

**STORMWATER MANAGEMENT FACILITY
MAINTENANCE PLAN MANUAL**

FOR

**THE REDWOOD
REDEVELOPMENT OF BLOCK 151; LOT 33
FOR A FOUR-STORY APARTMENT BUILDING
TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NEW JERSEY**

SUBMITTED TO:

WEST ORANGE ZONING BOARD

PREPARED FOR:

**REDWOOD, L.L.C.
c/o PAGANO REAL ESTATE INC.
55 HARRISTOWN ROAD
GLEN ROCK, NJ 07452-3303**

PREPARED BY:

**PETRY ENGINEERING, LLC
155 PASSAIC AVENUE
FAIRFIELD, NEW JERSEY 07004
973-227-7004**



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**FOR
THE REDWOOD
REDEVELOPMENT OF BLOCK 151; LOT 33
FOR A FOUR-STORY APARTMENT BUILDING
TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NEW JERSEY
PASSAIC RIVER LOWER (SADDLE TO POMPTON) WATERSHED
PASSAIC RIVER DRAINAGE BASIN
SUB-WATERSHED UNIT CODE: 02030103120010
NJSWQS STREAM CLASSIFICATION: FW2-NON-TROUT**

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March 7, 2023**



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Introduction

This Manual presents specific maintenance information about structural and nonstructural stormwater management measures that shall be used to address stormwater quality and quantity requirements of the NJDEP Stormwater Management Rules at N.J.A.C. 7:8, as applied to the proposed residential development site. Two specific structural measures, also known as structural Best Management Practices (BMPs), included in this manual are:

- I. HDPE Pipe Repair Options
- II. StormFilter Inspection and Maintenance Procedures

Information regarding maintenance of each BMP is presented in separate sections of this Manual. Generally, a site specific maintenance plan will need to be established. The information provided in this manual provide minimum recommendations for maintenance.

The specific maintenance plans for the structural/non-structural BMPs included in this Manual will be followed by those parties responsible for their operation and maintenance. To assist the operator and maintenance inspector of the on-site stormwater management facilities, copies of tables, sample checklists, procedural steps and logs from the NJDEP Stormwater Management Facilities Maintenance manual are included in this Manual.

General maintenance for all stormwater management measures include:

- a. Inspection of inlets (in parking lot areas) and riprap aprons for clogging and excessive debris and sediment accumulations at least 4 times annually as well as after every storm exceeding 1 inch of rainfall.
- b. Disposal of debris, trash, sediment and other waste material must be done at suitable disposal/recycling sites and in compliance with all applicable local, state and federal waste regulations.
- c. Parking lot and lawn areas within the site to be kept free of trash/debris and maintained to the greatest extent possible to prevent clogging of stormwater systems.
- d. All structural components such as outlet structures must be inspected for cracking, subsidence, spalling erosion and deterioration at least annual and repaired as required to restore components to original condition.
- e. Inspection of all underground systems shall be in strict accordance with OSHA recommendations for confined space entry and shall be performed during periods of dry weather.



- f. In no instance shall inspection of an underground system be performed less than 72 hours after the end of a rainfall event to allow proper drain time of the systems.

General StormFilter Maintenance:

- a. At minimum, one annual inspection per year for all StormFilters. (Before winter season is recommended, and replacement of filters or removal of sediment executed during periods of dry weather)
- b. Inspect all StormFilters after all major rainfall events.
- c. Maintenance of StormFilters is generally required if more than 4" of sediment has accumulated on the vault floor. (See Maintenance Decision Tree in Maintenance procedures attached to this report for additional information)

General RipRap Apron Maintenance:

- a. Four riprap aprons are located on site.
- b. At minimum, rip rap aprons to be inspected at least once a year or after any major rainfall event. Remove and properly dispose of all trash and debris surrounding and accumulated on the apron itself.
- c. Check riprap aprons for displacement of stone, or scour along any wall or structure near the apron.
- d. Riprap and filter fabric (beneath stone) to be reset if significant erosion or displacement of stone has taken place.

The responsible party for the subject site operation and maintenance is:

Redwood, L.L.C.
c/o Pagano Real Estate Inc.
55 Harrison Road
Glen Rock, NJ 07452-3303
201-493-0300 (ex.100)



TECHNICAL NOTE

HDPE Pipe Repair Options

TN 5.03
January 2010

Introduction

High-density polyethylene (HDPE) pipe is lightweight and very easy to handle. The attributes that make the pipe easy to use can also make it easy to abuse, resulting in damaged pipe or joints. This technical bulletin discusses some of the products available that can be used to repair damaged HDPE pipe or joints in the field.

Repair Options

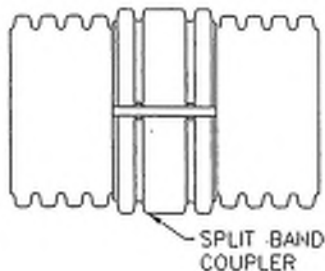
One of the primary considerations in selecting a repair method is the degree of joint performance required. Watertight repairs are generally used on pipe with watertight joints, and soil-tight repairs on pipe with soil-tight joints. This helps keep costs in line and prevents the repair from being the weak area of the pipe system.

The way in which a pipe can be accessed is another primary consideration which influences what type of repair alternative is selected. Pipe that is not yet buried, or can be easily excavated, can be repaired from the exterior. If the pipe is buried and cannot be conveniently excavated, an internal repair may be the best alternative. If the pipe is too small to enter, there are companies with remote controlled equipment that can install the product. Each situation must be considered individually.

The repair options addressed below are divided into external repairs and internal repairs. During any pipe repair, backfill should be placed and compacted per project specifications to provide proper support for the pipe and coupler.

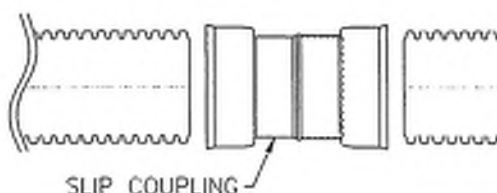
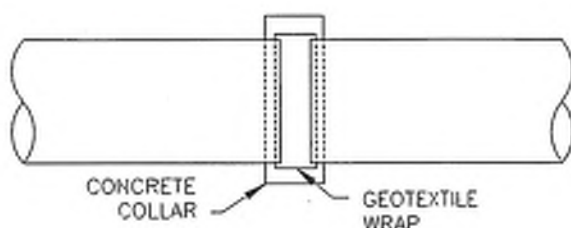
External Mechanical Repairs

Mar Mac Polyseal Pipe Coupler, 4- through 60-inch (100 - 1500 mm), consists of a mastic adhesive base layer, a cross-laminated polyethylene middle layer with a spun-bonded geotextile polypropylene cloth outer layer. The coupler incorporates a self-adhering rubberized bonding mastic and securing bands to insure a positive seal around the pipe. . If the pipe itself is damaged, the damaged area will need to be removed and a new pipe section spliced in before installing a coupler around both ends. Polyseal Pipe Couplers are reasonably priced, especially when considering the quality of the finished repair, and are typically used with soil-tight smooth interior corrugated HDPE pipe products. *Note: Mar-Mac bands shall be installed in accordance with manufacturer's recommendations.*



Snap couplers, 4- through 8-inch (100 - 200 mm), and *split band couplers*, 10- through 30-inch (250 - 750 mm), will provide a soil-tight repair with or without gaskets. This repair method should only be used if the damaged area is in a non-trafficked green area, is cosmetic in nature, confined to a single corrugation, and is not defined as structural damage. The coupler shall be centered around the damaged area of pipe and tightened down with the nylon straps. If the damaged area is large or significant, the damaged area is to be cut out, and replaced with a new section of pipe. The replacement section is to be 'spliced' in place using snap or split band couplers. They are a convenient, low-cost repair alternative, and are typically used to repair soil-tight smooth interior corrugated HDPE pipe products.

Concrete collars also provide a soil-tight repair, dependent on the integrity of the installation. Installing a concrete collar involves building a form around the area to be repaired and encasing it in concrete. A geotextile is usually wrapped around the repair area prior to pouring the collar to keep the concrete from seeping into the pipe. Typically, approximately 6" (0.15m) is excavated beneath the pipe to allow for proper application of the geotextile and concrete encasement. If the pipe itself is damaged, the damaged area shall be removed and a replacement pipe section spliced in prior to pouring the collar. In order to provide a greater level of joint performance, a gasket can be installed on the pipe in the concrete encasement. Concrete collars are typically more costly and time consuming than snap couplers or split band couplers but are reasonable repair options for soil-tight smooth interior corrugated HDPE pipe products.



Slip Couplings 4- through 24-inch (100 – 600 mm), provides a watertight repair that will meet most pressure testing requirements, when installed correctly. The slip coupling uses PVC bells with gaskets. The gaskets are placed in the valleys on either side of the section to be repaired and slip couplings are then slid over the gaskets. PVC slip couplings are most commonly used with watertight smooth interior corrugated HDPE pipe products.

Internal Repairs

Internal mechanical repair products generally consist of a flexible cylindrical gasket sleeve, which is expanded to conform to the inner wall of the pipe. The feasibility of this repair method depends on the size of the damaged section or joint and available access into the pipe. Internal mechanical seals slightly restrict the inside diameter of the pipe. This should be considered when assessing the risk of debris obstruction.

NPC Internal Joint Seal, 18- through 60-inch (450 – 1500 mm), consists of an EPDM rubber seal and stainless steel bands. The rubber seal is inserted into the pipe and positioned over the joint. A torque wrench is used to expand the bands against the inner wall of the pipe. The Internal Joint Seal is designed to seal joints – not repair damaged pipe sections. The damaged area of the pipe must be removed and a replacement section spliced in if necessary in order to use the Internal Joint Seal. This system may provide a watertight joint when installed as recommended. The manufacture should be contacted to verify the product meets the specific application requirements including test requirements, if specified. If pressure tests are required, NPC should be contacted to ensure that the product is suitable for the specific test criteria.

Internal mechanical seals will slightly restrict the inside diameter of the pipe. This should be considered when assessing the risk of debris obstruction.

Link Pipe Grouting Sleeve™, 4 through 60 inch (100 – 1500 mm), is a stainless steel grouting sleeve that is installed with an inflatable plug. The sleeve may be used to seal a joint or repair short sections of damaged pipe. The manufacture should be contacted to verify the product meets the specific application requirements including test requirements, if specified.

Internal chemical sealing is another method of internal joint repair using chemically activated gel or grout to minimize joint leakage. The grout is typically applied with specialized remote-controlled equipment. Test/seal



packer is used to remotely seal a joint. The grouting chemicals are forced through the joint out into the surrounding soil where they gel with the soil. The gelled mass forms a waterproof collar around the pipe. The result is significantly reduced leakage. There are several types of chemical grouts available and the manufacturer should be contacted to review the specific situation and any joint tightness or pressure test criteria. Companies such as Avanti International, Strata Tech Inc., and Caryl Corporation manufacture and/or install chemical grout. Stephen's Technologies *New Life Coatings* and *NewLife Liner Systems* as well as Avast Hydro-Lining International, are examples of companies that offer cured in place epoxy lining systems that have been effectively used with HDPE pipe. Most pipe diameters can be chemically grouted provided the grouting contractor has the appropriate equipment.

Manufacturer Contact Information

Contact the Regional Engineer or Application Engineering Department for assistance with other unique conditions or for contact information regarding any companies listed in this technical note.

Note: The HDPE pipe products are solely intended for the conveyance of fluids. Access into this product for maintenance, inspection, repair, or other reason should be done in strict accordance with OSHA recommendations for confined space entry.

TECHNICAL NOTE

Retention/Detention System Maintenance

TN 6.01
February 2007

This document is provided for informational purposes only and is meant only to be a guide. Individuals using this information should make their own decisions as to suitability of this guideline for their individual projects and adjust accordingly.

Introduction

A retention/detention system is comprised of a series of pipes and fittings that form an underground storage area, which retains or detains storm water runoff from a given area. As sediment and debris settle out of the detained stormwater, build up occurs that requires the system to be regularly inspected and cleaned in order for the system to perform as originally designed. The following provides the available fittings and guidelines for inspection and maintenance of an HDPE underground storage system.

System Accessories and Fittings

Concentric Reducers

Concentric Reducers are fittings that transition between two pipes, either in line with one another or at perpendicular angles. The centerlines of the two pipes are at the same elevation. When a concentric reducer is used to connect the manifold pipe to the lateral pipes, most debris will be trapped in the manifold pipe.



Eccentric Reducers

Eccentric Reducers are fittings that transition between two pipes, either in line with one another or at perpendicular angles. The inverts of the two pipes are at the same elevations. When an eccentric reducer is used to connect the manifold pipe to the lateral pipes, most debris will follow the flow of the storm water into the lateral pipes.



Riser

Each retention/detention system typically has risers strategically placed for maintenance and inspection of the system. These risers are typically 24" in diameter or larger and are placed on the manifold fittings.

Cleanouts

Cleanout ports are usually 4-, 6-, or 8-in diameter pipe and are placed on the manifold fittings. They are used for entrance of a pipe from a vacuum truck or a water-jetting device.



RISER
CROSS-SECTION VIEW



CLEANOUT
CROSS-SECTION VIEW

For a complete listing of available fittings and components please refer to the *ADS Fittings Manual*.

Maintenance Overview of a Retention/Detention System

Maintaining a clean and obstruction-free retention/detention system helps to ensure the system performs the intended function of the primary design. Build up of debris may obstruct flow through the laterals in a retention system or block the entranceway of the outlet pipe in a detention system. This may result in ineffective operation or complete failure of the system. Additionally, surrounding areas may potentially run the risk of damage due to flooding or other similar issues.

Inspection/Maintenance Frequency

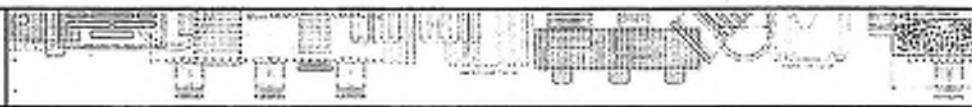
All retention/detention systems must be cleaned and maintained. Underground systems may be maintained more cost effectively if these simple guidelines are followed. Inspection should be performed at a minimum of once per year. Cleaning should be done at the discretion of individuals responsible to maintain proper storage and flow. While maintenance can generally be performed year round, it should be scheduled during a relatively dry season.

Pre-Inspection

A post-installation inspection should be performed to allow the owner to measure the invert prior to accumulation of sediment. This survey will allow the monitoring of sediment build-up without requiring access to the retention/detention system.

The following is the recommended procedure for pre-inspections:

- 1) Locate the riser section or cleanouts of the retention/detention system. The riser will typically be 24" in diameter or larger and the cleanouts are usually 4", 6" or 8" in diameter.
- 2) Remove the lid of the riser or clean outs.
- 3) Insert a measuring device into the opening and make note to a point of reference on the stick or string. (This is done so that sediment build up can be determined in the future without having to enter the system.)



Inspection/Maintenance

A retention/detention system should be inspected at a minimum of one time a year or after major rain events if necessary.

The following is the recommended procedure to inspect system in service:

- 1) Locate the riser section of the retention/detention system. The riser will typically be 24" in diameter or larger.
- 2) Remove the lid from the riser.
- 3) Measure the sediment buildup at each riser and cleanout location. Only certified confined space entry personnel having appropriate equipment should be permitted to enter the retention/detention System.
- 4) Inspect each manifold, all laterals, and outlet pipes for sediment build up, obstructions, or other problems. Obstructions should be removed at this time.
- 5) If measured sediment build up is between 5% - 20% of the pipe diameter, cleaning should be considered; if sediment build up exceeds 20%, cleaning should be performed at the earliest opportunity. A thorough cleaning of the system (manifolds and laterals) shall be performed by either manual methods or by a vacuum truck.

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:

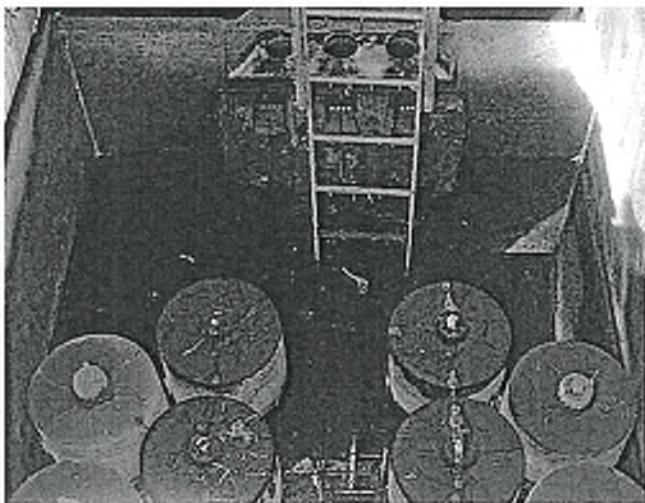
Important: Inspection should be performed by a person who is familiar with the operation and configuration of the StormFilter treatment unit.

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:

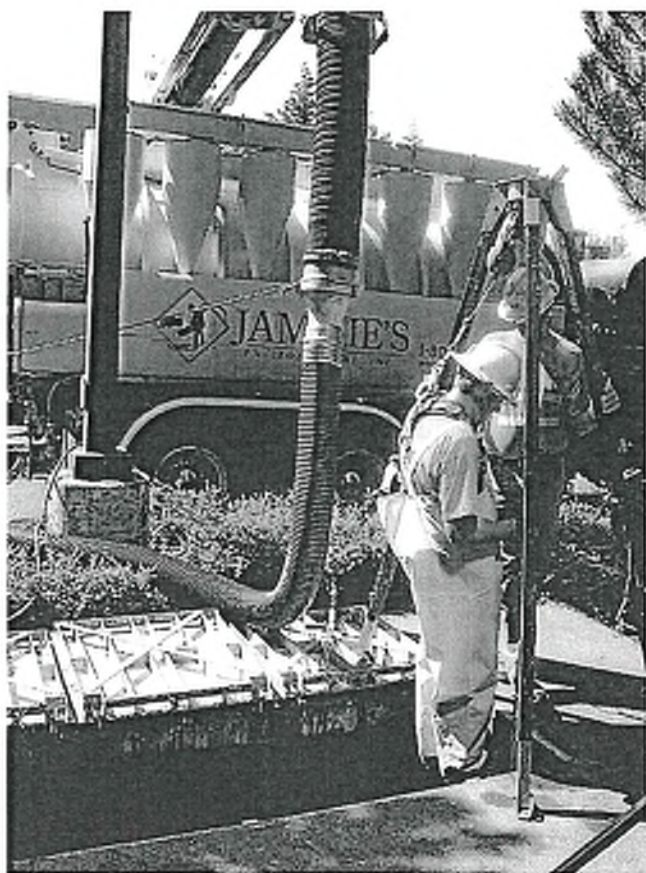
1. If applicable, set up safety equipment to protect maintenance personnel and pedestrians from site hazards.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the doors (access portals) to the vault and allow the system to vent.
4. Without entering 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.

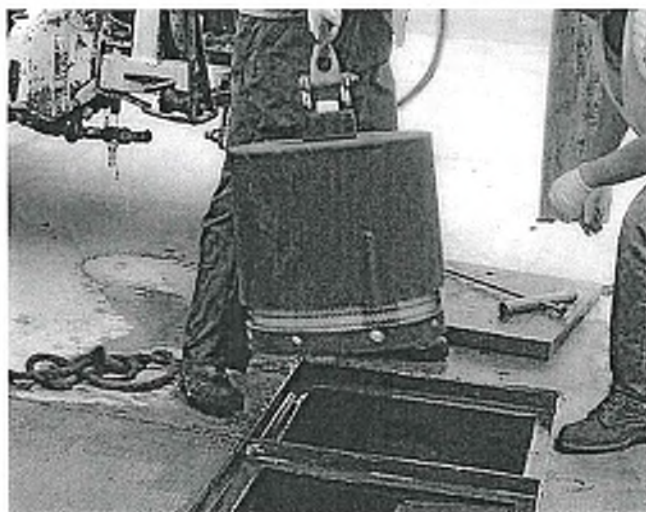
In order for maintenance of the StormFilter to be successful, it is imperative that all other components be properly maintained. The maintenance/repair of upstream facilities should be carried out prior to StormFilter maintenance activities.

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:

Section III – Maintenance Cost Estimate

Basin #1 & #2 Inspections.....	\$500 per year (per system)
StormFilter Inspection (2 systems).....	\$500 per year (per system)
StormFilter Replacement.....	\$250/cartridge every 3 years
RipRap Inspection (4 aprons).....	\$100 per year (per apron)

Maintenance cost estimate includes all maintenance tasks, including seed, equipment, sediment, trash and debris removal. Maintenance cost estimates are based on engineering assumptions, manufacturer's recommendations as well as the relative frequency of maintenance. Actual costs may differ from estimate.



APPENDIX

MAINTENANCE EQUIPMENT AND PROCEDURES

TABLE 4-1

N.J. DEPARTMENT OF ENVIRONMENTAL PROTECTION STORMWATER MANAGEMENT FACILITY MAINTENANCE MANUAL

SUMMARY OF MAINTENANCE PROCEDURES

A. PREVENTATIVE MAINTENANCE

1. Grass Cutting
2. Grass Maintenance
3. Vegetative Cover
4. Removal and Disposal of Trash and Debris
5. Sediment Removal and Disposal
6. Mechanical Components
7. Elimination of Mosquito Breeding Habitats
8. Pond Maintenance
9. Inspection
10. Reporting

B. CORRECTIVE MAINTENANCE

1. Removal of Debris and Sediment
2. Structural Repairs
3. Dam, Embankment, and Slope Repairs
4. Dewatering
5. Pond Maintenance
6. Extermination of Mosquitoes
7. Erosion Repair
8. Fence Repair
9. Elimination of Trees, Brush, Roots, and Animal Burrows
10. Snow and Ice Removal

C. AESTHETIC MAINTENANCE

1. Graffiti Removal
2. Grass Trimming
3. Control of Weeds
4. Details

MAINTENANCE EQUIPMENT AND PROCEDURES

TABLE 4-2

N.J. DEPARTMENT OF ENVIRONMENTAL PROTECTION STORMWATER MANAGEMENT FACILITY MAINTENANCE MANUAL

MAINTENANCE EQUIPMENT AND MATERIALS

This Table lists the equipment and materials which are typically required to maintain a SWMF. It is presented as a general guide to assist owners, maintenance directors, designers, and financial planners in establishing specific facility maintenance programs. The reader should note that actual equipment and materials requirements must be determined on an individual basis for each facility. Additionally, specific manufacturers, brand names, and types of equipment are not included, as availability, personal preference, and specific usage must also be determined for each maintenance program.

A. GRASS MAINTENANCE EQUIPMENT

1. Tractor-Mounted Mowers
2. Riding Mowers
3. Hand Mowers
4. Gas Powered Trimmers
5. Gas Powered Edgers
6. Seed Spreaders
7. Fertilizer Spreaders
8. De-Thatching Equipment
9. Pesticide and Herbicide Application Equipment
10. Grass Clipping and Leaf Collection Equipment

B. VEGETATIVE COVER MAINTENANCE EQUIPMENT

1. Saws
2. Pruning Shears
3. Hedge Trimmers
4. Wood Chippers

C. TRANSPORTATION EQUIPMENT

1. Trucks for Transportation of Materials
2. Trucks for Transportation of Equipment
3. Vehicles for Transportation of Personnel

MAINTENANCE EQUIPMENT AND PROCEDURES

TABLE 4-2 (CONTINUED)

D. DEBRIS, TRASH, AND SEDIMENT REMOVAL EQUIPMENT

1. Loader
2. Backhoe
3. Grader

E. MISCELLANEOUS EQUIPMENT

1. Shovels
2. Rakes
3. Picks
4. Wheel Barrows
5. Fence Repair Tools
6. Painting Equipment
7. Gloves
8. Standard Mechanics Tools
9. Tools for Maintenance of Equipment
10. Office Space
11. Office Equipment
12. Telephones
13. Safety Equipment
14. Tools for Concrete Work (Mixers, Form Materials, etc.)
15. Welding Equipment (for Repair of Trash Racks, etc.)

F. MATERIALS

1. Topsoil
2. Fill
3. Seed
4. Soil Amenities (Fertilizer, Lime, etc.)
5. Chemicals (Pesticides, Herbicides, etc.)
6. Mulch
7. Paint
8. Paint Removers (for Graffiti)
9. Spare Parts for Equipment
10. Oil and Grease for Equipment and SWMF Components
11. Concrete

Maintenance Work Order and Checklist for Stormwater Management Facilities

Name of Facility: _____

Location: _____ Date: _____

Crew: _____ Work Started: date _____ time _____

Equipment: _____ Work Completed: date _____ time _____

Weather: _____ Total Manhours of Work: _____

A. Preventative Maintenance

Work Item	Items Required (√)	Items Done (√)	Comments and Special Instructions
1. Grass Cutting			
A. Bottoms			
B. Embankments and Side Slopes			
C. Perimeter Areas			
D. Access Areas and Roads			
E. Other:			
2. Grass Maintenance			
A. Fertilizing			
B. Re-Seeding			
C. De-Thatching			
D. Pest Control			
E. Other:			
3. Vegetative Cover			
A. Fertilizing			
B. Pruning			
C. Pest Control			
D. Other:			
4. Trash and Debris Removal			
A. Bottoms			
B. Embankments and Side Slopes			
C. Perimeter Areas			
D. Access Areas and Roads			
E. Inlets			
F. Outlets and Trash Racks			
G. Other:			
5. Sediment Removal			
A. Inlets			
B. Outlets and Trash Racks			
C. Bottoms			
D. Other:			

SWM Maintenance List

 Items
Required
(√)

 Items
Done
(√)

Comments and Special Instructions

Page 2 of 3

Work Item

6. Mechanical Components

A. Valves			
B. Sluice Gates			
C. Pumps			
D. Fence Gates			
E. Locks			
F. Access Hatches			
G. Other:			

7. Elimination of Potential Mosquito Breeding Habitats

--	--	--	--

8. Pond Maintenance

A. Aeration Equipment			
B. Debris & Trash Removal			
C. Weed Removal			
D. Other:			

9. Other Preventative Maintenance

A.			
B.			
C.			

B. Corrective Maintenance

Work Item	Items Required (√)	Items Done (√)	Location, Comments and Special Instructions
1. Removal of Debris & Sediment			
2. Structural Repairs			
3. Dam, Embankment & Slope Repairs			
4. Dewatering			
5. Pond Maintenance			
6. Control of Mosquitoes			
7. Erosion Repair			
8. Fence Repair			
9. Elimination of Trees, Brush, Roots & Animal Burrows			
10. Snow & Ice Removal			
11. Other			

C. Aesthetic Maintenance

Work Item	Items Required (✓)	Items Done (✓)	Location & Comments
1. Graffiti Removal			
2. Grass Trimming			
3. Weeding			

Remarks (Refer to Item No., if Applicable):

Work Order Prepared By: _____

Work Completed By: _____

[illegible][illegible][illegible][illegible]

Work Item

- [illegible]

- [illegible]

- [illegible]

- [illegible]

- | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|
| | | | | | | | | |
|--|--|--|--|--|--|--|--|--|

- [illegible]

- [illegible]

- [illegible]

- [illegible]

- [illegible]

- [illegible]

C. Aesthetic Maintenance

Work Item

1. Graffiti Removal

--	--	--	--	--	--	--	--	--	--

2. Grass Trimming

--	--	--	--	--	--	--	--	--	--

3. Weeding

--	--	--	--	--	--	--	--	--	--

4. Other:

--	--	--	--	--	--	--	--	--	--

Remarks (Refer to Item No., If Applicable):

Table 4-5

Inspection Checklist for Stormwater Management Facilities

Name of Facility: _____

Location: _____ Date: _____

Weather: _____

Facility Item	O.K. ¹	Routine ²	Urgent ³	Comments ⁴
1. Embankments and Side Slopes				
A. Vegetation				
B. Linings				
C. Erosion				
Settlement				
Sloughing				
F. Trash and Debris				
G. Seepage				
H. Aesthetics				
I. Other:				

A. Vegetation				
B. Linings				
C. Erosion				
Settlement				
Sloughing				
F. Trash and Debris				
G. Seepage				
H. Aesthetics				
I. Other:				

2. Bottoms (Detention and Infiltration)

A. Vegetation				
B. Erosion				
C. Standing Water				
D. Settlement				
E. Trash and Debris				
F. Sediment				
G. Aesthetics				
H. Other:				

3. Low Flow Channels (Detention)

A. Vegetation				
B. Linings				
C. Erosion				
D. Settlement				
E. Standing Water				
F. Trash and Debris				
G. Sediment				
H. Other:				

Facility Item O.K.¹ Routine² Urgent³ Comments⁴

4. Ponds (Retention)

A. Vegetation				
B. Shoreline Erosion				
C. Aeration Equipment				
D. Trash & Debris				
E. Sediment				
F. Water Quality				
G. Other:				

5. Inlet Structure

A. Condition of Structure				
B. Erosion				
C. Trash & Debris				
D. Sediment				
E. Aesthetics				
F. Other:				

6. Outlet Structure (Detention & Retention)

A. Condition of Structure				
B. Erosion				
C. Trash & Debris				
D. Sediment				
E. Mechanical Components				
F. Aesthetics				
G. Other:				

7. Emergency Spillway

A. Vegetation				
B. Lining				
C. Erosion				
Trash & Debris				
Other:				

8. Perimeter

A. Vegetation				
B. Erosion				
C. Trash & Debris				
D. Fences & Gates				
E. Aesthetics				
F. Other:				

9. Access Roads

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

Facility Item O.K.¹ Routine² Urgent³ Comments⁴

10. Miscellaneous

A. Effectiveness of Exist. Maint. Program				
B. Dam Inspections				
C. Potential Mosquito Habitats				
D. Mosquitoes				
E.				
F.				
G.				

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

² The item checked requires attention, but does not present an immediate threat to the facility function or other facility components.

³ The item checked requires immediate attention to keep the facility operational or to prevent damage to other facility components.

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

Remarks (Refer to Item No., if Applicable):

Inspector: _____

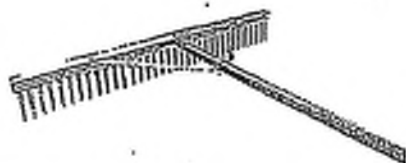
Facility Item

10. Miscellaneous

A. Effectiveness of Exist. Maint. Program										
B. Dam Inspections										
C. Potential Mosquito Habitats										
D. Mosquitoes										
E.										
F.										
G.										

- ¹ The item checked is in good condition, and the maintenance program is adequate.
- ² The item checked requires attention, but does not present an immediate threat to the facility function or other facility components.
- ³ The item checked requires immediate attention to keep the facility operational or to prevent damage to other facility components.

Remarks (Refer to Item No., If Applicable):



Specialty designed for sifting, grading and screening. The tool of choice when you have to sift or screen stones and debris from sand or fine soil.

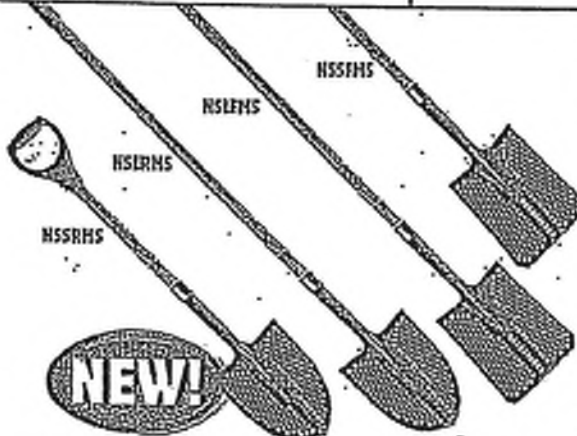
All Rakes have a 56" L handle with 5" L vinyl grip for increased comfort.

No.	Description	Weight	1-2	3+
818-60777	24" W Landscape Rake	4.5 lb.	\$40.50	\$36.50
818-60778	36" W Landscape Rake	5.3 lb.	49.70	44.50
818-60779	48" W Landscape Rake	6.0 lb.	57.80	52.10
818-60780	24" W Screening Rake	4.0 lb.	40.90	44.10
818-60781	36" W Screening Rake	4.5 lb.	50.20	52.50

SCREENING RAKE BY BEN MEADOWS
(OR APPROVED EQUAL)

50 lb/bag PINELANDS GREEN TURF FESCUE
PLUS MIX (SUN OR SHADE) \$73.00/bag
40% Jubilee tall fescue
40% Morgan tall fescue
14% Saint perennial ryegrass
6% Cache Kentucky bluegrass

GRASS SEED MIXES BY
PINELANDS NURSERY
(OR APPROVED EQUAL)



Mud Slingers

Buy these 4 great new additions to our already outstanding line of shovels and spades.

- Holes in blade allow for superior mud-release.
- The blade is almost 1 pound lighter.
- Fiberglass handle and cushion grip.
- Satisfaction Guaranteed.

All Mud Slingers \$46.47 ea.

Indestructible Shovels & Spades!

No more broken handles!

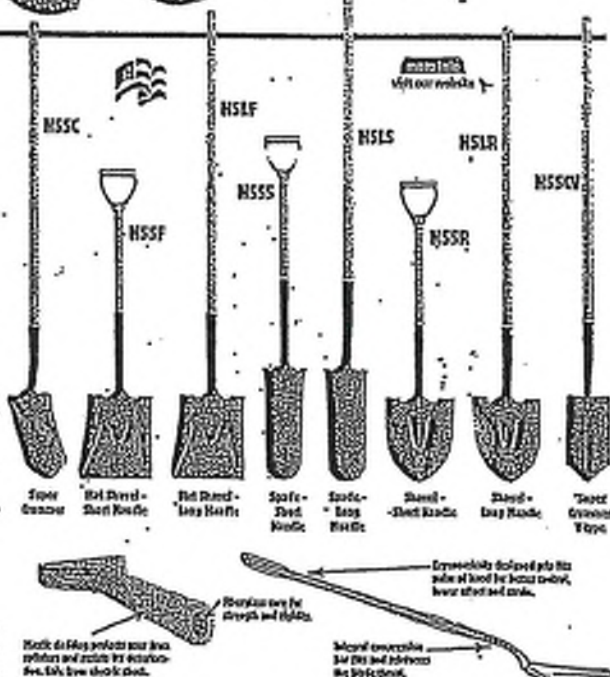
- Heavy 14-gauge blades with hollow-back construction.
- Solid fiberglass handles that are guaranteed for a lifetime.
- Forward turned steps for foot comfort and easier penetration.
- Does not absorb moisture, resists industrial chemicals.
- Easily cleaned of concrete, tar, etc.
- Easy to handle in extreme temperatures.
- Ergonomic design for comfort and stress reduction.
- Excellent rigidity reduces wasted effort.

*Super Crumpler V-type

..... \$35.19 ea.

All Others \$31.19 ea.

Handles only \$16.70 ea.



MUD SLINGERS, SHOVELS &
SPADES BY AGRI DRAIN
(OR APPROVED EQUAL)

EXHIBIT 1

NOTE:
ITEMS SHALL BE USED FOR REMOVAL OF
SAND AND DEBRIS.

ADDITIONAL MAINTENANCE CRITERIA

MATERIAL DISPOSAL

Disposal of debris, trash, sediment, and other waste material must be done at suitable disposal/recycling sites and in compliance with all applicable local, state, and federal waste regulations.

MAINTENANCE CRITERIA

- Two inspections are required during the first year of operation of both Basin #1 & #2 and their respective isolator rows. Inspection in subsequent years is based on the maintenance plan that is developed in the first year, but should be inspected a minimum of once very year.
- Two inspections are required during the first year of operation of the Stormfilter structures. Inspection in subsequent years is based on the maintenance plan that is developed in the first year, but should be inspected a minimum of once very year.