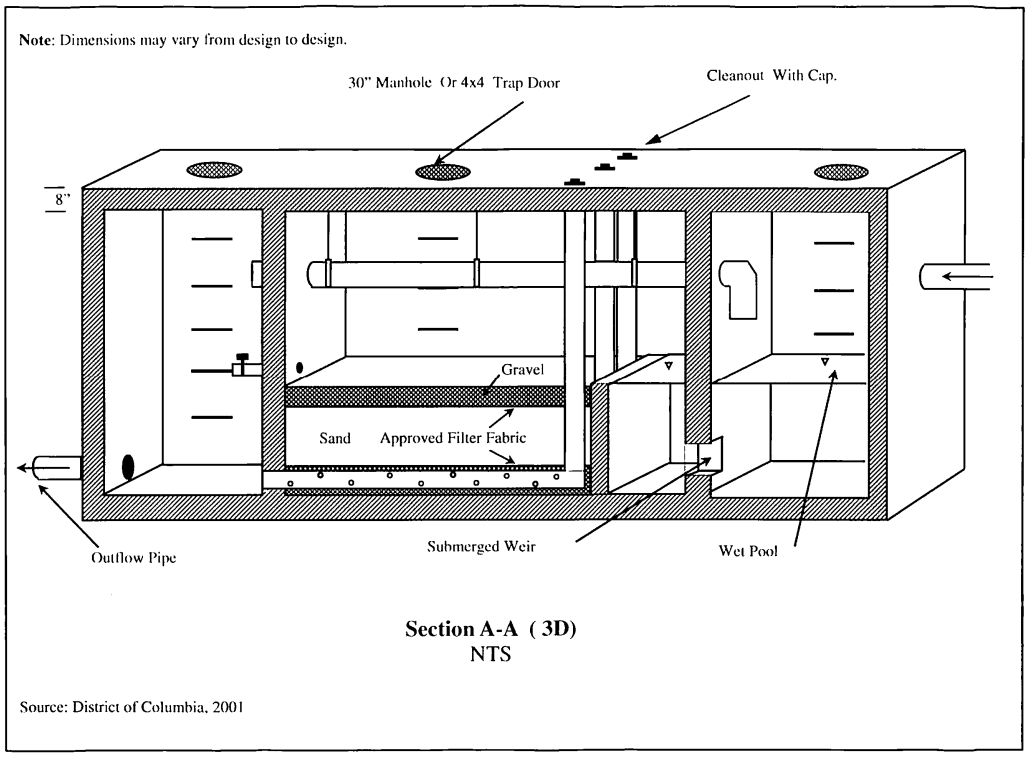
Inspection and Maintenance Procedures for District of Columbia Storm Water Sand Filters



Government of the District of Columbia
District Department of the Environment
Watershed Protection Division
Inspection and Enforcement Branch

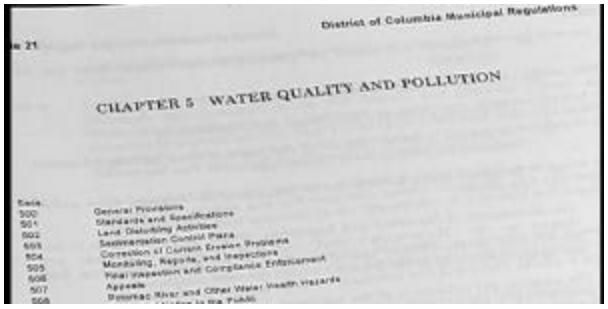
DISTRICT DEPARTMENT OF THE ENVIRONMENT

green forward

Sand Filter Maintenance and Inspection

INSPECTION AND MAINTENANCE PROGRAM

The District of Columbia has pioneered the use of sand filters to treat storm water runoff and over one thousand have been approved for installation since 1988. With time, the efficiency of storm water sand filters decline, and maintenance is required to return it to full operating capacity. It is the responsibility of the owner of the sand filter to assure proper maintenance in accordance with requirements of the District of Columbia.


District of Columbia Municipal Regulations

CHAPTER 5 WATER QUALITY AND POLLUTION

Sand filter maintenance falls under the statutory authority of the District Department of the Environment. Statutory Requirements are found in Section 534 of Title 21, Chapter 5, Water Quality and Pollution, of the District of Columbia Municipal Regulations.

Responsibility for the inspection of storm water treatment devices lies with the Watershed Protection Division of the Department of the Environment. The Department of the Environment has developed this handbook to assist contractors and sand filter owners in the preventive and restorative maintenance of sand filters. Restorative maintenance procedures are illustrated in a video that is available from the Watershed Protection Division.

THE SAND FILTER

A typical District of Columbia sand filter is contained in a three-chamber underground or sometimes above ground concrete vault. The three chambers, as shown on the cover of this booklet, are:

- A separation chamber where runoff enters and sedimentation takes place
- The sand filter itself
- A discharge chamber

Access to the sand filter is provided through the top of the slab via three manholes, or through a double door over the middle chamber. In some cases there may be a grate over the first chamber.

PREVENTIVE MAINTENANCE

Preventive maintenance will extend the life of the filter bed and reduce the frequency of restorative maintenance. The Department of the Environment requires the following for a new sand filter:

- *The water level in the filter chamber should be monitored by the owner on a quarterly basis and after every large storm for the first year after completion of construction.*

- *A log of the results should be maintained, indicating the rate of dewatering after each storm event Complete dewatering should occur within 72 hours of a storm event.*

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The most important step the owner can take to prevent fouling of the filter bed is to periodically clear the first chamber of debris and sediment. Accordingly, an additional requirement of the Department of Health is:

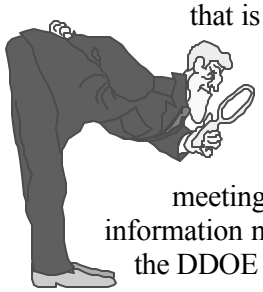
- *The first chamber should be pumped out annually, once the performance of the structure has been demonstrated. Contractors that provide this service must be registered in the District of Columbia.*

After approximately three to five years, the of the filter bed may become clogged with fine silt and debris, depending on the land use. Failure to pump out the first chamber annually may hasten clogging. When the draw down time for the filter bed exceeds 72 hours, partial restoration of the filter bed will be required. Partial restoration of the filter bed involves the removal and replacement of the upper layer of gravel, sand, and geotextile fabric.

RESTORATIVE MAINTENANCE

Inspection

The restorative maintenance process is initiated when the Department of the Environment identifies a unit that is no longer operating effectively and notifies the owner. It is the responsibility of the owner to retain an approved contractor and complete the necessary maintenance within 60 days of recieving a maintenance notice from the DDOE.



Prior to initiating maintenance it is recommended that a preliminary site meeting between the contractor and sand filter owner be arranged to obtain the information necessary to prepare a project Work Plan. If requested a Department of the DDOE staff member will attend the meeting.

Work Plan

A mandatory element of the restorative maintenance process is the preparation of a Work Plan that addresses all aspects of the proposed maintenance project including:

- Health and safety concerns
- Identification of all applicable permits
- Sand filter restoration
- Site restoration
- Handling, characterization, and disposal of wastes

The Work Plan must be submitted to the Department of the Environment at least two full working days before work is to begin. No work should be performed without an approved Work Plan.

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Health and Safety Concerns

Before work begins on the filter, the contractor should conduct a safety meeting to be sure all personnel are familiar with safety requirements and with procedures for handling equipment, materials, and wastes. At the site, set up traffic and pedestrian controls, then organize and set up equipment, materials, and waste handling devices.

The sand filter is a confined space and the atmosphere may not be suitable for immediate entry. The atmosphere should be tested for oxygen level and explosive gasses, and for gasses such as carbon monoxide or hydrogen sulfide that may be of concern. Workers who enter the filter should have received confined space entry training.

Sand Filter Restoration

Depending on its age or condition, either partial or full restoration of the sand filter may be required. This will be determined by the Department of the Environment at the time of the maintenance inspection.

Partial restoration involves pumping out and cleaning the first chamber, then removing and replacing the surface stone layer, underlying layer of filter fabric, and several inches of underlying sand in the second chamber. In full restoration the first chamber is cleaned out, and all of the materials in the sand filter chamber are removed and replaced. The perforated underdrain pipe in the second chamber may be reused if in good condition.

To prevent the loss of storm water, wash water, and sediment from the filter structure, a temporary stop should be placed in the discharge line from the third chamber. The stop must be removed at the end of each working day, and the stop must be removed if there is flow into the sand filter because of rain. Care should be taken during maintenance to minimize spillover of materials from the second chamber to the third. Any spillover from the day's work should be pumped out before the stop is removed.

Remove standing water from the separation and filter bed chambers, and remove all accumulated sediment from the separation chamber. Most of the standing water in the first and second chambers will be removed when the first chamber is pumped out.

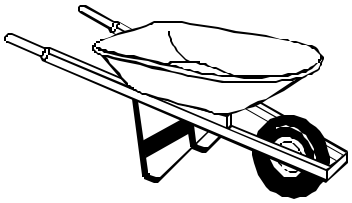
After all standing water has been pumped out, remove the surface stone layer, the underlying filter fabric, and where needed, the top two to three inches of sand from the filter chamber. This comp letes the removal requirements for partial restoration For full restoration all of the sand, stone, and filter fabric in the filter chamber must be removed and replaced.

The sand layer is about two feet thick. Removal of the sand will expose a second layer of filter fabric, then a second stone layer, then several lengths of perforated underdrain pipe sometimes wrapped in filter fabric. Remove and dispose of the fabric wrapping.

From the sand chamber, inspect the underdrains for mechanical damage. From the third or exit chamber, examine the inside of the drainpipe for blockage and/or mechanical damage. If there are any signs of mechanical damage the pipe must be replaced. If the pipe is blocked with sediment or debris, the pipe should be jetted clean or removed and replaced.

If there is a dewatering valve present in the exit chamber, inspect it for proper functioning and replace if necessary. After inspection the dewatering valve should be left in the closed position.

Reconstruction of the Filter



The sand filter should be reconstructed to either the original storm water management plan specifications or to revised specifications approved by the District of Columbia Department of the Environment.

The underdrains should be covered with an approved grade of stone. Make sure that enough stone is available to cover the underdrains to a depth of 1 inch. Place a layer of approved filter cloth on the stone layer. Ensure a 3 -inch upward U-shaped wrap around the chamber walls. Any overlaps of filter fabric should span a minimum of 6 inches.

After the filter cloth is placed over the gravel, install a 2-foot layer of clean washed sand over the fabric, gravel, and under drain. Then place another layer of filter cloth on the sand layer, again ensuring a minimum 3-inch upward U-shape around the chamber walls and 12-inch overlaps. A final layer of washed stone is placed on top of the filter cloth. This layer of gravel should be flush with the top of the weir wall.

Before exiting the filter inspect all chambers to be sure no tools or materials are left behind. Remove the stop from the discharge pipe and confirm that the dewatering valve is in the closed position. Close and lock the access doors if present or replace the manhole covers on all chambers of the sand filter.

The in-ground restoration of the filter is now complete.

Site Restoration

After all work in the filter chamber has been completed, the surface work area must be cleaned up and restored to its original condition.

Sweep up any debris, prepare waste containers for removal from the site, repair damage to asphalt, any grass, graded areas, and retrieve traffic cones and signs. If required by permits, notify police or other agencies that work has been completed.

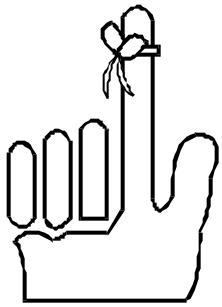
Arrange for final inspection by the Department of the Environment keeping in mind that a release will not be issued until all components of the Work Plan have been completed to the satisfaction of the Department.

Waste Disposal

All materials removed from the filter including sand and filter fabric should be placed in containers suitable for transport to a disposal site. Samples may be taken by the disposal facility to determine the correct means of disposal. Copies of all records related to transportation, analysis, and disposal of wastes should be provided to the Department of the Environment, Watershed Protection Division.

SUMMARY

The Department of the Environment is responsible for ensuring proper operation of the numerous storm water sand filters in the District of Columbia. If the Department of the Environment determines that maintenance work on a sand filter is required, the following steps should be taken:



An onsite meeting between the filter owner and maintenance contractor is recommended to address all questions that should be included in the mandatory Work Plan needed for restorative maintenance service.
The meeting should include safety issues, applicable permits, waste handling, and identification of water and power sources.
Contractors that perform sand filter maintenance must be registered in the District of Columbia,
The Work Plan must be submitted at least two working days before work begins.
The Work Plan must be approved by the Department of the Environment before work begins.

For information on registered contractors, and further information on the sand filter inspection and maintenance program, please contact the District of Columbia Department of the Environment, Watershed Protection Division, at:

District Department of the Environment
1200 First Street NE, 5th Floor
Washington, DC 20002
Tel 202 535-2977

DC Water Quality Sand Filter Dewatering and Maintenance Log

Inspection Date	Rain Date	Dewatering Date	Maintenance Service Date