

BERTIN ENGINEERING



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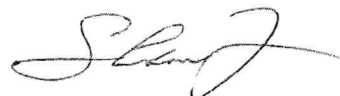
**STORMWATER OPERATION
&
MAINTENANCE MANUAL**

**MOUNTAIN VIEW AUTO BODY
BLOCK 3905, LOTS 12, 13 & 14
246-264 SOUTH BROAD STREET
VILLGE OF RIDGEWOOD, BERGEN COUNTY, NEW JERSEY
BE# 22-146**

DATE PREPARED: JUNE 13, 2022

**PREPARED FOR: MOUNTAIN VIEW AUTO
96 NEWARK POMPTON TURNPIKE
WAYNE, NJ 07470**

**PREPARED BY: BERTIN ENGINEERING
66 GLEN AVENUE
GLEN ROCK, NJ 07452**



**SHAN-PEI FANCHIANG, P.E.
N.J.P.E. LICENSE NO. 37073**

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STORMWATER OPERATION & MAINTENANCE MANUAL

RESPONSIBLE PARTIES

1. Location: Block 3905, Lots 12, 13 & 14
246-264 South Broad Street
Ridgewood, Bergen County, New Jersey
2. Owner: Mountain View Auto
96 Newark Pompton Turnpike
Wayne, NJ 07470
3. Entity Responsible for Maintenance: Mountain View Auto
96 Newark Pompton Turnpike
Wayne, NJ 07470
4. Maintenance Contractor: TBD
5. Designer: Bertin Engineering
66 Glen Avenue
Glen Rock, NJ 07452
201-670-6688

The party listed under item #3 (Entity Responsible for Maintenance) is responsible for corrective and preventative maintenance as per N.J.A.C. 7:8-5.8(b).

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STORMWATER OPERATION & MAINTENANCE MANUAL

Specific Maintenance Procedures

1. Construction Sequencing and Quality Control:

Construction sequencing shall balance the timing of land disturbance activities and the installation of measures to control erosion and sediment in order to reduce on-site erosion and off-site sedimentation. Construction sequencing is utilized to plan earthwork and erosion control activities on site in order to preserve water quality within the site's watershed area. Proposed soil erosion and sediment control practices must be utilized throughout construction.

2. Regular Maintenance of Site:

The proposed stormwater systems are intended to treat and convey the stormwater on the property. The maintenance plan is prepared to ensure the system operates at its maximum efficiency. The responsible party is accountable to ensure the operation, maintenance, repair, and safety of the stormwater system. Maintenance of the stormwater system should be performed on a regular basis. This includes but is not limited to debris and sediment removal with proper disposal, mosquitoes/insect control and inspection work.

Other regular maintenance includes mowing of lawn areas, pruning and/or restoration of landscaping and vegetation, restoration of eroded areas, and the elimination of any mosquito breeding habitats as needed. The parking lot shall be swept by a street sweeper on a quarterly basis.

3. Maintenance of Stormwater Management:

A. General

All trees, shrubs, and underbrush must be pruned or trimmed as necessary to maintain access to the stormwater management measures such as manholes, inlets, outlet control structure, underground detention basins, the onsite conveyance system and landscaping. The proposed system must not increase health or safety risks in any way. Increased staffing, improved equipment, and more specialized training may be required to properly maintain the new facility. Two people will be needed to perform routine maintenance of the systems. The routine equipment to be utilized for the maintenance tasks include a jet vacuum vehicle, shovels, lighting equipment, and a wheelbarrow or truck for the hauling of debris. During maintenance and inspections, all associated safety and protection measures must be taken. Water, mosquito control chemicals, and concrete repair materials may also be required depending on the

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condition of the structures. Inspection and maintenance logs shall be maintained and provided upon request of town officials.

B. Inlets, Manholes, Outlet Control Structures & Conveyance System

The inlets, manholes, outlet control structures and conveyance piping shall be inspected for excessive debris and sediment accumulation semi-annually as well as after every storm exceeding 1 inch of rainfall in a one hour period. Concrete structures should be checked annually for cracking, subsidence, spalling, erosion and deterioration. Removal of debris, trash, sediment, and other waste materials should be performed when there is a building of sediment in excess of 2 inches. This can be removed manually or by vacuum. Disposal of such debris must be performed at suitable disposal/recycling sites and in compliance with local, state, and federal waste regulations.

The attached "Maintenance Inspection for Inlets/Manholes/Outlet Control Structures/Conveyance System" and "Maintenance Log for Inlets/Manholes/Outlet Control Structures/Conveyance System" must be completed during every routine maintenance and inspection.

C. Cultec Recharger Units

Please see the attached Cultec Operation & Maintenance Information for maintenance instructions for the water treatment units. Disposal of debris, trash, sediment, and other waste material removed from the stormwater drainage system is to be done at suitable disposal/recycling sites and in compliance with local, state, and federal waste regulations.

The party responsible for the maintenance plan as indicated on page 2 shall coordinate the inspections as per the attached maintenance schedule.

The Annual Record of Operation and Maintenance must be completed during every routine maintenance and inspection for each unit.

D. Aqua-Ponic Stormwater Biofiltration System

Please see the attached Aqua-Ponic Inspection & Maintenance Information for maintenance instructions for the water treatment unit. Disposal of debris, trash, sediment, and other waste material removed from the stormwater drainage system is to be done at suitable disposal/recycling sites and in compliance with local, state, and federal waste regulations.

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The party responsible for the maintenance plan as indicated on page 2 shall coordinate the inspections as per the attached inspection & maintenance schedule.

The Annual Record of Operation and Maintenance must be completed during every routine maintenance and inspection for each unit.

E. Vegetated Areas

Grass should be mowed at least once a month during the growing season. Vegetated areas shall be inspected annually for erosion and scour and for unwanted trees and weeds. When establishing or restoring vegetation, biweekly inspections of vegetation health shall be performed during the first growing season or until the vegetation is established. Once established, inspections of vegetation health, density, and diversity shall be performed twice annually during both the growing and non-growing season. If vegetation has greater than 50 percent damage, the area will be reestablished in accordance with the original specifications and the inspection requirements presented above. All use of fertilizers, mechanical treatments, pesticides, and other means to assure optimum vegetation health must not compromise the intended purpose of the infiltration basin. All vegetation deficiencies should be addressed without the use of fertilizers and pesticides whenever possible. All vegetated areas shall be inspected at least annually for unwanted growth, which should be removed with minimum disruption to the remaining vegetation and basin subsoil.

4. Maintenance Records

Records of the maintenance shall be maintained by the management company or building superintendent, and made available to health inspectors or other City officials. All repairs of the stormwater system must be recorded. Attached are the applicable maintenance logs and forms.

**MAINTENANCE INSPECTION FOR INLETS, MANHOLES,
OUTLET CONTROL STRUCTURES & CONVEYENCE SYSTEM**

MOUNTAIN VIEW AUTO BODY
96 NEWARK POMPTON TURNPIKE
WAYNE, NJ 07470

NOTE: INSPECTIONS TO BE EVALUATED DURING A PERIOD OF DRY AND WARM WEATHER AND LOW TIDE CONDITIONS AT THE PROJECT SITE.

Yes	No	Maintenance Evaluation	Action(s) Required if Answer "Yes"
<input type="checkbox"/>	<input type="checkbox"/>	Is there a buildup of sediment (in excess of 2 inches), trash, debris or any other stormwater pollution?	Remove sediment and evaluate on-site upstream systems. Dispose debris in accordance with local, state, and federal requirements.
<input type="checkbox"/>	<input type="checkbox"/>	Is there standing water?	Evaluate downstream systems for clogging or trash sediment buildup.
<input type="checkbox"/>	<input type="checkbox"/>	Are there any structural failure?	Consult engineer to determine safety and/or stability of the system.
<input type="checkbox"/>	<input type="checkbox"/>	Are there visible signs of cracking, subsidence, erosion or deterioration of any of the inlets, manholes, outlet control structures or piping?	Consult engineer to determine safety and/or stability of the system.
<input type="checkbox"/>	<input type="checkbox"/>	Are there any root intrusions or any other vegetation within the inlets, manholes, outlet control systems or piping?	Remove roots and dispose vegetation in accordance with local, state and federal regulations.
<input type="checkbox"/>	<input type="checkbox"/>	Are ladder rungs in manholes or outlet structures damaged, missing, or misaligned?	Repair or replace.
<input type="checkbox"/>	<input type="checkbox"/>	Are any covers or grates missing, damaged, or only partially in place at any inlets, manholes or outlet control structures?	Repair or replace.

CONTACTOR® & RECHARGER®

STORMWATER MANAGEMENT SOLUTIONS



OPERATION & MAINTENANCE GUIDELINES FOR CULTEC STORMWATER MANAGEMENT SYSTEMS

STORMWATER MANAGEMENT SOLUTIONS





OPERATIONS AND MAINTENANCE GUIDELINES

Published by **CULTEC, Inc.**

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Contact Information:

For general information on our other products and services, please contact our offices within the United States at (800)428-5832, (203)775-4416 ext. 202, or e-mail us at custservice@cultec.com.

For technical support, please call (203)775-4416 ext. 203 or e-mail tech@cultec.com.

Visit www.cultec.com/downloads.html for Product Downloads and CAD details.

Doc ID: CLT057 01-20
January 2020

*These instructions are for single-layer traffic applications only. For multi-layer applications, contact CULTEC.
All illustrations and photos shown herein are examples of typical situations. Be sure to follow the engineer's drawings.
Actual designs may vary.*

This manual contains guidelines recommended by CULTEC, Inc. and may be used in conjunction with, but not to supersede, local regulations or regulatory authorities. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Introduction

The CULTEC Subsurface Stormwater Management System is a high-density polyethylene (HDPE) chamber system arranged in parallel rows surrounded by washed stone. The CULTEC chambers create arch-shaped voids within the washed stone to provide stormwater detention, retention, infiltration, and reclamation. Filter fabric is placed between the native soil and stone interface to prevent the intrusion of fines into the system. In order to minimize the amount of sediment which may enter the CULTEC system, a sediment collection device (stormwater pretreatment device) is recommended upstream from the CULTEC chamber system. Examples of pretreatment devices include, but are not limited to, an appropriately sized catch basin with sump, pretreatment catchment device, oil grit separator, or baffled distribution box. Manufactured pretreatment devices may also be used in accordance with CULTEC chambers. Installation, operation, and maintenance of these devices shall be in accordance with manufacturer's recommendations. Almost all of the sediment entering the stormwater management system will be collected within the pretreatment device.

Best Management Practices allow for the maintenance of the preliminary collection systems prior to feeding the CULTEC chambers. The pretreatment structures shall be inspected for any debris that will restrict inlet flow rates. Outfall structures, if any, such as outlet control must also be inspected for any obstructions that would restrict outlet flow rates. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Operation and Maintenance Requirements

I. Operation

CULTEC stormwater management systems shall be operated to receive only stormwater run-off in accordance with applicable local regulations. CULTEC subsurface stormwater management chambers operate at peak performance when installed in series with pretreatment. Pretreatment of suspended solids is superior to treatment of solids once they have been introduced into the system. The use of pretreatment is adequate as long as the structure is maintained and the site remains stable with finished impervious surfaces such as parking lots, walkways, and pervious areas are properly maintained. If there is to be an unstable condition, such as improvements to buildings or parking areas, all proper silt control measures shall be implemented according to local regulations.

II. Inspection and Maintenance Options

- A. The CULTEC system may be equipped with an inspection port located on the inlet row. The inspection port is a circular cast box placed in a rectangular concrete collar. When the lid is removed, a 6-inch (150 mm) pipe with a screw-in plug will be exposed. Remove the plug. This will provide access to the CULTEC Chamber row below. From the surface, through this access, the sediment may be measured at this location. A stadia rod may be used to measure the depth of sediment if any in this row. If the depth of sediment is in excess of 3 inches (76 mm), then this row should be cleaned with high pressure water through a culvert cleaning nozzle. This would be carried out through an upstream manhole or through the CULTEC StormFilter Unit (or other pretreatment device). CCTV inspection of this row can be deployed through this access port to determine if any sediment has accumulated in the inlet row.
- B. If the CULTEC bed is not equipped with an inspection port, then access to the inlet row will be through an upstream manhole or the CULTEC StormFilter.
 1. **Manhole Access**

This inspection should only be carried out by persons trained in confined space entry and sewer inspection services. After the manhole cover has been removed a gas detector must be lowered into the manhole to ensure that there are not high concentrations of toxic gases present. The inspector should be lowered into the manhole with the proper safety equipment as per OSHA requirements. The inspector may be able to observe sediment from this location. If this is not possible, the inspector will need to deploy a CCTV robot to permit viewing of the sediment.

2. StormFilter Access

Remove the manhole cover to allow access to the unit. Typically a 30-inch (750 mm) pipe is used as a riser from the StormFilter to the surface. As in the case with manhole access, this access point requires a technician trained in confined space entry with proper gas detection equipment. This individual must be equipped with the proper safety equipment for entry into the StormFilter. The technician will be lowered onto the StormFilter unit. The hatch on the unit must be removed. Inside the unit are two filters which may be removed according to StormFilter maintenance guidelines. Once these filters are removed the inspector can enter the StormFilter unit to launch the CCTV camera robot.

- C. The inlet row of the CULTEC system is placed on a polyethylene liner to prevent scouring of the washed stone beneath this row. This also facilitates the flushing of this row with high pressure water through a culvert cleaning nozzle. The nozzle is deployed through a manhole or the StormFilter and extended to the end of the row. The water is turned on and the inlet row is back-flushed into the manhole or StormFilter. This water is to be removed from the manhole or StormFilter using a vacuum truck.

III. Maintenance Guidelines

The following guidelines shall be adhered to for the operation and maintenance of the CULTEC stormwater management system:

- A. The owner shall keep a maintenance log which shall include details of any events which would have an effect on the system's operational capacity.
- B. The operation and maintenance procedure shall be reviewed periodically and changed to meet site conditions.
- C. Maintenance of the stormwater management system shall be performed by qualified workers and shall follow applicable occupational health and safety requirements.
- D. Debris removed from the stormwater management system shall be disposed of in accordance with applicable laws and regulations.

IV. Suggested Maintenance Schedules

A. Minor Maintenance

The following suggested schedule shall be followed for routine maintenance during the regular operation of the stormwater system:

Frequency	Action
Monthly in first year	Check inlets and outlets for clogging and remove any debris, as required.
Spring and Fall	Check inlets and outlets for clogging and remove any debris, as required.
One year after commissioning and every third year following	Check inlets and outlets for clogging and remove any debris, as required.

B. Major Maintenance

The following suggested maintenance schedule shall be followed to maintain the performance of the CULTEC stormwater management chambers. Additional work may be necessary due to insufficient performance and other issues that might be found during the inspection of the stormwater management chambers. (See table on next page)

	Frequency	Action
Inlets and Outlets	Every 3 years	<ul style="list-style-type: none"> Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
	Spring and Fall	<ul style="list-style-type: none"> Check inlet and outlets for clogging and remove any debris as required.
CULTEC Stormwater Chambers	2 years after commissioning	<ul style="list-style-type: none"> Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
	9 years after commissioning every 9 years following	<ul style="list-style-type: none"> Clean stormwater management chambers and feed connectors of any debris. Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
	45 years after commissioning	<ul style="list-style-type: none"> Clean stormwater management chambers and feed connectors of any debris. Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. Attain the appropriate approvals as required. Establish a new operation and maintenance schedule.
Surrounding Site	Monthly in 1 st year	<ul style="list-style-type: none"> Check for depressions in areas over and surrounding the stormwater management system.
	Spring and Fall	<ul style="list-style-type: none"> Check for depressions in areas over and surrounding the stormwater management system.
	Yearly	<ul style="list-style-type: none"> Confirm that no unauthorized modifications have been performed to the site.

For additional information concerning the maintenance of CULTEC Subsurface Stormwater Management Chambers, please contact CULTEC, Inc. at 1-800-428-5832.



WQMP Operation & Maintenance (O&M) Plan

Project Name: _____

Prepared for:

Project Name: _____

Address: _____

City, State Zip: _____

Prepared on:

Date: _____



This O&M Plan describes the designated responsible party for implementation of this WQMP, including: operation and maintenance of all the structural BMP(s), conducting the training/educational program and duties, and any other necessary activities. The O&M Plan includes detailed inspection and maintenance requirements for all structural BMPs, including copies of any maintenance contract agreements, manufacturer's maintenance requirements, permits, etc.

8.1.1 Project Information

Project name	
Address	
City, State Zip	
Site size	
List of structural BMPs, number of each	
Other notes	

8.1.2 Responsible Party

The responsible party for implementation of this WQMP is:

Name of Person or HOA Property Manager	
Address	
City, State Zip	
Phone number	
24-Hour Emergency Contact number	
Email	

8.1.3 Record Keeping

Parties responsible for the O&M plan shall retain records for at least 5 years.

All training and educational activities and BMP operation and maintenance shall be documented to verify compliance with this O&M Plan. A sample Training Log and Inspection and Maintenance Log are included in this document.

8.1.4 Electronic Data Submittal

This document along with the Site Plan and Attachments shall be provided in PDF format. AutoCAD files and/or GIS coordinates of BMPs shall also be submitted to the City.



Appendix ____

BMP SITE PLAN

Site plan is preferred on minimum 11" by 17" colored sheets, as long as legible.



OPERATIONS AND MAINTENANCE GUIDELINES

Minor Maintenance

Frequency		Action
Monthly in first year		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
<input type="checkbox"/> Month 1	Date:	
<input type="checkbox"/> Month 2	Date:	
<input type="checkbox"/> Month 3	Date:	
<input type="checkbox"/> Month 4	Date:	
<input type="checkbox"/> Month 5	Date:	
<input type="checkbox"/> Month 6	Date:	
<input type="checkbox"/> Month 7	Date:	
<input type="checkbox"/> Month 8	Date:	
<input type="checkbox"/> Month 9	Date:	
<input type="checkbox"/> Month 10	Date:	
<input type="checkbox"/> Month 11	Date:	
<input type="checkbox"/> Month 12	Date:	
Spring and Fall		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
One year after commissioning and every third year following		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
<input type="checkbox"/> Year 1	Date:	
<input type="checkbox"/> Year 4	Date:	
<input type="checkbox"/> Year 7	Date:	
<input type="checkbox"/> Year 10	Date:	
<input type="checkbox"/> Year 13	Date:	
<input type="checkbox"/> Year 16	Date:	
<input type="checkbox"/> Year 19	Date:	
<input type="checkbox"/> Year 22	Date:	



Major Maintenance

	Frequency	Action	
Inlets and Outlets	Every 3 years	Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.	
	Notes		
	<input type="checkbox"/> Year 1	Date:	
	<input type="checkbox"/> Year 4	Date:	
	<input type="checkbox"/> Year 7	Date:	
	<input type="checkbox"/> Year 10	Date:	
	<input type="checkbox"/> Year 13	Date:	
	<input type="checkbox"/> Year 16	Date:	
	<input type="checkbox"/> Year 19	Date:	
	<input type="checkbox"/> Year 22	Date:	
	Spring and Fall		Check inlet and outlets for clogging and remove any debris, as required.
	Notes		
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:		
<input type="checkbox"/> Fall	Date:		
CULTEC Stormwater Chambers	2 years after commissioning	<input type="checkbox"/> Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. <input type="checkbox"/> Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.	
	Notes		
	<input type="checkbox"/> Year 2	Date:	

Major Maintenance

Frequency		Action
CULTEC Stormwater Chambers	9 years after commissioning every 9 years following	
	<ul style="list-style-type: none"> <input type="checkbox"/> Clean stormwater management chambers and feed connectors of any debris. <input type="checkbox"/> Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. <input type="checkbox"/> Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended. 	
	Notes	
	<input type="checkbox"/> Year 9	Date:
	<input type="checkbox"/> Year 18	Date:
	<input type="checkbox"/> Year 27	Date:
	<input type="checkbox"/> Year 36	Date:
45 years after commissioning		
<ul style="list-style-type: none"> <input type="checkbox"/> Clean stormwater management chambers and feed connectors of any debris. <input type="checkbox"/> Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. <input type="checkbox"/> Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. <input type="checkbox"/> Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. <input type="checkbox"/> Attain the appropriate approvals as required. <input type="checkbox"/> Establish a new operation and maintenance schedule. 		
Notes		
<input type="checkbox"/> Year 45	Date:	



Major Maintenance

Frequency		Action	
Surrounding Site	Monthly in 1st year		
	<input type="checkbox"/> Check for depressions in areas over and surrounding the stormwater management system.		
	Notes		
	<input type="checkbox"/> Month 1	Date:	
	<input type="checkbox"/> Month 2	Date:	
	<input type="checkbox"/> Month 3	Date:	
	<input type="checkbox"/> Month 4	Date:	
	<input type="checkbox"/> Month 5	Date:	
	<input type="checkbox"/> Month 6	Date:	
	<input type="checkbox"/> Month 7	Date:	
	<input type="checkbox"/> Month 8	Date:	
	<input type="checkbox"/> Month 9	Date:	
	<input type="checkbox"/> Month 10	Date:	
	<input type="checkbox"/> Month 11	Date:	
	<input type="checkbox"/> Month 12	Date:	
	Spring and Fall		
	<input type="checkbox"/> Check for depressions in areas over and surrounding the stormwater management system.		
	Notes		
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	Yearly		
	<input type="checkbox"/> Confirm that no unauthorized modifications have been performed to the site.		
Notes			
<input type="checkbox"/> Year 1	Date:		
<input type="checkbox"/> Year 2	Date:		
<input type="checkbox"/> Year 3	Date:		
<input type="checkbox"/> Year 4	Date:		
<input type="checkbox"/> Year 5	Date:		
<input type="checkbox"/> Year 6	Date:		
<input type="checkbox"/> Year 7	Date:		

INSPECTION & MAINTENANCE MANUAL

AQUA-PONIC ™

Aqua-Ponic™ Stormwater Biofiltration System

Manufactured By:

AquaShield ™
STORMWATER TREATMENT SOLUTIONS
www.AquaShieldInc.com

AquaShield,™ Inc.
2733 Kanasita Drive
Suite 111
Chattanooga, TN 37343
(888) 344-9044
www.aquashieldinc.com

June 2020

INTRODUCTION

As the stormwater industry has matured there has been an ever-increasing movement toward the implementation of Low Impact Development (LID) products and practices as the preferred means to implement stormwater control measures within “green infrastructure” (GI) stormwater management programs. The Aqua-Ponic™ Stormwater Biofiltration System is now offered by AquaShield™, Inc. to meet the design challenges of LID principles along with enhanced aesthetics in an urban environment.

This Inspection & Maintenance (I&M) Manual includes information to better assist stakeholders with understanding the importance of implementing an effective program to ensure long-term functionality of an Aqua-Ponic™ system installation. The following aspects of an Aqua-Ponic™ system are described in this I&M manual:

- Aqua-Ponic™ Basics
- Mode of Operation
- Inspection and Maintenance.

AQUA-PONIC™ BASICS

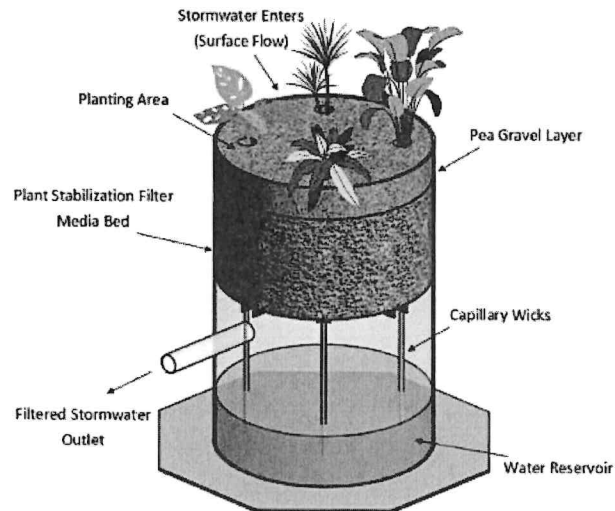
Aqua-Ponic™ technology is a modular proprietary, permanent, post-construction biofiltration system designed to remove total suspended solids (TSS), Total (insoluble) Phosphorus, and heavy metals such as copper and zinc from stormwater runoff. A distinguishing feature of the Aqua-Ponic™ is its combination of filtration with the principles of *hydroponics* - a method of hydroculture for growing plants without soil by instead using mineral nutrient solutions in a water solvent. That is, the Aqua-Ponic™ uses stormwater runoff as a nutrient asset instead of a liability. Terrestrial plants are grown with only their roots exposed to the nutrient liquid while being physically supported by a plant stabilization filter medium. The hydroponic design provides a sustainable water supply to the vegetation during those periods of time when hot and/or dry conditions may prevail.

The Aqua-Ponic™ system utilizes hardy low-profile perennial vegetation such as native grasses, shrub grasses and/or ornamental flowering plants. A facility can utilize a single type or multiple types of plants to enhance the viewscape. It is important to specify plants that demonstrate viability within the climatic zone of a site installation.

MODE of OPERATION

The minimum 12-inch plant stabilization media layer within the Aqua-Ponic™ serves three operational roles by providing (1) pollutant filtration, (2) plant stabilization and (3) nutrient uptake. Figure 1 is an illustration of the Aqua-Ponic™ Biofiltration System. Design elements include a three (3)-inch top layer of pea gravel underlain by the plant stabilization filter bed. Water enters the system as sheet flow and then flows downward under gravity flow conditions through the pea gravel, filter bed and the associated root systems of the vegetation. The pea gravel layer serves to protect the underlying plant stabilization filter bed while dispersing the influent stormwater runoff across the treatment area. The filtered water then percolates further downward into the underlying water sump. A supporting and removeable perforated stainless-steel sheet underlies the filter bed. A post-filtration flow control orifice is placed across the outlet pipe opening in order to facilitate an even distribution of influent runoff across the filter treatment

area. Crushed recycled landscaping glass can be used as an alternative to the top pea gravel layer which further enhances colorful viewscape options for the Aqua-Ponic™.



AQUA-PONIC™ 

Figure 1. Diagram of Aqua-Ponic™ Biofiltration System.

The sump serves as a water reservoir for the vegetation during quiescent periods. A series of wicks are suspended from the base of the plant stabilization bed via rubber grommets (eyelets). The wicks extend downward to near the base of the sump. Using capillary action, water is wicked up to the plant stabilization filter bed which serves to provide a sustainable supply of water and any soluble nutrients and metals not trapped in the filter bed during a runoff event. Treated water in excess of the sump storage volume exits the system via the outlet opening just below the base of the filter bed.

Each Aqua-Ponic™ unit is constructed of lightweight and durable Polymer Coated Steel (PCS) to provide long term operational and structural functionality. Aqua-Ponic™ units are shipped with the inclusion of any perforated sheets and the capillary wicks in place according to the model size. The plant stabilization filter media is shipped simultaneously in separate containers. For aesthetic reasons it is the responsibility of others to choose either the pea gravel or any recycled glass landscaping stone for the top bed layer. It is also the responsibility of others to specify, acquire and plant the vegetation. AquaShield™ does not specify the plants for Aqua-Ponic™ systems but can assist where warranted.

INSPECTION & MAINTENANCE

Maintenance frequency for the Aqua-Ponic™ will ultimately be determined by site-specific pollutant loading conditions. Inspections of the, plants, top gravel layer and the upper portion of the plant stabilization filter media can be accomplished from the surface without special tools. AquaShield™ recommends periodic inspections following installation to determine a site-specific maintenance cycle to ensure functionality of the media and the vegetation.

We recommend that periodic system inspections be performed to determine the pollutant and trash loading characteristics. In general, quarterly inspections should be performed during the first year of operation to better anticipate maintenance frequency in the first year and subsequent years of operation.

An Aqua-Ponic™ maintenance event should first determine any obvious signs of degradation, displacement, sediment or trash accumulation, or oil in the upper layers of the unit. The top gravel layer should be completely replaced and can be removed by shoveling or vacuuming. The top several inches of the underlying plant stabilization filter media may be replaced at the same time if warranted. Care should be taken not to damage the plants or disturb rootballs during limited media replacement. Care should also be taken when replacing a plant to avoid disturbing remaining plants.

Depending on site conditions, it may be necessary to remove all the media and all the plants and completely replace these components of the system. It is recommended that the wicks be replaced if a system is fully replaced with stabilization media and plants.

Sediment can accumulate in the base of the water supply sump over a period of time. After removing the pea gravel layer, the plants and the plant stabilization filter media bed, the perforated metal plate should be removed to access the water supply sump from the surface for the purpose of vacuuming water and any accumulated sediment. The wicking ropes should also be replaced at this time. The perforated metal plate with the new wicking ropes should be set in place prior to installing the plant stabilization filter media on top of the plate.

AquaShield™ can provide the plant stabilization filter media, wicks and any associated grommets. Although unlikely, the supporting stainless-steel plate can also be supplied by AquaShield™ if its replacement is necessary. While we recommend that the pea gravel be replaced as warranted, it may be feasible to wash the gravel during a maintenance event. However, in most cases it is more efficient to replace the pea gravel or any landscaping glass to avoid disposal of water that was used to clean either of those materials.

All I&M activities can be performed from the surface without the need for AquaShield™ personnel to be present. We recommend that all materials removed during the maintenance process be handled and disposed in accordance with all applicable federal, state and local guidelines. Depending on the influent pollutant characteristics of the facility drainage area, it may be appropriate to perform Toxicity Characteristics Leaching Procedure (TCLP) analyses on representative samples of the spent filter media to ensure that the handling and disposition of materials complies with any applicable environmental regulations and practices.

Attached is a two-page Aqua-Ponic™ I&M Log to document service provider(s), activities and scheduling.

Next two pages include I&M Logs

AQUA-PONIC™ INSPECTION & MAINTENANCE LOG

MAINTENANCE COMPANY INFORMATION

Company Name: _____
Street Address: _____
City: _____ State/Prov.: _____ Zip/Postal Code: _____
Contact: _____ Title: _____
Office Phone: _____ Cell Phone: _____

ACTIVITY LOG

Date of Cleaning: _____
Time of Cleaning: Start: _____ End: _____
Date of Next Inspection: _____
Floatable debris present: Yes No Action taken: _____

Oil present: Yes No Action taken: _____

Filter Media Needs Replacement: Yes No

Structural damage: Yes No Where: _____

Clogging: Yes No Describe: _____

Additional Comments and/or Actions to be Taken	Time Frame



Inspection & Maintenance Schedule Log

First Year Post-Construction

Date Installed/Activated: _____

	Month											
Activity	1	2	3	4	5	6	7	8	9	10	11	12
Inspect and Clean as needed			X			X			X			X
Inspect Bypass and maintain as needed			X			X			X			X
Clean System*												X

Second and Subsequent Years Post-Construction

	Month											
Activity	1	2	3	4	5	6	7	8	9	10	11	12
Inspect and Clean as needed												X
Inspect Bypass, maintain as needed												X
Clean System												X