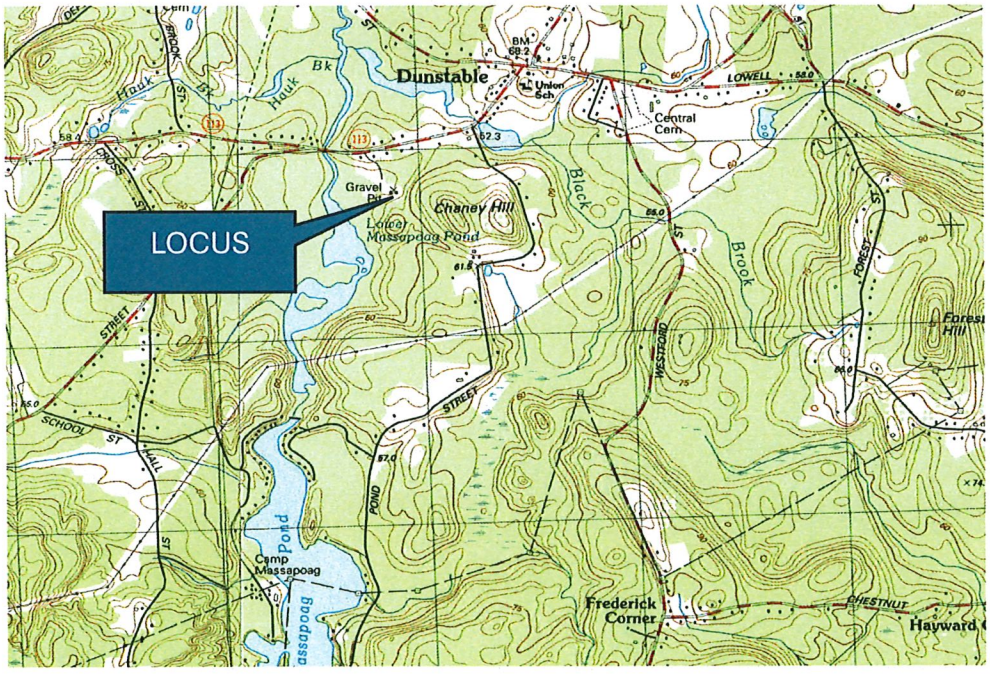
HALEY WARD

STORMWATER OPERATION & MAINTENANCE PLAN

MCO COTTAGE RENTALS
PLEASANT STREET
Dunstable, MA

APPLICANT:
MCO Cottage Rentals
P.O. Box 372 | Harvard, MA 01451



REPORT PREPARED BY:
Haley Ward, Inc.
510 Mechanic Street | Leominster, MA 01453

STORMWATER MAINTENANCE PROGRAM

As presented within the description of the proposed stormwater management system, several management practices have been instituted to collect, mitigate and treat stormwater runoff from the proposed development. These include the following:

- The utilization of deep-sump, hooded catch basins to provide initial treatment of stormwater runoff.
- The utilization of underground recharge systems to mitigate pre and post development flows for all storm events (i.e. 2, 10, 25, and 100 year storm events) prior to discharge to the underlying soil stratum.

In order to assure proper operation of the stormwater facilities in the future, it is necessary for a stormwater maintenance program be instituted and followed.

The owner of the property, MCO Cottage Rentals, will be the owner of the storm water system described herein and responsible for the required maintenance and operation of the storm water. The proposed maintenance procedures and scheduling is as follows:

CONSTRUCTION COMPLETION MAINTENANCE

Once construction grading of the project site is completed, proper stabilization of all slopes within the site is required. Hay mulch, geotextile fabric, and hydroseeding may be required to prevent necessary sediment transport to the proposed water quality unit and recharge area.

CATCH BASIN MAINTENANCE

On a quarterly basis all catchbasins are to be inspected for overall performance. The catchbasin grate should be cleaned of all organic debris that may have been deposited. Additionally, the gully stone throat, if applicable, should be inspected and debris removed as necessary. The catchbasin sump, which is the volume contained below the inlet/outlet inverts, is to be evaluated. Sand and accumulated organic matter should be removed if more than 50% of the total sump volume has been filled.

If oil and gasoline is found to be suspended within the collected water or sediment, further measures must be taken as far as collection and depositing at an approved hazardous waste facility. Upon the cleaning of the catchbasin, structural integrity and proper operation of the hooded vent (if applicable) should be evaluated. Replacement of deteriorated bricks, repair of cracks in the basin wall, or other required work shall be completed as necessary.

UDERGROUND STORMWATER RECHARGE SYSTEM MAINTENANCE

Due to the use of the deep-sump hooded catch basins, prior to the underground system, little maintenance is expected for these systems. At a minimum, at 6-month intervals, the underground systems should be inspected for any accumulated sediment within the pipe/chamber network and removal of sediment if, during the inspection, an accumulation of 2" or more of sediment is found at any point in the system. If sediment is found, additional evaluation of the upstream catch basins should also be done. Additionally, the drainage system should be observed at least once every six months under a major storm event to evaluate its performance and note any deficiencies that may be occurring. (see attached guide by StormTech)

SOURCE CONTROLS

In the event of a spill of petroleum products or hazardous substances, certain measures must be taken and include the following:

- A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, first aid equipment) should be readily available.
- All spills shall be cleaned up immediately after discovery.
- All measures must be taken to contain and abate the spill and to prevent the discharge of the Hazardous Substance or Oil to storm water or off-site. (The spill area must be kept well ventilated and personnel must wear appropriate protective clothing to prevent injury from contact with the Hazardous Substances.)
- In the event of a spill discharging to the stormwater system, the spill should be contained with the hooded catch basins and/or oil chambers of the water quality units. Any hazardous material found within the catch basins or water quality units should be removed immediately by a licensed liquid waste handler.
- The owner should be familiar with the spill reporting requirements of the Massachusetts Contingency Plan (310 CMR 40.0000).

Contact Numbers:

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P.O.Box 372
Harvard, MA 01451
(978) 456-8388

Dunstable Fire Department – Emergency - 911
Office – (978) 649-6661

MADEP Emergency Response - 1-888-304-1133

SNOW & ICE MANAGEMENT

- Snow should be stored in areas of the site such that any snowmelt is directed and captured by the drainage system.
- Avoid disposing of snow on top of storm drain catch basins or in stormwater drainage swales or ditches. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.
- Sand shall be the primary de-icing agent.
- After spring snowmelt has occurred, snow storage areas should be cleaned of all trash, debris and accumulated sands.

STORMWATER MAINTENANCE PLAN DATA SHEETS

Enclosed within the Stormwater Maintenance Plan, is a "member roster" to clearly establish the individuals responsible for the stormwater system maintenance. Additionally, a stormwater system inspection form has been included as an example of a method to document the required inspection and maintenance of the stormwater system.

An operation and maintenance log should be maintained for the last three years. This should include inspections, repairs, replacement and disposal. For disposal, the log shall indicate the type of material and the disposal location.

STORM WATER POLLUTION MAINTENANCE PLAN
MEMBER ROSTER

Completed By:_____ **Title:**_____ **Date:**_____

Director:_____ **Title:**_____

Office Phone:_____

Responsibilities:_____

Member:_____ **Title:**_____

Office Phone:_____

Responsibilities:_____

STORM WATER POLLUTION MAINTENANCE PLAN

INSPECTION AND MAINTENANCE REPORT FORM

CATCH BASIN REPORT FORM:

CB ID#	Depth of Sediment in CB	CB ID#	Depth of Sediment in CB	Comments

MAINTENANCE REQUIRED FOR CATCH BASINS:

TO BE PERFORMED BY: **ON OR BEFORE:**

INSPECTED BY: **DATE:**

STORM WATER POLLUTION MAINTENANCE PLAN

INSPECTION AND MAINTENANCE REPORT FORM

(To be Completed at 6 Month Intervals)

SUBSURFACE RECHARGE CHAMBER SYSTEM REPORT FORM:

Recharge System ID#	Depth of Sediment	Comments

MAINTENANCE REQUIRED FOR RECHARGE CHAMBERS:

TO BE PERFORMED BY: _____ **ON OR BEFORE:** _____

INSPECTED BY: _____ **DATE:** _____

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Subsurface Stormwater Management℠

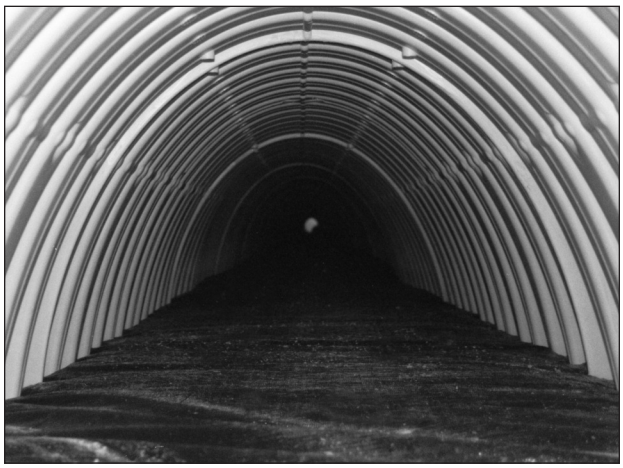
Isolator™ Row O&M Manual

StormTech® Chamber System for Stormwater Management

1.0 The Isolator™ Row

1.1 INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a patented technique to inexpensively enhance Total Suspended Solids (TSS) removal and provide easy access for inspection and maintenance.



Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.

1.2 THE ISOLATOR™ ROW

The Isolator Row is a row of StormTech chambers, either SC-310, SC-740, DC-780 or MC-3500 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

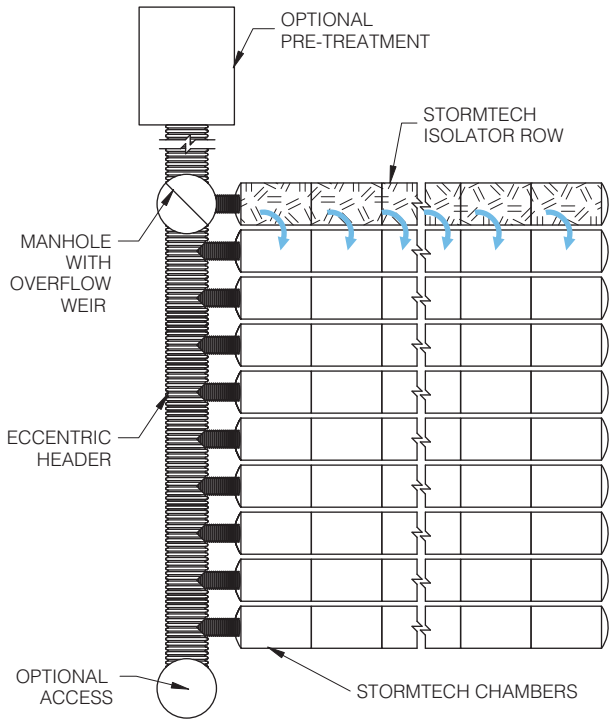
Two different fabrics are used for the Isolator Row. A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The tough geotextile provides a media for storm water filtration and provides a durable surface for maintenance operations. It is also designed to prevent scour of the underlying stone and remain intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber.

The Isolator Row is typically designed to capture the "first flush" and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole not only provides access to the Isolator Row but typically includes a high flow weir such that storm water flowrates or volumes that exceed the capacity of the Isolator Row overtop the over flow weir and discharge through a manifold to the other chambers.

The Isolator Row may also be part of a treatment train. By treating storm water prior to entry into the chamber system, the service life can be extended and pollutants such as hydrocarbons can be captured. Pre-treatment best management practices can be as simple as deep sump catch basins, oil-water separators or can be innovative storm water treatment devices. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.

StormTech Isolator Row with Overflow Spillway
(not to scale)



2.0 Isolator Row Inspection/Maintenance

2.1 INSPECTION

The frequency of Inspection and Maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

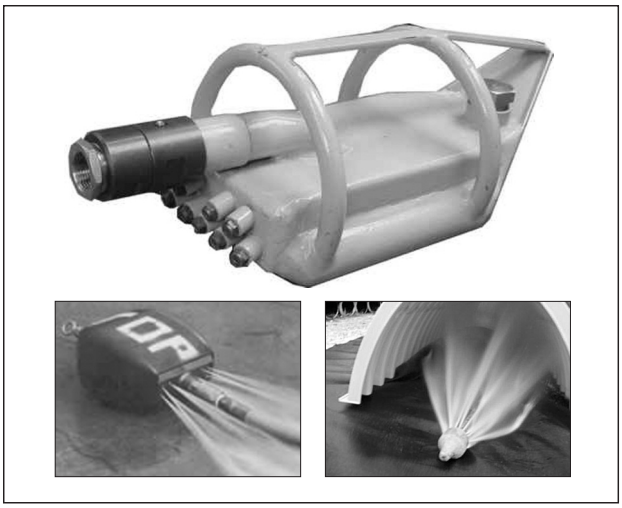
At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

2.2 MAINTENANCE

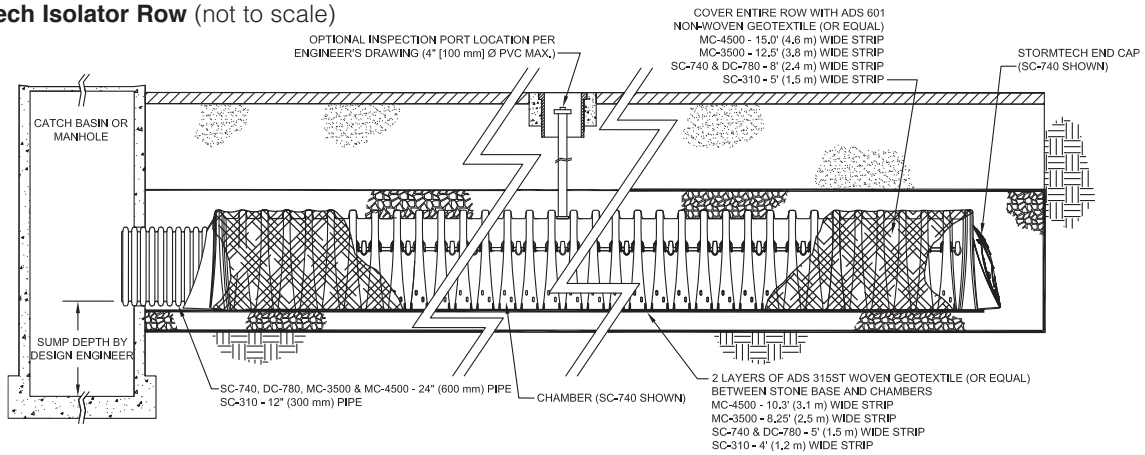
The Isolator Row was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.



Examples of culvert cleaning nozzles appropriate for Isolator Row maintenance. (These are not StormTech products.)

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row (not to scale)



Note: For many applications, the non-woven geotextile over the DC-780, MC-3500 and MC-4500 Isolator Row chambers can be eliminated or substituted with the AASHTO Class 1 woven geotextile. Contact your StormTech representative for assistance.

3.0 Isolator Row Step By Step Maintenance Procedures

Step 1) Inspect Isolator Row for sediment

A) Inspection ports (if present)

i. Remove lid from floor box frame

ii. Remove cap from inspection riser

iii. Using a flashlight and stadia rod, measure depth of sediment and record results on maintenance log.

iv. If sediment is at, or above, 3 inch depth proceed to Step 2. If not proceed to step 3.

B) All Isolator Rows

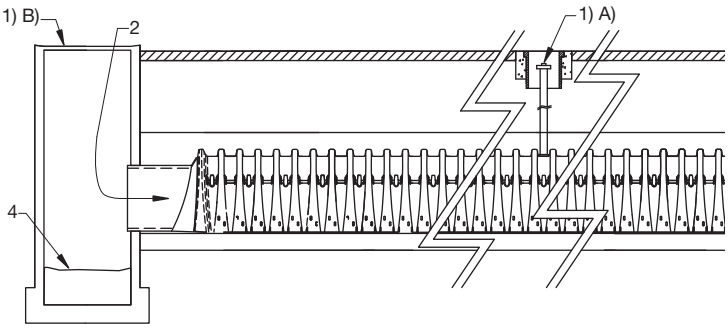
i. Remove cover from manhole at upstream end of Isolator Row

ii. Using a flashlight, inspect down Isolator Row through outlet pipe

1. Mirrors on poles or cameras may be used to avoid a confined space entry
2. Follow OSHA regulations for confined space entry if entering manhole

iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches) proceed to Step 2. If not proceed to Step 3.

StormTech Isolator Row (not to scale)



Step 2) Clean out Isolator Row using the JetVac process

A) A fixed culvert cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable

B) Apply multiple passes of JetVac until backflush water is clean

C) Vacuum manhole sump as required

Step 3) Replace all caps, lids and covers, record observations and actions

Step 4) Inspect & clean catch basins and manholes upstream of the StormTech system

Sample Maintenance Log

Date	Stadia Rod Readings		Sediment Depth (1) - (2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/01	6.3 ft.	none		New installation. Fixed point is CI frame at grade	djm
9/24/01		6.2	0.1 ft.	Some grit felt	sm
6/20/03		5.8	0.5 ft.	Mucky feel, debris visible in manhole and in Isolator row, maintenance due	rv
7/7/03	6.3 ft.		0	System jetted and vacuumed	djm

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