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STORMWATER MAINTENANCE PLAN

Princeton Nurseries
Block 102, Lots 5 & 6, and Block 106, Lot 1
Plainsboro Township, Middlesex County, New Jersey
Block 99, Lot 14.04
South Brunswick Township, Middlesex County, New Jersey

Chad Gaulrapp
New Jersey Professional Engineer License #GE41350

WRNUL23001
June 14, 2024
Rev. September 27, 2024
Rev. January 16, 2025

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ENGINEERS • ENVIRONMENTAL CONSULTANTS • SURVEYORS

Engineering for a Better Environment

STORMWATER MANAGEMENT MEASURES

MAINTENANCE PLAN

Development Name: **Princeton Nurseries**

Block(s) / Lot(s): 102 / 5 & 6 AND 106 / 1
Township, County: Plainsboro Township, Middlesex County

Block(s) / Lot(s): 99 / 14.04
Township, County: South Brunswick, Middlesex County

Party Responsible for Maintenance:

Owner: WRV Nurseries Plainsboro Owner, LLC
100 Passaic Avenue, Suite 240
Fairfield, NJ 07004

Prepared by: Pennoni Associates Date: 06/14/2024

Last Revised on -- /-- / ----

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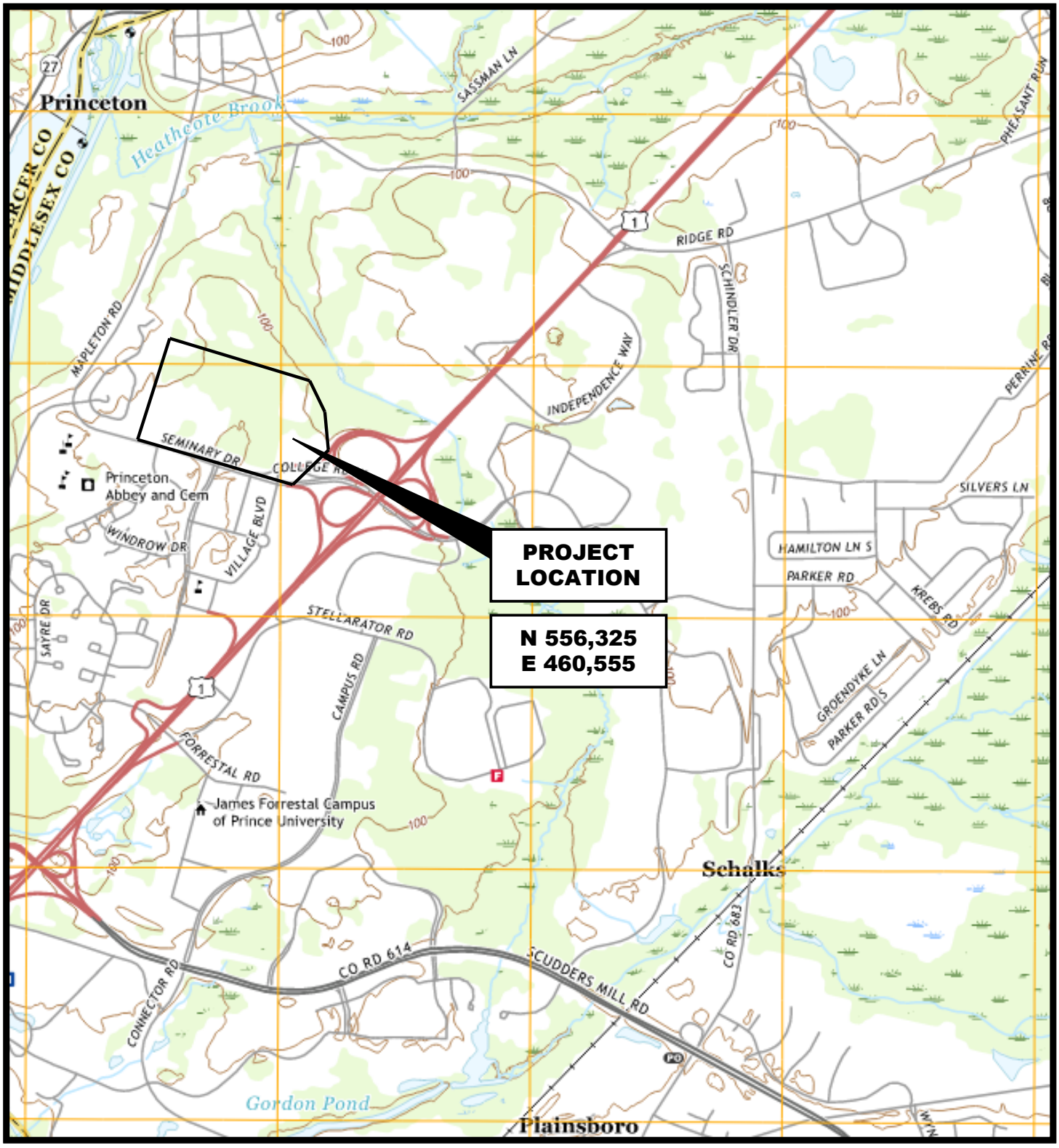

USGS Quad Map, Hightstown, NJ

vhh van note-harvey division of pennoni		PRINCETON NURSERIES BLOCK 102, LOTS 5 & 6, BLOCK 106, LOT 1 , PLAINSBORO TOWNSHIP BLOCK 99, LOT 14.04, SOUTH BRUNSWICK TOWNSHIP MIDDLESEX COUNTY, NEW JERSEY
Job No. WRNUL23001	Scale: 1"=2,000'	Figure 1 – Location Map

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1.0 PROJECT OVERVIEW

This Operation and Maintenance Manual has been prepared in support of the proposed stormwater facilities for the Princeton Nurseries mixed use development in the Township of Plainsboro and Township of South Brunswick, Middlesex County, New Jersey. The improvements include retail buildings, hotel, single family homes, townhomes, a clubhouse, stormwater collection / stormwater management, sanitary sewer pump station, and landscaping and lighting.

The responsibility for maintenance shall be dedicated to the property owner.

Owner: WRV Nurseries, LLC C/O
100 Passaic Avenue, Suite 240
Fairfield, NJ 07004

The property is located on Block 102, Lots 5 & 6 and Block 106, Lot 1, Township of Plainsboro and Block 99, Lot 14.04, Township of South Brunswick.

NJ State Plane Coordinates of each facility is indicated below:

Small Scale Bioretention Basin #1	-	N 557,249	E 459,714
Small Scale Subsurface Basin #2	-	N 556,918	E 459,743
Small Scale Subsurface Basin #3	-	N 556,607	E 459,468
Small Scale Subsurface Basin #4A	-	N 557,178	E 459,940
Small Scale Subsurface Basin #4B	-	N 557,087	E 459,912
Small Scale Subsurface Basin #5	-	N 557,128	E 460,106
Small Scale Subsurface Basin #6	-	N 557,035	E 460,079
Existing Basin #6	-	N 557,084	E 461,164
Small Scale Subsurface Basin #7	-	N 557,078	E 460,290
Small Scale Infiltration Basin #8	-	N 557,010	E 460,554
Small Scale Subsurface Basin #9	-	N 556,910	E 460,296
Small Scale Subsurface Basin #10	-	N 556,888	E 460,358
Small Scale Subsurface Basin #11	-	N 557,041	E 459,823
Small Scale Bioretention Basin #12	-	N 556,789	E 459,513
Small Scale Subsurface Basin #13	-	N 556,890	E 459,784
Small Scale Subsurface Basin #14	-	N 556,867	E 459,872
Small Scale Bioretention Basin #15	-	N 556,755	E 459,931
Small Scale Bioretention Basin #16	-	N 556,716	E 460,033
Small Scale Subsurface Basin #17	-	N 556,555	E 460,320
Small Scale Subsurface Basin #18	-	N 556,557	E 459,682
Small Scale Subsurface Basin #19	-	N 556,532	E 459,772
Small Scale Subsurface Basin #20	-	N 556,413	E 459,895
Small Scale Subsurface Basin #21	-	N 556,266	E 460,113

NJ State Plane Coordinates of each facility is indicated below:

Small Scale Subsurface Basin #22	-	N 556,263	E 460,235
Small Scale Bioretention Basin #25	-	N 557,117	E 460,939
Small Scale Bioretention Basin #26	-	N 556,529	E 461,230
Small Scale Subsurface Basin #27	-	N 556,603	E 461,126
Small Scale Bioretention Basin #28	-	N 556,623	E 461,671
Small Scale Bioretention Basin #29	-	N 556,491	E 461,534
Small Scale Infiltration Basin #30	-	N 556,302	E 461,798
Small Scale Subsurface Basin #31	-	N 556,320	E 461,498
Small Scale Subsurface Basin #32	-	N 556,093	E 460,837
Small Scale Subsurface Basin #33	-	N 556,289	E 460,967
Small Scale Subsurface Basin #34	-	N 556,090	E 460,909
Small Scale Bioretention Basin #35	-	N 555,818	E 459,344
Small Scale Bioretention Basin #36	-	N 556,203	E 461,373
Small Scale Subsurface Basin #37	-	N 556,236	E 461,194
Small Scale Subsurface Basin #41	-	N 556,187	E 460,117
Small Scale Subsurface Basin #42	-	N 556,116	E 461,603
Small Scale Subsurface Basin #43	-	N 556,017	E 461,575
Small Scale Subsurface Basin #44	-	N 555,905	E 461,541
Small Scale Bioretention Basin #45	-	N 555,899	E 461,843
Small Scale Subsurface Basin #46	-	N 555,828	E 461,353
Small Scale Subsurface Basin #47	-	N 555,982	E 461,054
Small Scale Subsurface Basin #48	-	N 556,298	E 459,728
Small Scale Subsurface Basin #49	-	N 556,262	E 459,852
Small Scale Subsurface Basin #50	-	N 555,796	E 461,464
Small Scale Bioretention Basin #51	-	N 556,019	E 459,522
Small Scale Bioretention Basin #52	-	N 556,186	E 459,697
Small Scale Bioretention Basin #53	-	N 556,085	E 459,971
Small Scale Subsurface Basin #54	-	N 555,659	E 460,658
Small Scale Subsurface Basin #55	-	N 556,018	E 460,086
Small Scale Subsurface Basin #56	-	N 555,578	E 460,820
Small Scale Subsurface Basin #57	-	N 555,477	E 460,787
Small Scale Bioretention Basin #58	-	N 555,779	E 459,835
Small Scale Bioretention Basin #59	-	N 555,777	E 459,642
Small Scale Subsurface Basin #60	-	N 555,679	E 460,585
Small Scale Subsurface Basin #61	-	N 555,485	E 461,068
Small Scale Subsurface Basin #62	-	N 555,642	E 461,156
Small Scale Subsurface Basin #63	-	N 555,533	E 461,409

Each facility location relative to the site has been indicated on the Facility Location Maps in Appendix B.

The inspection, maintenance and repair report shall be updated and kept on file at the maintenance office.

The person responsible for maintenance shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and deed as needed.

The person responsible for maintenance shall retain and make available, upon request by any public entity with administrative, health, environmental or safety authority over the site, the maintenance plan and the documentation required.

To the extent permitted by law, the Township will at all reasonable times have a right of ingress and egress over the Easement Area and the right to enter the Easement Area via any road or parking lot located within any common area owned by the Grantor to inspect the System located in the Easement Area.

Except in the case of an emergency, the Township will provide not less than seven (7) days prior notice to the performing any inspection or monitor of the System in accordance with approved plan. The applicant agrees that the failure to timely object after receiving notice from the Township constitutes consent to inspection of the property within the timeframe specified in the notice.

If, after reasonable notice by the Township, the applicant fails to maintain the System in accordance with the approved Manual and the Maintenance Plan, the Township may perform any maintenance needed to correct a condition that impacts the effectiveness of routine maintenance and operations of the system and collect any costs incurred as a result from each owner of the System and in the same manner as real property taxes are collected. In addition, the Township may seek reimbursement under any other method legally available to collect debts owed.

The applicant agrees to indemnify and save the Township harmless from any and all claims for direct damage to persons or property arising from inspections performed by the Township.

2.0 STORMWATER SYSTEM OVERVIEW

Small Scale Bioretention Basins - The basins consist of small-scale surface bioretention basins.

Small Scale Subsurface Basins - The basins consist of a small-scale subsurface basins.

Small Scale Infiltration Basins - The basins consist of a small-scale surface infiltration basins.

Porous Asphalt Areas - Porous asphalt areas are located throughout the project in driveways and parking areas. The porous asphalt is utilized for water quality to treat the 1.25 in / 2 hr. water quality storm runoff.

Green Infrastructure Manufactured Treatment Devices - GI MTD's are located throughout the project as pretreatment for the subsurface basins.

3.0 MAINTENANCE/INSPECTIONS

The following summarizes general maintenance items, which should be addressed on an annual basis:

1. Removal of debris and sediment;

2. General maintenance and repairs to the manufactured treatment devices;

An inspection, maintenance and repair report will be updated and submitted annually to the Township.

4.0 GENERAL MAINTENANCE

All facilities expected to receive and/or trap debris and sediment must be inspected for clogging and excessive debris and sediment accumulation at least four (4) times annually as well as after every storm exceeding one (1) inch of rainfall. Such components may include bottoms, riprap aprons and inflow points.

5.0 REGULAR MAINTENANCE ITEMS

Regular maintenance items, as itemized in the checklist enclosed as Appendix C. includes the following items:

1. Removal and Disposal of Trash and Debris: Immediately following any significant rainfall event, and at least once every 3 months, all trash and debris should be removed from the impoundment area.

2. Sediment Removal and Disposal: Accumulated sediment should be removed before it threatens the operation of the facility. Sediment volume should be monitored on a quarterly basis to assure the outlets are not blocked.
   Disposal of sediment should be in accordance with current Township standards and regulations of the New Jersey Department of Environmental Protection.

Corrective Maintenance

Corrective maintenance should be provided as soon as practicable after a situation that requires attention is reported. Corrective maintenance includes repair of damage caused by vandalism, removal of debris and sediment that threatens the operational capacity of the facility, and corrections of any problems that jeopardize the safety or operation of the facility.

Maintenance Inspection

An inspection of the facility should be made a minimum of once every year in order to determine the effectiveness of the maintenance work and the condition of the facility. In addition, an inspection should be made whenever a severe storm warning is issued in order to determine the readiness of the facility.

Records

Included in this report as Appendix C, are checklists and logs for use by maintenance personnel and inspectors. These should be utilized every time maintenance or inspection is performed on the facility. The reports should be appropriately filed and used to determine effectiveness of the existing maintenance and inspection schedules and used as a guide to revise the schedules as necessary to effectively maintain the operational integrity of the facility.

6.0 BEST MANAGEMENT PRACTICES (BMPS)

The NJDEP Stormwater Management Regulations (N.J.A.C. 7:8) have been adopted to address the adverse impacts of land development. The stormwater management measures taken to meet these requirements are collectively known as Best Management Practices (BMPs). BMPs can be non-structural, as in the disconnect of stormwater runoff, or structural, as in the construction of manufactured treatment devices discussed in this manual

6.1 BIORETENTION AREAS

The following is taken from the Rain Garden Manual of New Jersey by the Rutgers Cooperative Extension Water Resources Program:

Definition

A bioretention area is a landscaped/grassed depression that captures, filters and infiltrates stormwater runoff. The rain garden/bioretention area removes nonpoint source pollutants from stormwater runoff while recharging groundwater.

Purpose

A bioretention area has two main goals. The first goal is to serve as a functional system to capture, filter and infiltrate stormwater runoff at the source and the second goal is to be an aesthetically pleasing garden/grass area.

Maintenance

1. Vegetation

   Grasses within the bioretention area must be carefully maintained so as not to compact the soil, and through handheld equipment. The vegetative cover should be maintained at 85%.

2. Sediment/Debris Removal

   Occasionally use a flat shovel to remove any excess sediment, leaves, or debris that may accumulate.
   Grass clippings shall be collected and properly disposed of. Precautions must be taken to prevent planting bed soil compaction and sediment contamination by runoff.

   Sediment removal should take place when the bioretention area is thoroughly dry. Disposal of debris, trash and sediment or other waste material should be done at suitable disposal/recycling sites and in compliance with all applicable local, state and federal waste disposal regulations.

3. Structural Components

All structural components must be inspected for cracking, erosion and deterioration at least annually. The 4" perforated underdrains shall be inspected for clogging.

4. Other Maintenance criteria

The maintenance plan must indicate the approximate time it would normally take to drain the maximum design storm runoff volume below the bottom of the basin. This normal drain or drawdown time should then be used to evaluate the infiltration area's actual performance.

If significant increases or decreases in the normal drain time are observed, the basin's bottom surface, subsoil and both groundwater and tailwater levels must be evaluated and appropriate measures taken to comply with the maximum drain time requirements and maintain the proper functioning of the infiltration area.

The bottom of a bioretention area should be inspected at least monthly as well as after each storm event exceeding one inch of rainfall. The permeability rate of the soil below the infiltration area may also be retested periodically.

6.2 SMALL SCALE INFILTRATION AREA

The following is taken from the New Jersey Best Management Practices Manual.

Definition

An infiltration – extended detention basin is a stormwater management facility constructed of highly permeable soils that provides temporary storage of stormwater runoff from Water Quality Storm. It also functions to temporarily store and attenuate the stormwater runoff from large storms, such as 2-, 10-, and 100-year storms.

Purpose

The surface infiltration – detention basin has the infiltration function to remove pollutants and to infiltrate stormwater; in addition to groundwater recharge. Pollutants in runoff are treated through the processes of filtration through and biological and chemical activity within the soils.

It also has the storage space to store the runoff volume from large storms. The total suspended solids (TSS) removal rate attributed to infiltration basins is 80%

Maintenance

1. Sand Layer

   To ensure that the design permeability rate is maintained over time, a sand layer is required at the bottom of every surface type of small-scale infiltration basin.

   The minimum depth is 6 inches.

   The sand must meet all the specifications for clean, medium-aggregate concrete sand in accordance with AASHTO M-6 or ASTM C-33, as certified by a professional engineer licensed in the State of New Jersey.

   The maximum percentage of fines is 15%. The minimum tested permeability rate is 20 inches/hour.

2. Sediment/Debris Removal

   Occasionally use a flat shovel to remove any excess sediment, leaves, or debris that may accumulate. Grass clippings shall be collected and properly disposed of. Precautions must be taken to prevent sand bed compaction and sediment contamination by runoff.

   Sediment removal should take place when the basin area is thoroughly dry. Disposal of debris, trash and sediment or other waste material should be done at suitable disposal/recycling sites and in compliance with all applicable local, state and federal waste disposal regulations.

3. Structural Components

   All structural components must be inspected, at least once annually, for cracking, subsidence, spalling, erosion and deterioration.

   Components expected to receive and/or trap debris and sediment must be inspected for clogging at least four times annually, as well as after every storm exceeding 1 inch of rainfall.

   Sediment removal should take place when all runoff has drained and the basin is dry.

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.

Access points for maintenance are required on all enclosed areas within a small-scale infiltration basin; these access points must be clearly identified in the maintenance plan. In addition, any special training required for maintenance personnel to perform specific tasks, such as confined space entry, must be included in the plan.

Stormwater BMPs may not be used for stockpiling of plowed snow and ice, compost, or any other material.

4. Other Maintenance criteria

The maintenance plan must indicate the approximate time it would normally take to drain the maximum design storm runoff volume below the bottom of the basin. This normal drain or drawdown time should then be used to evaluate the infiltration area's actual performance.

If significant increases or decreases in the normal drain time are observed, the basin's bottom surface, subsoil and both groundwater and tailwater levels must be evaluated and appropriate measures taken to comply with the maximum drain time requirements and maintain the proper functioning of the infiltration area.

The bottom of a surface infiltration area should be inspected at least monthly as well as after each storm event exceeding one inch of rainfall. The permeability rate of the soil below the infiltration area may also be retested periodically.

If water fails to infiltrate 72 hours after the end of the storm, corrective measures must be taken. Annual tilling by light equipment can assist in maintaining infiltration capacity and break up clogged surfaces.

6.3 UNDERGROUND INFILTRATION BASIN

The following is taken from the New Jersey Best Management Practices Manual and manufacturer's maintenance specifications:

Definition

The underground infiltration system is comprised of an arch shaped chamber system.

All underground infiltration 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. While maintenance can generally be performed year-round, it should be scheduled during a relatively dry season.

Maintenance

1. Removal and Disposal of Accumulated Debris and Trash

   All underground detention basin components expected to receive and/or trap debris and sediment must be inspected for clogging and excessive debris and sediment at least four times annually as well as after every storm exceeding 1 inch of rainfall. All debris and trash should be removed from the underground basin.

2. Sediment Removal and Disposal

   Accumulated sediment should be removed before it threatens the operation or storage volume of the basin. Sediment volume should be monitored on a quarterly basis to assure that the storage capacity of the basin is not adversely affected. If sediment is at, or above 3" depth clean out the isolator row using the JetVac process.

   A JetVac truck utilizing a fixed floor cleaning nozzle with rear facing nozzle spread of 45 or more will be required. Insert the nozzle from the distribution manifold into the arch row through the opening. Turn the water feed hose on and feed the supply hose until the nozzle has reached the end of the arch row. Withdraw the nozzle slowly.

   The tool will backflush the arch row forcing debris into the distribution manifold. Use the stringer vacuum hose to remove the sediments and debris from the distribution manifold. Multiple passes may be required to fully cleanout the arch row.

Use caution to minimize movement of stone bedding at the arch invert while performing this task; relevel stone as needed. Vacuum out the distribution manifold and remove all debris that may be clogging the outlet pipe.

Sediment removal should take place during the dry season. Disposal of debris, trash and sediment or other waste material should be done at suitable disposal/recycling sites and in compliance with all applicable local, state and federal waste disposal regulations.

3. Structural Components

All structural components must be inspected for cracking, subsidence spalling, erosion and deterioration at least annually.

4. Inspection

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

Inspection can be done through manhole access and visually inspecting the distribution manifold. When the depth of sediment accumulates over 4 inches, cleanout is recommended.

Refer to Appendix C for Manufacturers maintenance procedures.

6.4 POROUS ASPHALT

Maintaining porous asphalt is essential to preserve its stormwater management capabilities and overall longevity. The Facility Location Map for pervious pavement is in Appendix B. Here's a guide to the maintenance requirements for the asphalt pavements:

1. Maintenance for Hydrological Benefits

   The use of this type of asphalt primarily aims to enhance the hydrological properties of roadways and site designs. Failure to correctly maintain a pervious paving system will shorten its lifespan or result in system failure; therefore, the maintenance plan must ensure proper training of personnel and include the special equipment necessary in accordance with the industry or manufacturer's requirements.

2. Annual Infiltration Rate Inspection

   To ensure the long-term effectiveness of porous asphalt in managing stormwater, it's crucial to inspect the surface infiltration rates annually. This involves observing the pavement during rain events to detect any changes in its ability to effectively infiltrate stormwater. The surface course must be inspected after every storm exceeding 1 inch of rainfall. If mud or sediment is tracked onto the surface course, it must be removed as soon as possible. Removal should take place when all runoff has drained from the surface course.

   The surface course must be inspected, at least once annually, for cracking, subsidence, spalling, erosion, deterioration, and unwanted vegetation. Remedial measures must be taken as soon as possible. Herbicides must not be applied.

3. Regular Cleaning Schedule

   Porous asphalt pavements require cleaning two to four times a year. This can be done through vacuuming or power-washing to remove solids and debris that might cause clogging. Regular cleaning is essential to prevent permanent clogging and maintain the pavement's permeability.

   Each spring, after the last snow or ice event, the infiltration rate of the surface course must be tested in accordance with the methods of either ASTM C1701 or C1781, as corresponds to the post-construction test performed for the system. At least 3 locations must be tested. One of the locations must be in an area where sediment is most likely to be deposited, such as, but not limited to, a parking lot entrance. The other test locations must be evenly spaced across the system surface. The locations and results obtained must be recorded in the maintenance plan for

future reference and compared to the as-built testing results as a metric for determining if a system requires corrective action.

4. Winter Maintenance

   During winter, porous asphalt does not require any special plowing methods. Workers can use deicing chemicals to melt ice and snow, but they typically use lesser amounts compared to impervious pavements. This reduced need for deicing chemicals is another important benefit.

5. Avoiding Seal Coating and Managing Repairs

   It is important to avoid seal coating or crack sealing on the asphalt, as these processes can impair its permeability. For patching, a conventional mix may be used but only if the affected area is less than 10% of the pavement. This ensures that the majority of the pavement maintains its porous characteristics.

6.5 STORMWATER INLETS AND PIPES

Definition

Inlet structures are box structures with grate openings to receive surface water which is then conveyed through the underground stormwater pipe system.

Purpose

The primary function of an inlet structure is to allow water to enter the storm drainage system. Inlets also serve as access points for cleaning and inspection.

Maintenance

1. Sediment Removal and Disposal

   Inspect your structures every six months during the first year of operation to determine your site-specific rate of pollutant accumulation. Maintenance events may include inspection, floatable removal and sediment removal.

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

2. Other Maintenance criteria

Regular inspections of inlets and storm pipes should take place approximately three times per year, with additional inspections advised after major weather events. Inspection of the drainage flow paths should be performed to check for blockages. All drains must remain free of foreign objects.

Pipes should be checked for settlement at the joints, which may cause leakage and undermining of the system. Inspections in locations that are not easily accessible may be performed by video inspection of the system.

6.6 GREEN INFRASTRUCTURE MANUFACTURED TREATMENT DEVICE (FILTERRA)

Definition

A green infrastructure manufactured treatment device is a stormwater treatment system used to address stormwater runoff quality impacts of site development and pre-treatment for subsurface infiltration basins.

Purpose

Green infrastructure manufactured treatment devices will remove 80% total suspended solids.

Maintenance

1. Inspection

Inspect the unit and the surrounding area with photographs. All structural components must be inspected at least once annually for cracking and deterioration or more frequently if specified in the manufacturers MTD Operations and Maintenance Manual.

Observe the inside of the structure. Look for any obstructions in the inflow pipe, pre-treatment chamber, discharge chamber or outflow pipe.

2. Sediment/Debris Removal

Sediment removal should take place when the MTD is thoroughly dry. Disposal of debris, trash and sediment or other waste material should be done at suitable disposal/recycling sites and in compliance with all applicable local, state and federal waste disposal regulations.

3. Vegetation

Examine the plant's health and replace if necessary. Prune as necessary to encourage growth in the correct directions. Vegetative cover must be maintained at 85%.

A minimum of one inspection during the growing season and one inspection during the non-growing season is required to ensure the health of the vegetation.

Refer to Appendix C for Manufacturers maintenance procedures.

6.7 GREEN INFRASTRUCTURE MANUFACTURED TREATMENT DEVICE (MODULAR WETLANDS)

Definition

A green infrastructure manufactured treatment device is a stormwater treatment system used to address stormwater runoff quality impacts of site development and pre-treatment for subsurface infiltration basins.

Maintenance

1. Inspection

Inspect the unit and the surrounding area with photographs. All structural components must be inspected at least once annually for cracking and deterioration or more frequently if specified in the manufacturers MTD Operations and Maintenance Manual.

Observe the inside of the structure. Look for any obstructions in the inflow pipe, pre-treatment chamber, discharge chamber or outflow pipe, and pre-filter cartridges.

2. Sediment/Debris Removal

Maintenance of the system may be required if excess accumulation of floatable in the pre-treatment chamber is impacted by more than 18" and sediment accumulation of more than 6".

Sediment removal should take place when the MTD is thoroughly dry. Disposal of debris, trash and sediment or other waste material should be done at suitable disposal/recycling sites and in compliance with all applicable local, state and federal waste disposal regulations.

3. Vegetation

Examine the plant's health, trim and/or replace if necessary. The general life of the biofiltration media is 10 to 20 years based on pollutant loading. If the biofiltration media is replaced, replanting of vegetation is required.

Refer to Appendix C for Manufacturers maintenance procedures.

7.0 SAFETY OF INSPECTION AND MAINTENANCE PERSONNEL

Maintenance personnel may require training in maintenance tasks. Inspectors are expected to be dressed in protective clothing and use the appropriate equipment and safety gear in accordance with OSHA regulations and procedures when performing their tasks. Equipment should always be operated safely and in accordance with manufacturers specifications. Call utility companies before initiating any maintenance activity involving any excavation.

8.0 MISCELLANEOUS ITEMS

1. Emergency Conditions

Recommended corrective responses to various emergency conditions that may be encountered at the stormwater management measure are to be determined on an as-needed basis after each subsequent inspection.

2. Specialized Stormwater Management Measures

Maintenance, repair, and replacement instructions for specialized, proprietary, and non-standard measure components, in addition to manufacturer's product installation guides and user manuals, have been included and referenced, if applicable, on the design plans for the project. Refer to specific product guides and user manuals for specific detail regarding the respective item.

3. Disposal and Recycling Sites

Approved disposal and recycling sites and procedures for sediment, trash, debris, and other material removed from the stormwater management measures during maintenance operations shall be utilized and have been referenced herein and on the design plans for the project.

4. As-Built Construction Plans

As-built construction plans of the stormwater management measures and copies of pertinent construction documents, such as laboratory test results, permits, and completion certificates are required for verification for the associated measures to function properly and in accordance with the approved design. As-built construction plans will be available through the responsible party denoted in the report.

5. Permits for Maintenance Activities

Permits may be required from the New Jersey Department of Environmental Protection for the maintenance activities associated with the proposed drainage system discharging to Delaware River Compliance with all NJDEP regulations and requirements pertaining to the disposal of sediment, trash, debris and other removed material is required.

APPENDIX A

- **TOOLS AND EQUIPMENT**
- **MAINTENANCE CATEGORIES**

TOOLS AND EQUIPMENT

The following is a list of required inspection equipment for routine operation and maintenance procedures and inspections:

1. A clipboard, a pencil and the inspection checklist. The checklist is included in Appendix B.
2. A standard 6-foot collapsible ruler.
3. A camera. Photographs or observed portions of the basin will provide a measure of performance when comparing past and present maintenance practices or conditions.
4. A probe. A stiff light stick or rod with a blunt tip of sufficient strength to penetrate soil. The probe can provide information on condition below the surface of the basin bottom, such as depth and softness of a saturated area.
5. A weed whacker. Can be used to clear non-visible areas and to perform routine maintenance on basin embankments.
6. A flashlight. Can be used to observe the inside of outlet pipes and structural components.

Maintenance of the basin may include the use of equipment including the following:

1. Chainsaw.
2. Stump grinder.
3. Wheelbarrow.
4. Backhoe.
5. Dump truck.
6. Pole with skimmer or net.
7. Trash bag for removed floatables.
8. JetVac.
9. Ladder.

Sources of the following materials should be identified for immediate use of warranted repairs by the inspection:

1. Clean sand or gravel for filling erosion rills and gullies.
2. Topsoil mixture, fertilizer and seed.
3. Large stone riprap for emergency repairs caused by erosion.
4. Synthetic geotextile fabric, netting and stakes to prevent seed and topsoil from blowing away.
5. A commercially or municipally owned JetVac is used to clean the porous asphalt and clean the subsurface basins.

MAINTENANCE CATEGORIES

1. **Immediate Maintenance:** demands immediate attention and usually requires construction equipment and professional guidance. Immediate maintain is characterized by the following:

    a. A severe slope failure.
    b. Blocked grate, outlet structure or pipes.
    c. Increasing, uncontrolled seepage through the embankment.
    d. Foul odor.
    e. Clogged drains
    f. Failure to infiltrate

2. **Corrective Maintenance:** should be performed as soon as possible after an inspection. Corrective maintenance consists of the following:

    a. Clearing of trees, shrubs and underbrush on the basin embankment, crest or near the outlet structure.
    b. Filling eroded areas or gullies and seeding to stabilize the turf areas or replacing and/or regarding sand beds.
    c. Sweep/vacuum porous pavement
    d. Clearing of inlet grates.

3. **Continuing Maintenance:** will occur on a regular basis and can be performed during the inspection or in accordance with the maintenance schedule outlined above. Continuing maintenance includes:

    a. Filling small, eroded gullies.
    b. Filling ruts caused by pedestrian traffic along the embankment.
    c. Removing accumulated trash and debris.
    d. Fertilizing and seeding grassed areas as necessary.
    e. Mowing grassed areas.
    f. Jet cleaning of underground detention basin.

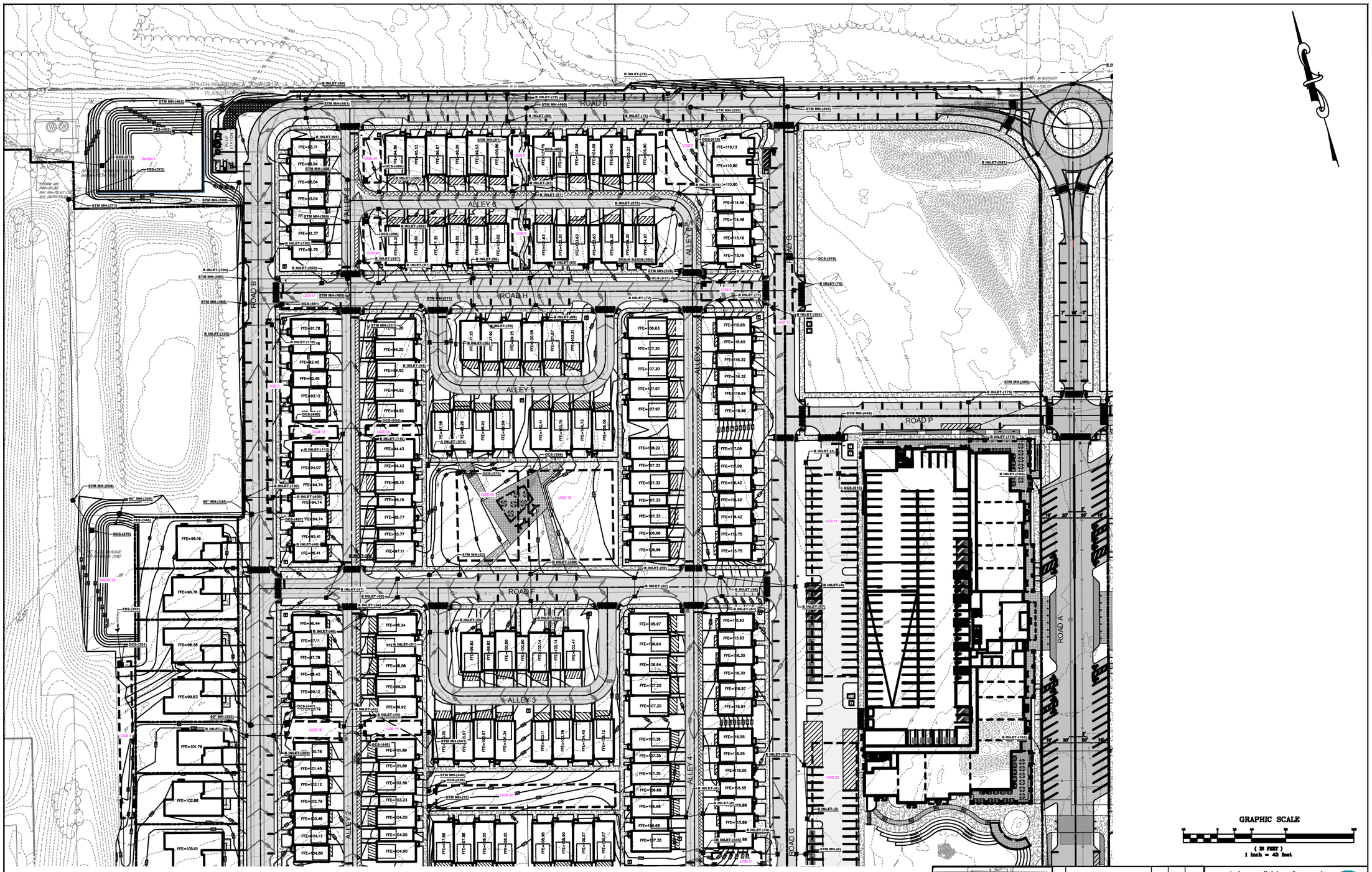
MAINTENANCE INSPECTION

An inspection of the facilities should be made a minimum of once every three months in order to determine the effectiveness of the maintenance work and the condition. In addition an inspection should be made whenever a severe weather warning is issued in order to determine the readiness of the facilities.

Reports should be appropriately filed and used to determine the effectiveness of the existing maintenance and inspection schedules and also used as a guide to revising the schedules as necessary to maintain the operational integrity.

APPENDIX B

- **FACILITY LOCATION MAPS**
- **POROUS PAVEMENT MAP**



SHEET KEY MAP

REV.	DESCRIPTION	DATE	DFT.BY	CKD.BY
2	PER TOWNSHIP REVIEW	8/27/24		
1	PER CLIENT REVISIONS	7/19/24		

6/14/24
DATE OF SIGN.

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www.vannoteharvey.com
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Certificate of Authorization No. 24GA28033300

STORMWATER FACILITY LOCATION MAP – 1
OF
THE PRINCETON NURSERIES
PREPARED FOR
WRV NURSERIES PLAINSBORO OWNER, LLC
SITUATED IN
PLAINSBORO TOWNSHIP
MIDDLESEX CO., N.J.
SCALE 1"= 40'
JUNE 14, 2024

DRAWN BY	FIELD BK	ORDER No.	FILE No.	SHEET No.
DATE 6/14/24 WDV				
CHECKED BY DATE 6/14/24 CG	PAGE	WRNUL23001		MP–1

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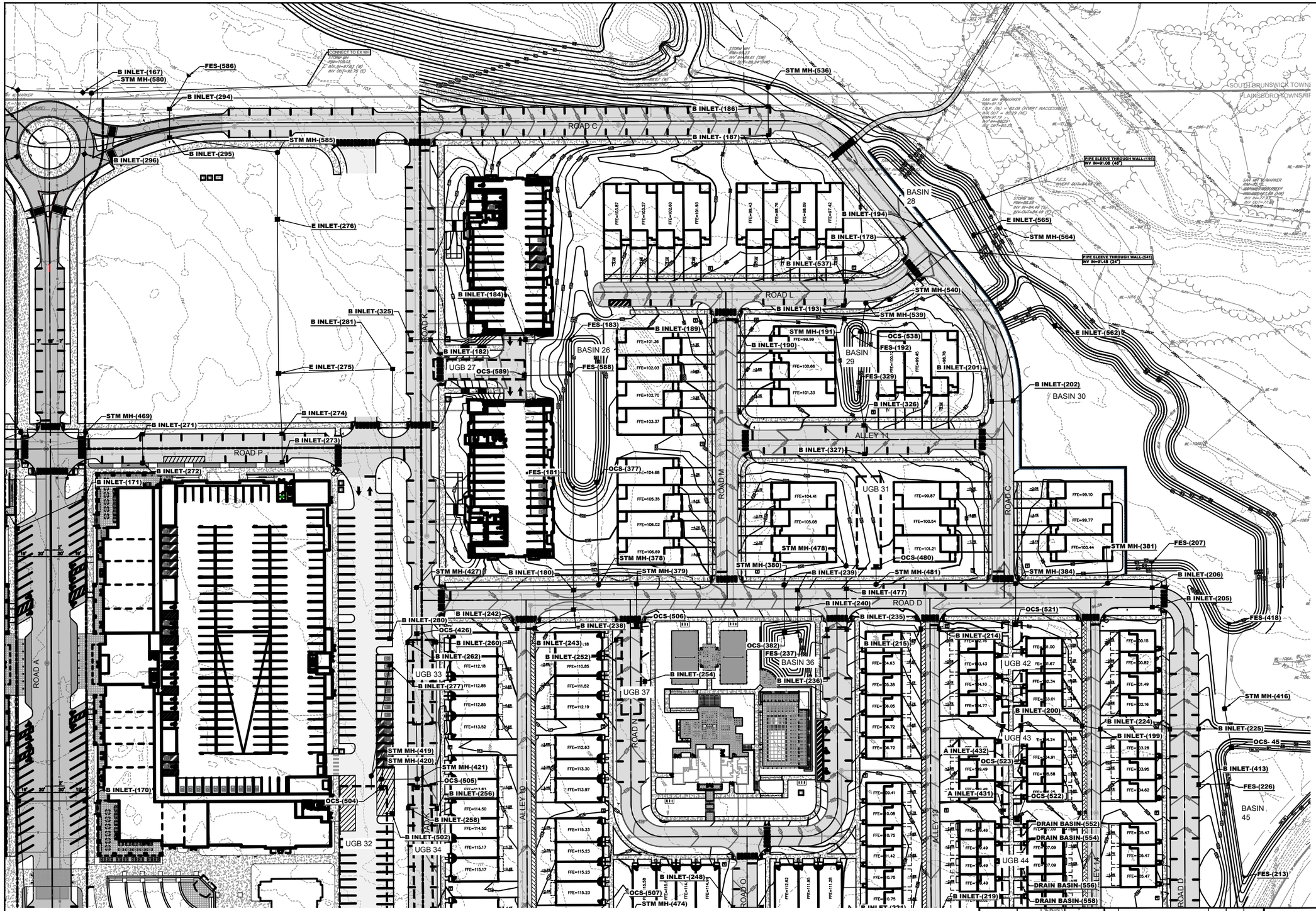
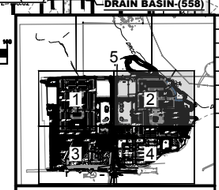


GRAPHIC SCALE

(IN FEET)
1 inch = 40 feet



SHEET KEY MAP

REV.	DESCRIPTION	DATE	DFT.BY	CKD.BY
2	PER TOWNSHIP REVIEW	9/27/24		
1	PER CLIENT REVISIONS	7/19/24		

6/14/24
DATE OF SIGN.

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STORMWATER FACILITY LOCATION MAP – 2
OF
THE PRINCETON NURSERIES
PREPARED FOR
WRV NURSERIES PLAINSBORO OWNER, LLC
SITUATED IN

PLAINSBORO TOWNSHIP
SCALE 1"= 40'

MIDDLESEX CO., N.J.
JUNE 14, 2024

DRAWN BY WDV DATE 6/14/24	FIELD BK	ORDER No. WRNUL23001	FILE No.	SHEET No. MP–2
CHECKED BY CG DATE 6/14/24	PAGE			

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SEMINARY DRIVE

PRINCETON WINDROWS

ROAD A

ROAD B

ROAD D

ROAD E

ROAD G

ALLEY A

ALLEY B

GRAPHIC SCALE

(IN FEET)
1 inch = 80 feet

SHEET KEY MAP

REV.	DESCRIPTION	DATE	DFT.BY	CKD.BY
2	PER TOWNSHIP REVIEW	9/27/24		
1	PER CLIENT REVISIONS	7/19/24		

6/14/24
DATE OF SIGN.

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FACILITY LOCATION MAP – 3
OF
THE PRINCETON NURSERIES
PREPARED FOR
WRV NURSERIES PLAINSBORO OWNER, LLC
SITUATED IN

PLAINSBORO TOWNSHIP
SCALE 1"= 40'
MIDDLESEX CO., N.J.
JUNE 14, 2024

DRAWN BY	CHECKED BY	FIELD BK	PAGE	ORDER No.	FILE No.	SHEET No.
WDV DATE 6/14/24	CG DATE 6/14/24			WRNJL23001		MP-3

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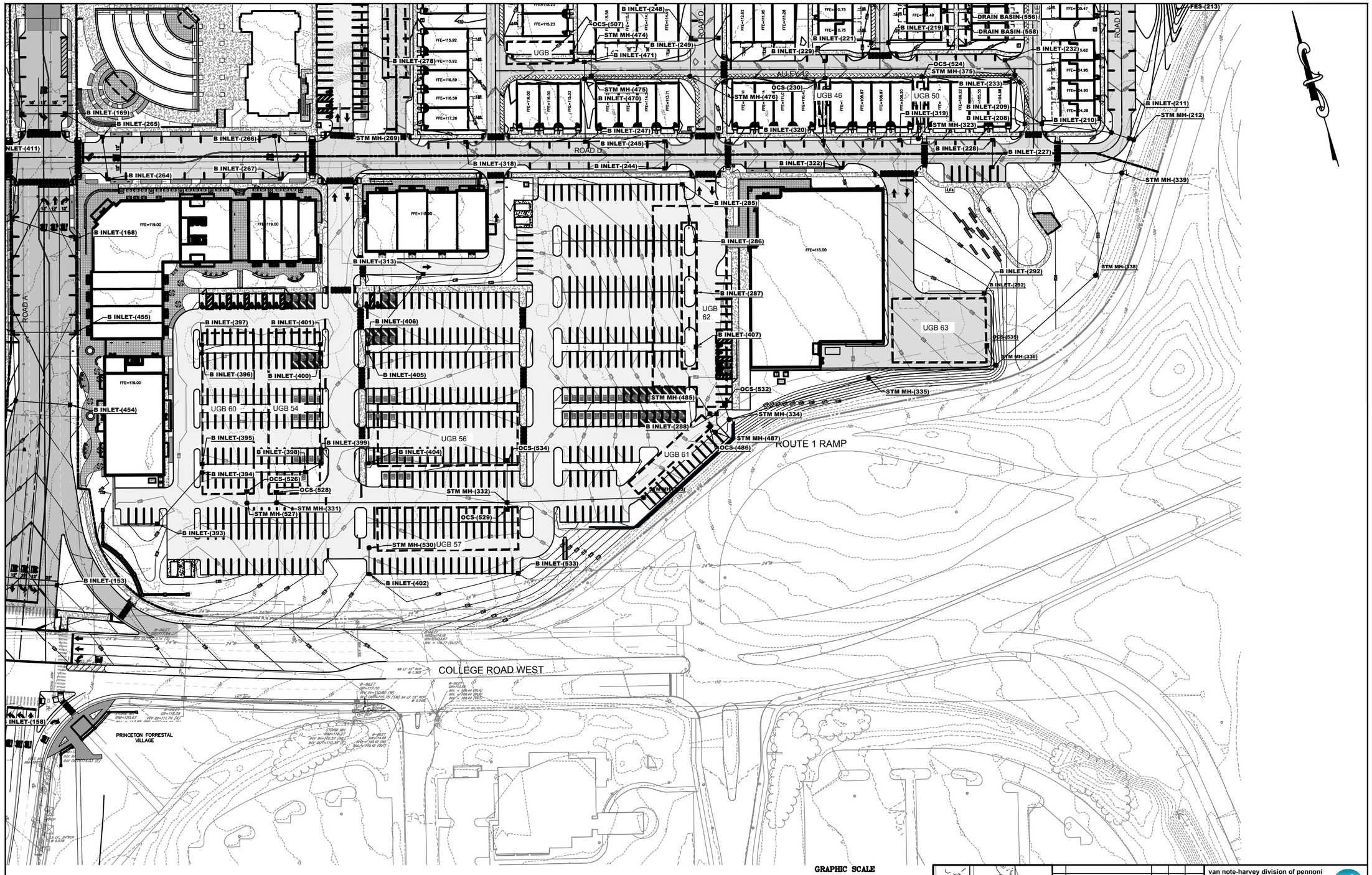

GRAPHIC SCALE

(IN FEET)
1 inch = 40 feet

SHEET KEY MAP

REV.	DESCRIPTION	DATE	DFT.BY	CKD.BY
2	PER TOWNSHIP REVIEW	9/27/24		
1	PER CLIENT REVISIONS	7/19/24		

6/14/24
DATE OF SIGN.

CHAD GAULRAPP
N.J. PROFESSIONAL ENGINEER LIC. NO. GE 41398

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www.pennoni.com
Certificate of Authorization No. 24GA28033300

FACILITY LOCATION MAP – 4
OF
THE PRINCETON NURSERIES
PREPARED FOR
WRV NURSERIES PLAINSBORO OWNER, LLC
SITUATED IN

PLAINSBORO TOWNSHIP
SCALE 1" = 40'
MIDDLESEX CO., N.J.
JUNE 14, 2024

DRAWN BY	WDV	FIELD BK		ORDER No.	FILE No.	SHEET No.
DATE	6/14/24			WRNUL23001		MP-4
CHECKED BY	CG	PAGE				
DATE	6/14/24					

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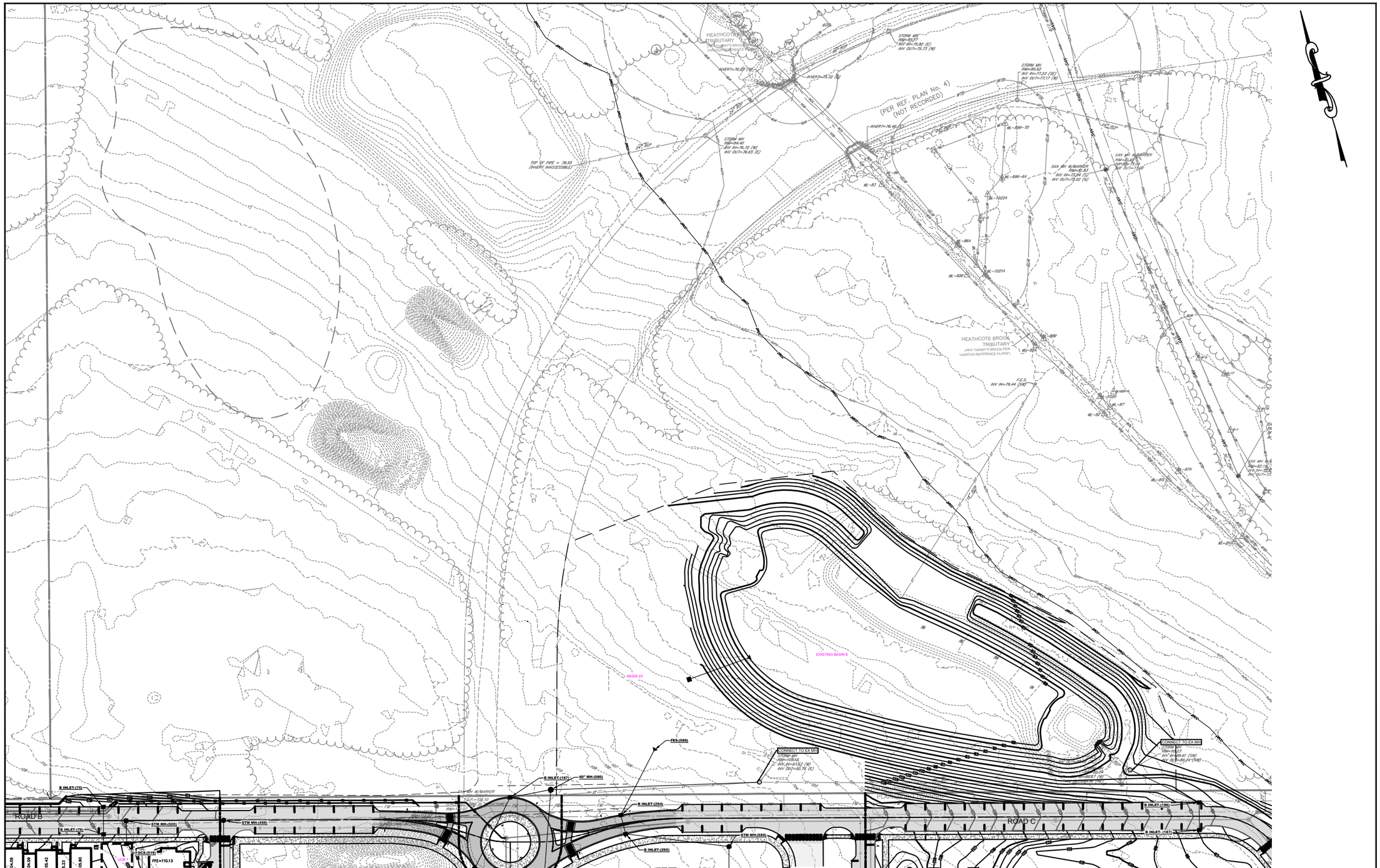

REV.	DESCRIPTION	DATE	DFT.BY	CKD.BY
2	PER TOWNSHIP REVIEW	9/27/24		
1	PER CLIENT REVISIONS	7/19/24		

6/14/24
DATE OF SIGN.

CHAD GAULRAPP
N.J. PROFESSIONAL ENGINEER LIC. NO. GE 41399

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STORMWATER FACILITY LOCATION MAP – 5
OF
THE PRINCETON NURSERIES
PREPARED FOR
WRV NURSERIES PLAINSBORO OWNER, LLC
SITUATED IN
PLAINSBORO TOWNSHIP
MIDDLESEX CO., N.J.
SCALE 1" = 40'
JUNE 14, 2024

DRAWN BY	FIELD BK	ORDER No.	FILE No.	SHEET No.
WDV				
DATE 6/14/24		WRNUL23001		MP–5
CHECKED BY CG	PAGE			
DATE 6/14/24				

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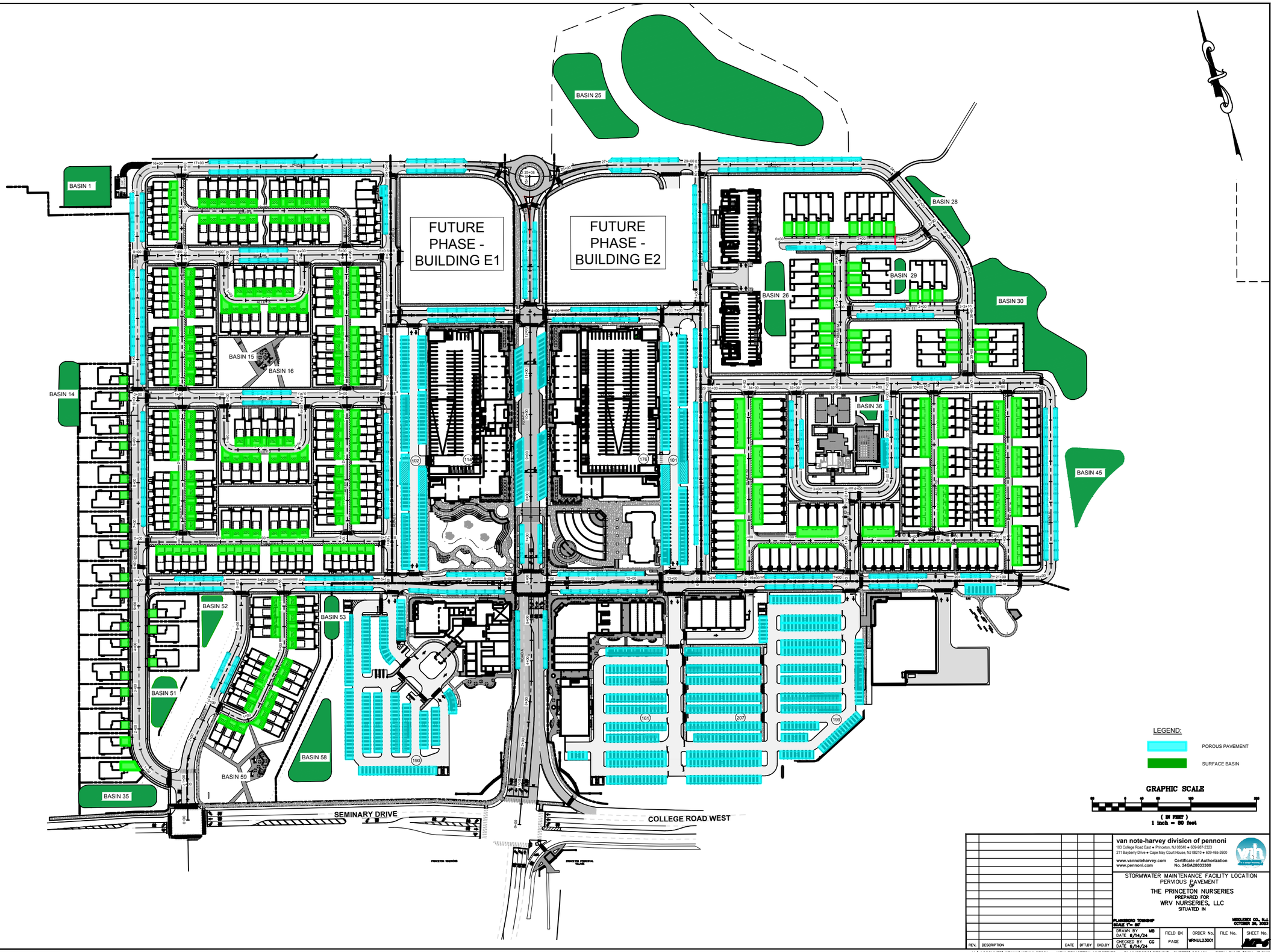

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Certificate of Authorization No. 24GA28033300

STORMWATER MAINTENANCE FACILITY LOCATION
PERVIOUS PAVEMENT
OF
THE PRINCETON NURSERIES
PREPARED FOR
WRV NURSERIES, LLC
SITUATED IN

PLAINSBORO TOWNSHIP
SCALE 1"= 80'

MIDDLESEX CO., N.J.
OCTOBER 28, 2025

DRAWN BY	DATE	CHECKED BY	DATE	FIELD BK	PAGE	ORDER No.	FILE No.	SHEET No.
MB	6/14/24	CG	6/14/24			WRNUL23001		

REV.	DESCRIPTION	DATE	DFT.BY	CKD.BY

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APPENDIX C

- **BASIN INSPECTION AND MAINTENANCE COSTS**
- **MAINTENANCE LOGS/CHECKLISTS**
- **CORRECTIVE MAINTENANCE RECORD**

ENGINEER'S ESTIMATE OF
BASIN INSPECTION AND MAINTENANCE COSTS
PRINCETON NURSERIES
TOWNSHIP OF PLAINSBORO AND TOWNSHIP OF SOUTH BRUNSWICK
MIDDLESEX COUNTY, NEW JERSEY

Item #	Description	Rate	Unit	Total Units	Frequency Per Year	Item Total
1	Grass Trimming	$ 150.00	LS	19	10	$28,500.00
2	Landscape Maintenance (Basin)	$ 100.00	LS	19	2	$3,800.00
3	Landscape Maintenance Materials	$ 250.00	LS	19	1	$4,750.00
4	General Maintenance	$ 150.00	LS	59	2	$17,700.00
5	Visual Inspection	$ 125.00	LS	59	2	$14,750.00
6	Trash and Debris Removal	$ 200.00	LS	59	As Needed	$11,800.00
7	Preventive Maintenance	$ 200.00	LS	59	1	$11,800.00
8	Corrective Maintenance	$ 250.00	LS	59	1	$14,750.00
9	GI Manufactured Treatment Devices	$ 150.00	LS	19	1	$2,850.00
10	Vacuum Clean Subsurface Pipes	$ 750.00	LS	40	1	$30,000.00

TOTAL ANNUAL	$140,700.00

Inspection Checklist / Maintenance Actions
Porous Asphalt

Checklist (circle one)**:** Quarterly / Annual / Monthly / Special Event Inspection

Checklist No. _____ **Inspection Date: _____**

Date of most recent rain event: _____

Rain Condition (circle one):
Drizzle / Shower / Downpour / Other _____

Ground Condition (circle one):
Dry / Moist / Ponding / Submerged / Snow accumulation

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
A Pretreatment (Vegetative Filter Strip) If applicable	1	Poor quality vegetation, erosion, sedimentation, or debris	Y__ N__	(See Vegetative Filter Strip Field Manual)
B1 Pavement Surface (Porous Pavement)	1	Standing water is present after the design drain time The observed drain time is approximately _____ hours. Excessive sediment or mud accumulation on top of the pavement	Y__ N__	Recheck to determine if there is standing water after 72 hours If standing water is present longer than 5 days, report to mosquito commission. If excessive sediment is present, the system may be clogged - Sweep the surface - Power wash (at 45 degree angle to the top) - Vacuum the surface - Excavate to inspect the storage bed for clogging, replace the storage bed material if it is severely clogged - Check the permeability rate of the subsoil Work Order # _____
B 1 Pavement Surface (Porous Pavement)	2	Cracking, subsidence, spalling, or other damage to the pavement	Y__ N__	Repair according to the manufacturer's procedures and material. See Reference Documents section. Work Order # _____
	3	Weeds or other vegetation on the porous pavement	Y__ N__	Remove the vegetation

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
Note:				
C Vegetation (for permeable pavers with vegetation)	1	Vegetation is overgrown	Y__ N__	Remove the vegetation according to the permeable paver manufacturer's instruction Work Order # _____
D Outlet	1	Clogged overflow outlet	Y__ N__	Clear and remove sediment
	2	Discharge pipe apron is eroded or scoured	Y__ N__	Restabilize the discharge riprap apron Work Order #_____
Note:				

Follow Up Items (Component No. / Inspection Item No.):

_____

Associated Work Orders: # _____, # _____, # _____, # _____, # _____

_____ _____ _____

Inspector Name **Signature** **Date**

Report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities.

File this checklist in the Maintenance Log after performing maintenance.

Preventative Maintenance Record

Corresponding Checklist No. _____
Component No._____, Inspection Item No._____

Work Logs

Activities	Components	Date Completed
Sediment/debris removal	A – Pretreament (Vegetative Filter Strip)	
	B1 – Pavement Surface (Porous Pavement)	
	B2 – Pavement Surface (Permeable Paver)	
	D – Outlet	
Vegetation removal	A – Pretreament (Vegetative Filter Strip)	
	B2 – Pavement Surface (Permeable Paver)	
	C – Vegetation	
(List additional tasks, if applicable)		

Debris, sediment, and trash are handled (onsite / by _____ (contractor name) to disposal site _____). (See Part I: Maintenance Plan – Disposal Plan Section)

Crew member:_____/_____ Date: _____
(name/ signature)

Supervisor:_____/_____ Date: _____
(name/ signature)

File this Preventative Maintenance Record in the Maintenance Log after performing maintenance

Inspection Checklist / Maintenance Actions
Surface Infiltration Basin

Checklist (circle one)**:** Quarterly / Annual / Monthly / Special Event Inspection

Checklist No. _____ **Inspection Date: _____**

Date of most recent rain event: _____

Rain Condition (circle one):
Drizzle / Shower / Downpour / Other _____

Ground Condition (circle one):
Dry / Moist / Ponding / Submerged / Snow accumulation

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
A1 Pretreatment (Forebay)	1	Scouring or erosion is present at inlet structure and/or riprap apron	Y__ N__	Check the flow diversion device before the inlet pipe and whether the bypass flow channel is clogged Work Order # _____
	2	Clogged pipes or excessive sediment in the forebay	Y__ N__	Remove sediment or debris
	3	Damaged outlet structure (e.g., cracking, subsidence, spalling, erosion, or deterioration)	Y__ N__	Repair or replace the outlet structure Work Order # _____
A2 Pretreatment (MTD, if installed)	1	MTD inspection	Y__ N__	(If a MTD is used for pretreatment, see manufacturer's maintenance manual)
A3 Pretreatment (Structural BMP)	1	BMP inspection	Y__ N__	(See BMP No. _____ Field Manual)
Note:				

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
B Infiltration Bed	1	Standing water is present after the design drain time The observed drain time is approximately _____ hours.	Y__ N__	Recheck to determine if there is standing water after 72 hours If standing water is present longer than 5 days, report to mosquito commission. Remove any sediment buildup Replace the sand layer (if sand layer is installed; volume of replacement sand is specified in the Basin Configuration Targets in the Basic Design Information Section of this Manual) Work Order # _____
	2	Excessive sediment, silt, or trash accumulation on basin bed	Y__ N__	Clean pretreatment system Remove silt, sediment, and trash Work Order # _____
Note:				

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
B Infiltration Bed	3	Erosion or channelization is present	Y__ N__	Check whether the flow bypass or diversion device is clogged Re-grade the infiltration bed Work Order # _____
	4	Animal burrows/rodents are present	Y__ N__	Pest control Work Order # _____
	5	Uneven bed	Y__ N__	Use light equipment to resurface the bed Work Order # _____
	6	Evidence of sinkholes or subsidence	Y__ N__	Monitor for sinkhole development
Note:				

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
C Vegetation	1	Large spot(s) showing bare soil	Y__ N__	Vegetative cover must be maintained at 85%. Revegetate the entire basin if 50% or more vegetation has been lost. Check Landscaping plan for guidance (if available) Work Order # _____
	2	Overgrown vegetation	Y__ N__	Mow/trim the vegetation Work Order # _____
	3	Tree growth in the basin	Y__ N__	Clear, trim, or prune the trees according to the original Landscaping Plan Inspect to determine if the tree roots caused any structural damage Work Order # _____
Note:				

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
D Basin Embankment and Side Slopes	1	Signs of erosion, soil slide or bulges, seeps and wet spots, loss of vegetation, or erosion on the basin slope	Y__ N__	Check for excessive overland runoff flow through the embankment. Check for any sink hole development Direct the overland runoff to the forebay or pretreatment area Restabilize the bank Work Order # _____
Note:				

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
E Outlet	1	Trash or debris accumulation more than 20%	Y__ N__	Clean and remove Determine source of trash and address to reduce future maintenance costs or basin failure
	2	Trash rack is damaged or rusted greater than 50% Trash rack is bent, loose, or missing parts	Y__ N__	Repair or replace trash rack Work Order #_____
	3	Outlet components (e.g., orifice plates or weir plate) skewed, misaligned, or missing	Y__ N__	Repair or replace component Work Order #_____
	4	Discharge pipe apron is eroded or scoured	Y__ N__	Restabilize the discharge riprap apron Work Order #_____
	5	Standing water is present in the outlet structure longer than 72 hours	Y__ N__	Pump out the standing water Work Order # _____

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
Note:				
F Emergency Spillway	1	Trees or excessive vegetation present	Y__ N__	Remove trees and roots, and restore berms if necessary Work Order #_____
	2	Damaged structure	Y__ N__	Repair Work Order #_____
G Miscellaneous	1	Fence: broken or eroded parts	Y__ N__	Repair or replace Work Order #_____
	2	Gate: missing gate or lock	Y__ N__	Repair or replace Work Order #_____
	3	Sign/plate: tiled, missing, or faded	Y__ N__	Repair or replace Work Order #_____
	4	Excessive or overgrown vegetation blocking access to the basin	Y__ N__	Clear, trim, or prune the vegetation to allow access for inspection and maintenance Work Order #_____

Follow Up Items: (Component No. / Checklist No.):
_____

Associated Work Orders: # _____, # _____, # _____, # _____, # _____

_____	_____	_____
Inspector Name	Signature	Date

Report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities.

File this checklist in the Maintenance Log after performing maintenance

Inspection Checklist / Maintenance Actions
Subsurface Basin

Checklist (circle one)**:** Quarterly / Annual / Monthly / Special Event Inspection

Checklist No. _____ **Inspection Date: _____**

Date of most recent rain event: _____

Rain Condition (circle one):
Drizzle / Shower / Downpour / Other _____

Ground Condition (circle one):
Dry / Moist / Ponding / Submerged / Snow accumulation

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
A Chambers	1	The cap of the inspection port is loose, damaged, or missing.	Y__ N__	Fix, repair, or replace the cap Work Order #_____
	2	Standing water is present after the design drain time The observed drain time is approximately _____ hours.	Y__ N__	Recheck to determine if there is standing water after 72 hours If standing water is present longer than 5 days, report to mosquito commission. Remove any sediment buildup and Check the chambers for clogging and clean it if necessary Check the chambers for damage and repair it if necessary Check subsoil permeability and replace subsoil if necessary Work Order #_____

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
	3	Excessive sediment or debris present in the inspection port	Y__ N__	Clear and remove sediment or debris
Note:				
A Chambers	4	Little or no flow into the system	Y__ N__	Check whether the inlet pipe, or flow diverter is clogged Clear and remove debris
	5	Overflow pipe is clogged	Y__ N__	Clear the clog
	6	Odor present	Y__ N__	Clear and remove sediment and debris Investigate the pipes

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
	7	Overflow from the top of the access manholes	Y__ N__	Clear and remove sediment and debris Check the bypass pipe if any clog Remove any sediment buildup and replace the stone fill if necessary Check the pipe for clogging and clean it if necessary Check the pipes for damage and repair it if necessary Check subsoil permeability and replace subsoil if necessary
Note:				

Follow Up Items: (Component No. / Inspection Item No.):

_____

Associated Work Orders: # _____, # _____, # _____, # _____, # _____

_____ _____ _____

Inspector Name Signature Date

Report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities.

File this checklist in the Maintenance Log after performing maintenance

Inspection Checklist / Maintenance Actions
Bioretention System

Checklist (circle one)**:** Quarterly / Annual / Monthly / Special Event Inspection

Checklist No. _____ **Inspection Date: _____**

Date of most recent rain event: _____

Rain Condition (circle one):
Drizzle / Shower / Downpour / Other _____

Ground Condition (circle one):
Dry / Moist / Ponding / Submerged / Snow accumulation

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
A1 Pretreatment (Forebay) (if installed)	1	Scouring or erosion is present at inlet structure and/or riprap apron	Y__ N__	Check the flow diversion device before the inlet pipe and whether the bypass flow channel is clogged Work Order # _____
	2	Clogged pipes or excessive sediment in the forebay	Y__ N__	Remove sediment or debris
	3	Damaged outlet structure (e.g., cracking, subsidence, spalling, erosion, or deterioration)	Y__ N__	Repair or replace the outlet structure Work Order # _____
A2 Pretreatment (MTD)	1	MTD inspection (if installed)	Y__ N__	(If a MTD is used for pretreatment, see Maintenance Manual Provided by the manufacturer)

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
A3 Pretreatment (Structural BMP) (if installed)	1	BMP inspection	Y__ N__	(See BMP No. _____ Field Manual)
Note:				
B Basin Bed	1	Standing water is present after the design drain time	Y__ N__	Recheck to determine if there is standing water after 72 hours If standing water is present longer than 5 days, report to mosquito commission.

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
		The observed drain time is approximately _____ hours.		Remove any sediment buildup Check the soil permeability Till the soil bed with rotary tiller or disc harrow Replace the planting soil, if necessary Work Order # _____
	2	Excessive sediment, silt, or trash accumulation on basin bed	Y__ N__	Clean pretreatment system Remove silt, sediment, and trash
	3	Erosion or channelization is present	Y__ N__	Check whether the flow bypass or diversion device is clogged Re-grade the infiltration bed Work Order # _____

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
	4	Animal burrows/rodents are present	Y__ N__	Pest control Work Order # _____
Note:				
B Basin Bed	5	Uneven bed	Y__ N__	Use light equipment to resurface the bed Work Order # _____
	6	Evidence of sinkholes or subsidence	Y__ N__	Monitor for sinkhole development
C Vegetation	1	Large spot(s) showing bare soil	Y__ N__	Vegetative cover must be maintained at 85%. Revegetate the entire basin if 50% or more vegetation has been lost. Check Landscaping plan for guidance (if available) Work Order # _____

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
	2	Invasive plants are present	Y__ N__	Remove the invasive plants and restore the vegetation in accordance with the landscaping plan Work Order # _____
	3	The vegetation in the basin has been mowed or removed	Y__ N__	Revegetate the system in accordance with the vegetation plan Work Order # _____ Note: The vegetation in a bioretention system should **not** be mowed or removed
Note:				

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
D Bioretention System Embankment and Side Slopes	1	Signs of erosion, soil slide or bulges, seeps and wet spots, loss of vegetation, or erosion on the basin slope	Y__ N__	Check for excessive overland runoff flow through the embankment. Check for any sink hole development Direct the overland runoff to the forebay or pretreatment area Restabilize the bank Work Order # _____
	2	Overgrown perimeter vegetation	Y__ N__	Mow the vegetation on the perimeter of the embankment Work Order # _____ Note: Mowing of vegetation should only take place in the area **outside** the basin. Dense vegetation must be maintained in the basin.
E Outlet	1	Trash or debris accumulation more than 20%	Y__ N__	Clean and remove Determine source of trash and address to reduce future maintenance costs or basin failure

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
	2	Trash rack is damaged or rusted greater than 50% Trash rack is bent, loose, or missing parts	Y__ N__	Repair or replace trash rack Work Order #_____
	3	Outlet components (e.g., orifice plates or weir plate) skewed, misaligned, or missing	Y__ N__	Repair or replace component Work Order #_____
	4	Discharge pipe apron is eroded or scoured	Y__ N__	Restabilize the discharge riprap apron Work Order #_____
Note:				
F Emergency Spillway	1	Trees or excessive vegetation present	Y__ N__	Remove trees and roots, and restore berms if necessary Work Order #_____
	2	Damaged structure	Y__ N__	Repair Work Order #_____

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
G Miscellaneous	1	Fence: broken or eroded parts	Y__ N__	Repair or replace Work Order #_____
	2	Gate: missing gate or lock	Y__ N__	Repair or replace Work Order #_____
	3	Sign/plate: tiled, missing, or faded	Y__ N__	Repair or replace Work Order #_____
	4	Excessive or overgrown vegetation blocking access to the basin	Y__ N__	Clear, trim, or prune the vegetation to allow access for inspection and maintenance Work Order #_____
Note:				

Follow Up Items (Component No. / Inspection Item No.):
_____

Associated Work Orders: # _____, # _____, # _____, # _____, # _____

_____ _____ _____
Inspector Name Signature Date

Report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities.

File this checklist in the Maintenance Log after performing maintenance

CORRECTIVE MAINTENANCE RECORD

1. **Work Order # _____ Date Issued _____**

2. **Issue to be resolved**:

3. The issue was from **Corresponding Checklist _____, Component No. _____Inspection Item No._____.**

4. **Required Actions**

Actions	Planned Date	Date Completed

5. **Responsible person(s):**
   _____

6. **Special requirements**
   - Time of the season or weather condition :_____
   - Tools/equipment:_____
   - Subcontractor (name or specific type):_____

Approved by _____/_____ Date _____
(name/signature)

Verification of completion by _____/_____ Date _____
(name/signature)

File this Corrective Maintenance Record in the Maintenance Log after performing maintenance.

12.0 Inspection and Maintenance

12.1 Isolator Row Plus Inspection

Regular inspection and maintenance are essential to assure a properly functioning stormwater system. Inspection is easily accomplished through the manhole or optional inspection ports of an Isolator Row PLUS. Please follow local and OSHA rules for a confined space entry.

Inspection ports can allow inspection to be accomplished completely from the surface without the need for a confined space entry. Inspection ports provide visual access to the system with the use of a flashlight. A stadia rod may be inserted to determine the depth of sediment. If upon visual inspection it is found that sediment has accumulated to an average depth exceeding 3 (76 mm), cleanout is required.

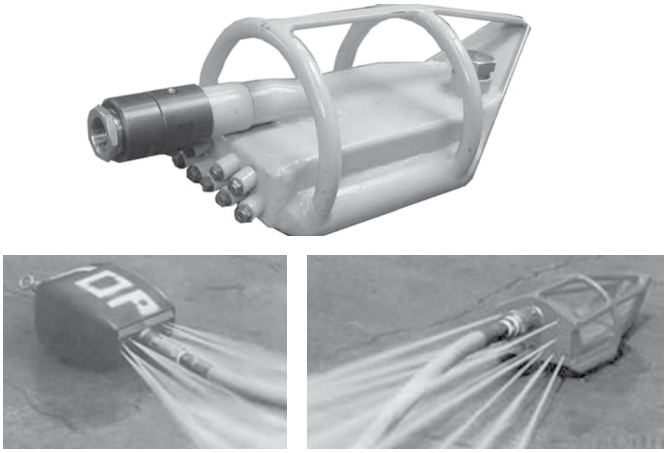
A StormTech Isolator Row PLUS should initially be inspected immediately after completion of the site's construction. While every effort should be made to prevent sediment from entering the system during construction, it is during this time that excess amounts of sediments are most likely to enter any stormwater system. Inspection and maintenance, if necessary, should be performed prior to passing responsibility over to the site's owner. Once in normal service, a StormTech Isolator Row PLUS should be inspected bi-annually until an understanding of the sites characteristics is developed. The site's maintenance manager can then revise the inspection schedule based on experience or local requirements.

12.2 Isolator Row Plus Maintenance

JetVac maintenance is recommended if sediment has been collected to an average depth of 3 (76 mm) inside the Isolator Row PLUS. More frequent maintenance may be required to maintain minimum flow rates through the Isolator Row PLUS. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row PLUS while scouring and suspending sediments. As the nozzle is retrieved, a wave of suspended sediments is flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/ JetVac combination vehicles. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45 (1143 mm) are best. StormTech recommends a maximum nozzle pressure of 2000 psi be utilized during cleaning. The JetVac process shall only be performed on StormTech Rows that have ADS PLUS fabric over the foundation stone.

Looking down the Isolator Row PLUS

A typical JetVac truck (This is not a StormTech product.)



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

12.0 Inspection & Maintenance

StormTech Isolator Row Plus - Step-by-Step Maintenance Procedures

Step 1: Inspect Isolator Row PLUS 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
   iv. If sediment is at, or above, 3" (76 mm) depth proceed to Step 2. If not proceed to Step 3.

B) All Isolator Plus Rows
   i. Remove cover from manhole at upstream end of Isolator Row PLUS
   ii. Using a flashlight, inspect down Isolator Row PLUS through outlet pipe
      1. Follow OSHA regulations for confined space entry if entering manhole
      2. Mirrors on poles or cameras may be used to avoid a confined space entry
   iii. If sediment is at or above the lower row of sidewall holes [approximately 3" (76 mm)]proceed to Step 2. If not proceed to Step 3.

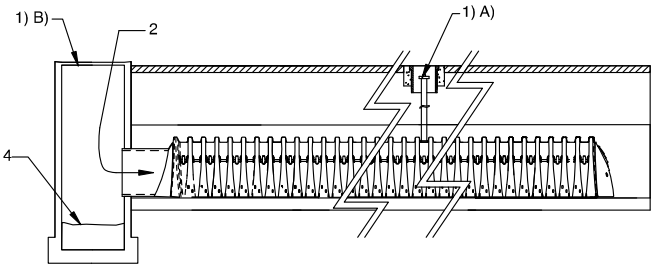
Step 2: Clean out Isolator Row PLUS using the JetVac process

A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 (1143 mm) or more is preferable
B) Apply multiple passes of JetVac until backflush water is clean
C) Vacuum manhole sump as required during jetting

Step 3: Replace all caps, lids and covers

Step 4: Inspect and clean catch basins and manholes upstream of the StormTech system following local guidelines.

Figure 20 – StormTech Isolator Row Plus (not to scale)



12.3 Eccentric Pipe Header Inspection

Theses guidelines do not supercede a pipe manufacturer's recommended I&M procedures. Consult with the manufacturer of the pipe header system for specific I&M procedures. Inspection of the header system should be carried out quarterly. On sites which generate higher levels of sediment more frequent inspections may be necessary. Headers may be accessed through risers, access ports or manholes. Measurement of sediment may be taken with a stadia rod or similar device. Cleanout of sediment should occur when the sediment volume has reduced the storage area by 25% or the depth of sediment has reached approximately 25% of the diameter of the structure.

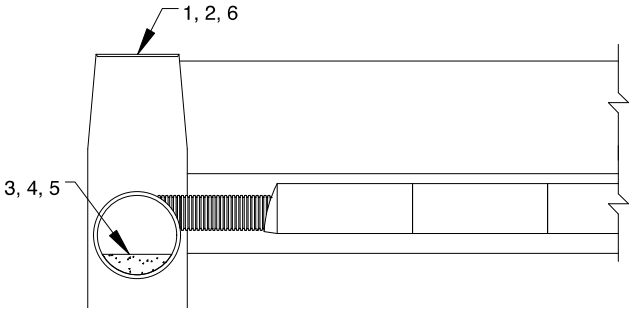
12.4 Eccentric Pipe Manifold Maintenance

Cleanout of accumulated material should be accomplished by vacuum pumping the material from the header. Cleanout should be accomplished during dry weather. Care should be taken to avoid flushing sediments out through the outlet pipes and into the chamber rows.

Eccentric Header Step-by-Step Maintenance Procedures

1. Locate manholes connected to the manifold system
2. Remove grates or covers
3. Using a stadia rod, measure the depth of sediment
4. If sediment is at a depth of about 25% pipe volume or 25% pipe diameter proceed to step 5. If not proceed to step 6.
5. Vacuum pump the sediment. Do not flush sediment out inlet pipes.
6. Replace grates and covers
7. Record depth and date and schedule next inspection

Figure 21 – Eccentric Manifold Maintenance



Please contact StormTech's Technical Services Department at 888-892-2894 for a spreadsheet to estimate cleaning intervals.

13.0 General Notes

1. StormTech requires installing contractors to use and understand StormTech's latest Installation Instructions prior to beginning system installation.

2. Our Technical Services Department offers installation consultations to installing contractors. Contact our Technical Service Representatives at least 30 days prior to system installation to arrange a preinstallation consultation. Our representatives can then answer questions or address comments on the StormTech chamber system and inform the Installing contractor of the minimum installation requirements before beginning the system's construction. Call **860-529-8188** to speak to a Technical Service Representative or visit **www.stormtech.com** to receive a copy of our Installation Instructions.

3. StormTech's requirements for systems with pavement design (asphalt, concrete pavers, etc.): Minimum cover for the SC-740, DC-780 and SC-310 chambers is 18" (457 mm) not including pavement; Minimum cover for the SC-160LP chamber is 14 (350 mm); Maximum cover for the SC-740 and SC-310 chambers is 96" (2.4 m) including pavement design; Maximum cover for the SC-160LP chamber is 10' (3.0 m); Maximum cover for the DC-780 chamber is 12' (3.6 m) including pavement design. For installations that do not include pavement, where rutting from vehicles may occur, minimum required cover is 24" (610 mm), maximum cover is as stated above.

4. The contractor must report any discrepancies with the bearing capacity of the chamber foundation materials to the design engineer.

5. AASHTO M288 Class 2 non-woven geotextile (filter fabric) must be used as indicated in the project plans.

6. Stone placement between chamber rows and around perimeter must follow instructions as indicated in the most current version of StormTech's Installation Instructions.

7. Backfilling over the chambers must follow requirements as indicated in the most current version of StormTech's Installation Instructions.

8. The contractor must refer to StormTech's Installation Instructions for a Table of Acceptable Vehicle Loads at various depths of cover. This information is also available at StormTech's website: **www.stormtech.com**. The contractor is responsible for preventing vehicles that exceed StormTech's requirements from traveling across or parking over the stormwater system. Temporary fencing, warning tape and appropriately located signs are commonly used to prevent unauthorized vehicles from entering sensitive construction areas.

9. The contractor must apply erosion and sediment control measures to protect the stormwater system during all phases of site construction per local codes and design engineer's specifications.

10. STORMTECH PRODUCT WARRANTY IS LIMITED. Contact StormTech for warranty information.

Aquabox O&M Manual

Aquabox Isolator® Row

Regular inspection and maintenance are essential to ensure a properly functioning stormwater system. The Aquabox Isolator Row is a technique to inexpensively enhance Total Suspended Solids (TSS) removal with easy access for inspection and maintenance.

The Aquabox Isolator Row

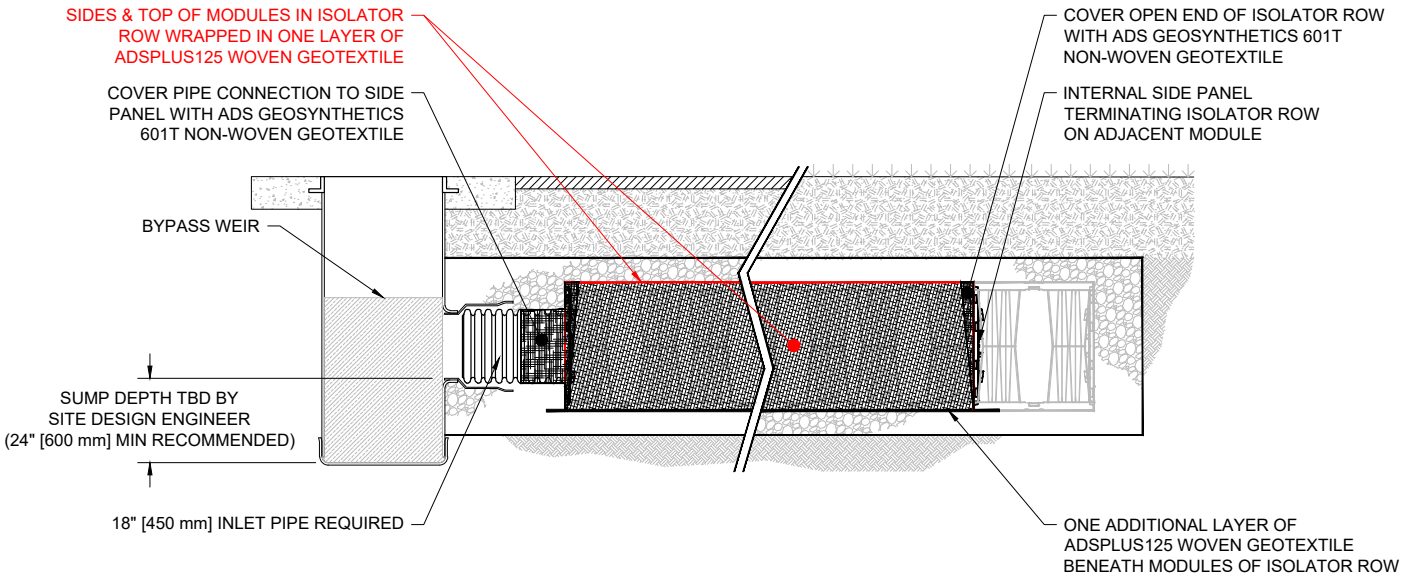
The Aquabox Isolator Row is a row of Aquabox modules wrapped in filter fabric and connected to a closely located manhole for easy access. The fabric lined modules provide for sediment settling and filtration as stormwater rises in the Isolator Row and passes through the filter fabric. The open structure of the modules allow stormwater to flow out the bottom and sides of the modules. Sediments are captured in the Aquabox Isolator Row, protecting the storage volume in the rest of the modules from sediment accumulation.

ADS Plus fabric is used to wrap the Aquabox Isolator Row. The woven geotextile provides a media for stormwater filtration, a durable surface for maintenance, prevents scour of the underlying stone and remains intact during high pressure jetting.

The Aquabox Isolator Row is designed to capture the “first flush” runoff and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole provides access to the Aquabox Isolator Row and includes a high/low concept such that stormwater flow rates or volumes that exceed the capacity of the Aquabox Isolator Row bypass through a manifold to the other modules. This is achieved with an elevated bypass manifold or a high-flow weir. After stormwater flows through the Aquabox Isolator Row and into the rest of the Aquabox system it is either exfiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

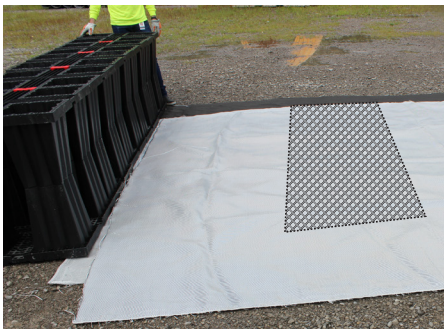
The Aquabox Isolator Row may be part of a treatment train system. The treatment train design and pretreatment device selection by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, ADS recommends using the Aquabox Isolator Row to minimize maintenance requirements and maintenance costs.

Aquabox Isolator Row Standard Cross-Section

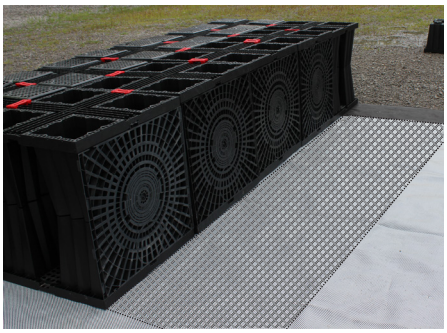


Installing the Aquabox Isolator® Row

Step 1: Roll out one piece of ADS Plus geotextile in the approximate area of the Isolator Row. The geotextile will be placed directly on the ADS 601 non-woven.



Step 2: Continue assembling the system until the modules are two rows away from the Isolator Row. Then roll out a second piece of ADS Plus the exact length of the Isolator Row. Place the edge this geotextile against the modules.



Step 3: Install the next row of modules, placing them on tope of the ADS Plus geotextile. This row requires side panels to be installed on the module sides facing the Isolator Row.

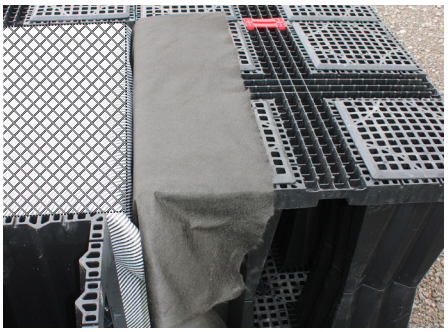
Step 4: Fold the upper layer of ADS Plus geotextile back over the top of the previously installed modules

Step 5: Install the modules of the Isolator Row, including top caps and joints.
Note: only single joints should be used between the Isolator Row modules and no joints should be used between the Isolator Row and adjacent modules.

Step 6: Once the Isolator Row modules are installed, fold the ADS Plus geotextile back over the top of the Isolator Row. Pull the geotextile down the other side of the row, removing slack. Begin installing the next row of modules to hold the geotextile in place.

Step 7: As the next row of modules are assembled, install side panels on the module sides facing the Isolator Row.

Note: do not use joints between the Isolator Row modules and this row.



Step 8: For Isolator Rows that end within the bed, install the module outside the end of the row with a side panel facing the Isolator Row. Place a piece of ADS 601 non-woven geotextile between the Isolator Row and this final module.

Step 9: The Isolator Row is now completely installed. The geotextile wrap traps sediment in the Isolator Row modules for easy maintenance. Proceed with the rest of the system install.

Aquabox Isolator Row Inspection/Maintenance

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, ADS 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 should be inspected via the connecting pipe from the upstream structure. Mirrors on poles or cameras may be used to avoid a confined space entry. Inspection ports (optional) may be used for easy access to the system from the surface.

When the average depth of sediment exceeds 3” (75 mm) throughout the Isolator Row, clean-out should be performed.

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 all modules of the 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 entry.

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. Rear facing jets with an effective spread of at least 45° are best. The minimum clear span within the Aquabox modules is 6.5” (162.5 mm)--please ensure cleaning equipment does not exceed this width. ADS recommends a maximum nozzle pressure of 1750 psi be utilized during cleaning. JetVac reels can vary in length. For ease of maintenance, ADS recommends Isolator Row lengths up to 150’ (46 m) with a structure at one end, or up to 300’ (91 m) with a structure at both ends.

adspipe.com
800-821-6710

Filterra HC
Owner's Manual

filterra®

Bioretention Systems

CONTECH®
ENGINEERED SOLUTIONS

filterra®
Bioretention Systems

Table of Contents

CONTECH®
ENGINEERED SOLUTIONS

Introduction

Thank you for your purchase of the Filterra® HC Bioretention System. Filterra HC is a specially engineered stormwater treatment system incorporating high performance biofiltration media to remove pollutants from stormwater runoff. All components of the system work together to provide a sustainable long-term solution for treating stormwater runoff.

The Filterra HC system has been delivered to you with protection in place to resist intrusion of construction related sediment which can contaminate the biofiltration media and result in inadequate system performance. These protection devices are intended as a best practice and cannot fully prevent contamination. It is the purchaser's responsibility to provide adequate measures to prevent construction related runoff from entering the Filterra HC system.

Included with your purchase is Activation of the Filterra HC system by the manufacturer as well as a 1-year warranty from delivery of the system and 1-year of routine maintenance (mulch replacement, debris removal, and pruning of vegetation) up to twice during the first year after activation.

Design and Installation

Each project presents different scopes for the use of Filterra HC systems. Information and help may be provided to the design engineer during the planning process. Correct Filterra HC box sizing (per local regulations) is essential to predict pollutant removal rates for a given area. The engineer shall submit calculations for approval by the local jurisdiction. The contractor is responsible for the correct installation of Filterra HC units as shown in approved plans. A comprehensive installation manual covering all Filterra configurations is available at www.ContechES.com.

Activation Overview

Activation of the Filterra HC system is a procedure completed by the manufacturer to place the system into working condition. This involves the following items:

- Removal of construction runoff protection devices
- Planting of the system's vegetation
- Placement of pretreatment mulch layer using mulch certified for use in Filterra HC systems.

Activation MUST be provided by the manufacturer to ensure proper site conditions are met for Activation, proper installation of the vegetation, and use of pretreatment mulch certified for use in Filterra HC systems.

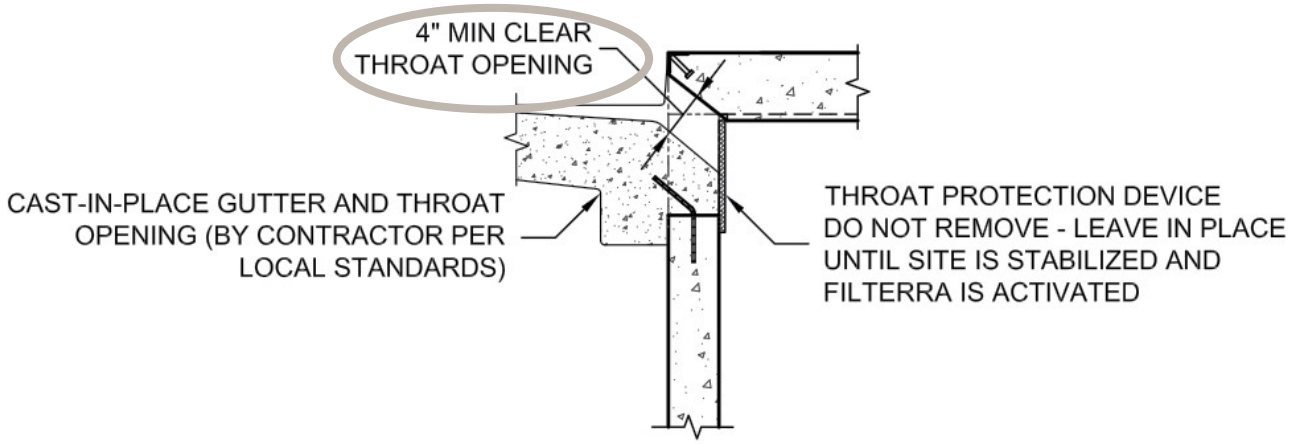
Minimum Requirements

The minimum requirements for Filterra HC Activation are as follows:

1. The site landscaping must be fully stabilized, i.e. full landscaping installed and some grass cover (not just straw and seed) is required to reduce sediment transport. Construction debris and materials should be removed from surrounding area.

2. Final paving must be completed. Final paving ensures that paving materials will not enter and contaminate the Filterra HC system during the paving process, and that the plant will receive runoff from the drainage area, assisting with plant survival for the Filterra HC system.

3. Filterra HC throat opening (if applicable) should be at least 4" in order to ensure adequate capacity for inflow and debris.



An Activation Checklist is included on page 12 to ensure proper conditions are met for Contech to perform the Activation services. A charge of $500.00 will be invoiced for each Activation visit requested by Customer where Contech determines that the site does not meet the conditions required for Activation.

Filterra HC Plant Selection Overview

Plant Lists are available on the Contech website highlighting recommended plants for Filterra systems in your area. Keep in mind that plants are subject to availability due to seasonality and required minimum size for the Filterra HC system. Plants installed in the Filterra HC system are container plants (max 15 gallon) from nursery stock and will be immature in height and spread at Activation.

It is the responsibility of the owner to provide adequate irrigation when necessary to the plant of the Filterra HC system.

The "Planting Requirements for Filterra HC Systems" document is included as an appendix and discusses proper selection and care of the plants within Filterra HC systems.

Warranty Overview

Refer to the Contech Engineered Solutions LLC Stormwater Treatment System LIMITED WARRANTY for further information. The following conditions may void the Filterra HC system's warranty and waive the manufacturer provided Activation and Maintenance services:

- Unauthorized activation or performance of any of the items listed in the activation overview
- Any tampering, modifications or damage to the Filterra HC system or runoff protection devices
- Removal of any Filterra HC system components
- Failure to prevent construction related runoff from entering the Filterra HC system
- Failure to properly store and protect any Filterra HC components (including media and underdrain stone) that may be shipped separately from the vault

Routine Maintenance Guidelines

Routine maintenance is included by the manufacturer on all Filterra HC systems for the first year after activation. This includes a maximum of 2 visits to remove debris, replace pretreatment mulch, and prune the vegetation. More information is provided in the Operations and Maintenance Guidelines. Some Filterra HC systems also contain diversion bypass or outlet bays. Depending on site pollutant loading, these bays may require periodic removal of debris, however this is not included in the first year of maintenance and would likely not be required within the first year of operation.

These services, as well as routine maintenance outside of the included first year, can be provided by certified maintenance providers listed on the Contech website. Training can also be provided to other stormwater maintenance or landscape providers.

Why Maintain?

All stormwater treatment systems require maintenance for effective operation. This necessity is often incorporated in your property's permitting process as a legally binding BMP maintenance agreement. Other reasons to maintain are:

- Avoiding legal challenges from your jurisdiction's maintenance enforcement program.
- Prolonging the expected lifespan the media in the Filterra HC system.
- Avoiding more costly media replacement.
- Helping reduce pollutant loads leaving your property.

Simple maintenance of the Filterra HC is required to continue effective pollutant removal from stormwater runoff before discharge into downstream waters. This procedure will also extend the longevity of the living biofilter system. The Filterra HC system is also subjected to various materials entering the inlet, including trash, silt, leaves, etc. which will be contained above the mulch layer. Too much silt may inhibit the Filterra HC system flow rate, which is the reason for site stabilization before activation. Regular replacement of the mulch stops accumulation of such sediment.

If the system is not maintained on regular intervals, is subject to a catastrophic spill or other event, or subject to unusual pollutant loading, full media bed replacement could be required. Please contact Contech for further evaluation if you feel this may be necessary.

When to Maintain?

Contech includes a 1-year maintenance plan with each system purchase. Annual included maintenance consists of a maximum of two (2) scheduled visits. Additional maintenance may be necessary depending on sediment and trash loading (by Owner or at additional cost). The start of the maintenance plan begins when the system is activated.

Maintenance visits are scheduled seasonally; the spring visit aims to clean up after winter loads including salts and sands while the fall visit helps the system by removing excessive leaf litter.

It has been found that in regions which receive between 30-50 inches of annual rainfall, (2) two visits are generally required; regions with less rainfall often only require (1) one visit per annum. Varying land uses can affect maintenance frequency;

e.g. some fast food restaurants require more frequent trash removal. Contributing drainage areas which are subject to new development wherein the recommended erosion and sediment control measures have not been implemented may require additional maintenance visits.

Some sites may be subjected to extreme sediment or trash loads, requiring more frequent maintenance visits. This is the reason for detailed notes of maintenance actions per unit, helping the Supplier and Owner predict future maintenance frequencies, reflecting individual site conditions.

Owners must promptly notify the (maintenance) Supplier of any damage to the plant(s), which constitute(s) an integral part of the bioretention technology. Owners should also advise other landscape or maintenance contractors to leave all maintenance to the Supplier (i.e. no pruning or fertilizing) during the first year.

Exclusion of Services

Clean up due to major contamination such as oils, chemicals, toxic spills, etc. will result in additional costs and are not covered under the Supplier maintenance contract. Should a major contamination event occur the Owner must block off the outlet pipe of the Filterra HC (where the cleaned runoff drains to, such as drop inlet) and block off the inlet of the Filterra HC. The Supplier should be informed immediately.

Maintenance Visit Summary

Each maintenance visit consists of the following simple tasks (detailed instructions below).

1. Inspection of Filterra HC and surrounding area
2. Removal of tree grate and erosion control stones
3. Removal of debris, trash and mulch
4. Mulch replacement
5. Plant health evaluation & pruning or replacement as necessary
6. Clean area around Filterra HC
7. Complete paperwork

Maintenance Tools, Safety Equipment and Supplies

Ideal tools include camera, bucket, shovel, broom, pruners, hoe/rake, and tape measure. Appropriate Personal Protective Equipment (PPE) should be used in accordance with local or company procedures. This may include impervious gloves where the type of trash is unknown, high visibility clothing and barricades when working near traffic and also safety hats and shoes. A T-Bar or crowbar should be used for moving the tree grates (up to 170 lbs ea.). Most visits require minor trash removal and a full replacement of mulch. See below for actual number of bagged mulch that is required in each media bay size. Mulch should be a double shredded, hardwood variety. Some visits may require additional Filterra engineered soil media for the Filterra HC system, available from the Supplier.

	Available Filterra® HC Media Bay Sizes (feet)	Filter Surface Area (ft^2)	Mulch Volume at 3" Depth (ft^2)	# of 2 ft^2 Mulch Bags
Standard Configuration Filterra and Filterra Biosape Vaults	4x4	16	4	2
	4x6 or 6x4	24	6	3
	4.5x7.83 or 7.83x4.5 (Nominal 4x8/8x4)	35.24	9	5
	6x6	36	9	5
	6x8 or 8x6	48	12	6
	6x10 or 10x6	60	15	8
	6x12 or 12x6	72	18	9
	7x13 or 13x7	91	23	12
	14x8	112	28	14
	16x8	128	32	16
	18x8	144	36	18
	20x8	160	40	20
	22x8	176	44	22
Peak Diversion Filterra Vaults	4x4	16	4	2
	4.5x5.83 or 5.83x4.5 (Nominal 4x6/6x4)	26.24	7	4
	6x6	36	9	5
	6x8	48	12	6
	6x10 or 10x6	60	15	8
	7x10	70	18	9
	8x10.5	84	21	11
	8x12.5	100	25	13
	Custom and/or Filterra Bioscape	Media Area in ft^2	0.25 x (Media Area in ft^2)	0.125 x (Media Area in ft^2)

Maintenance Visit Procedure

Keep sufficient documentation of maintenance actions to predict location specific maintenance frequencies and needs. An example Maintenance Report is included in this manual.

1. Inspection of Filterra HC and surrounding area

- Record individual unit before maintenance with photograph (numbered). Record on Maintenance Report (see example in this document) the following:

Record on Maintenance Report the following:

Standing Water	yes | no
Damage to Box Structure	yes | no
Damage to Grate	yes | no
Is Bypass Clear	yes | no

If yes answered to any of these observations, record with close-up photograph (numbered).

2. Removal of tree grate and erosion control stones

- Remove cast iron grates for access into Filterra HC box.
- Dig out silt (if any) and mulch and remove trash & foreign items.

3. Removal of debris, trash and mulch

Record on Maintenance Report the following:

Silt/Clay	yes | no
Cups/ Bags	yes | no
Leaves	yes | no
Buckets Removed	_____

- After removal of mulch and debris, measure distance from the top of the Filterra engineered media soil to the top of the top slab. Compare the measured distance to the distance shown on the approved Contract Drawings for the system. Add Filterra media (not top soil or other) to bring media up as needed to distance indicated on drawings.

Record on Maintenance Report the following:

Distance to Top of Top Slab (inches)	_____
Inches of Media Added	_____

4. Mulch replacement

- Add double shredded mulch evenly across the entire unit to a depth of 3″.
- Refer to Filterra Mulch Specifications for information on acceptable sources.
- Ensure correct repositioning of erosion control stones by the Filterra HC inlet to allow for entry of trash during a storm event.
- Replace Filterra HC grates correctly using appropriate lifting or moving tools, taking care not to damage the plant.

5. Plant health evaluation and pruning or replacement as necessary

- Examine the plant's health and replace if necessary.
- Prune as necessary to encourage growth in the correct directions

Record on Maintenance Report the following:

Height above Grate	_____ (ft)
Width at Widest Point	_____ (ft)
Health	healthy | unhealthy
Damage to Plant	yes | no
Plant Replaced	yes | no

6. Clean area around Filterra HC

- Clean area around unit and remove all refuse to be disposed of appropriately.

7. Complete paperwork

- Deliver Maintenance Report and photographs to appropriate location (normally Contech during maintenance contract period).
- Some jurisdictions may require submission of maintenance reports in accordance with approvals. It is the responsibility of the Owner to comply with local regulations.

Maintenance Checklist

Drainage System Failure	Problem	Conditions to Check	Condition that Should Exist	Actions
Inlet	Excessive sediment or trash accumulation.	Accumulated sediments or trash impair free flow of water into Filterra HC.	Inlet should be free of obstructions allowing free distributed flow of water into Filterra HC HC.	Sediments and/or trash should be removed.
Mulch Cover	Trash and floatable debris accumulation.	Excessive trash and/or debris accumulation.	Minimal trash or other debris on mulch cover.	Trash and debris should be removed and mulch cover raked level. Ensure bark nugget mulch is not used.
Mulch Cover	"Ponding" of water on mulch cover.	"Ponding" in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils.	Stormwater should drain freely and evenly through mulch cover.	Recommend contact manufacturer and replace mulch as a minimum.
Vegetation	Plants not growing or in poor condition.	Soil/mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants.	Plants should be healthy and pest free.	Contact manufacturer for advice.
Vegetation	Plant growth excessive.	Plants should be appropriate to the species and location of Filterra HC.		Trim/prune plants in accordance with typical landscaping and safety needs.
Structure	Structure has visible cracks.	Cracks wider than 1/2 inch or evidence of soil particles entering the structure through the cracks.		Vault should be repaired.
Maintenance is ideally to be performed twice annually.				

Filterra HC Inspection & Maintenance Log

Filterra HC System Size/Model: _____ **Location:** _____

Date	Mulch & Debris Removed	Depth of Mulch Added	Mulch Brand	Height of Vegetation Above Grate	Vegetation Species	Issues with System	Comments
1/1/17	*5 – 5 gal Buckets*	*3"*	*Lowe's Premium Brown Mulch*	*4'*	*Galaxy Magnolia*	*- Standing water in downstream structure*	*- Removed blockage in downstream structure*

Appendix 1 – Filterra® Activation Checklist

Project Name:_______________________________________Company:____

Site Contact Name: ______________________________________ Site Contact Phone/Email: ____________________________

Site Owner/End User Name:______________________Site Owner/End User Phone/Email: ____________________________

Preferred Activation Date: __________________________________(provide 2 weeks minimum from date this form is submitted)

Site Designation	System Size	Final Pavement / Top Coat Complete	Landscaping Complete / Grass Emerging	Construction materials / Piles / Debris Removed	Throat Opening Measures 4" Min. Height	Plant Species Requested
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	

Attach additional sheets as necessary.

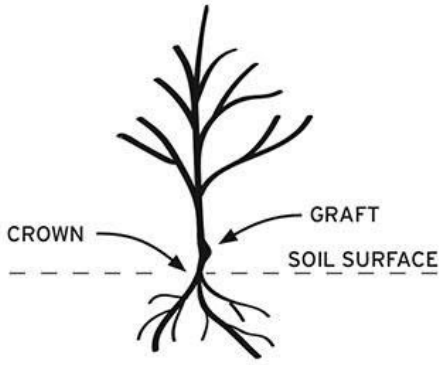
NOTE: A charge of $500.00 will be invoiced for each Activation visit requested by Customer where Contech determines that the site does not meet the conditions required for Activation. ONLY Contech authorized representatives can perform Activation of Filterra HC systems; unauthorized Activations will void the system warranty and waive manufacturer supplied Activation and 1st Year Maintenance.

____   _______________________

Signature   Date

Appendix 2 – Planting Requirements for Filterra® HC Systems

Plant Material Selection



- Select plant(s) as specified in the engineering plans and specifications.
- Select plant(s) with full root development but not to the point where root bound.
- Use local nursery container plants only. Ball and burlapped plants are not permitted.
- For precast Filterra HC systems with a tree grate, plant(s) must not have scaffold limbs at least 14 inches from the crown due to spacing between the top of the mulch and the tree grate. Lower branches can be pruned away provided there are sufficient scaffold branches for tree or shrub development.
- For precast Filterra HC systems with a tree grate, at the time of installation, it is required that plant(s) must be at least 6" above the tree grate opening at installation for all Filterra configurations. This DOES NOT apply to Full Grate Cover designs.
- Plant(s) shall not have a mature height greater than 25-30 feet.
- A 7-15 gallon container size shall be used.
- For precast Filterra HC systems, plant(s) should have a single trunk at installation, and pruning may be necessary at activation and maintenance for some of the faster growing species, or species known to produce basal sprouts

Plant Installation

- During transport protect the plant leaves from wind and excessive jostling.
- Prior to removing the plant(s) from the container, ensure the soil moisture is sufficient to maintain the integrity of the root ball. If needed, pre-wet the container plant.
- Cut away any roots which are growing out of the container drain holes. Plants with excessive root growth from the drain holes should be rejected.
- Plant(s) should be carefully removed from the pot by gently pounding on the sides of the container with the fist to loosen root ball. Then carefully slide out. Do not lift plant(s) by trunk as this can break roots and cause soil to fall off. Extract the root ball in a horizontal position and support it to prevent it from breaking apart. Alternatively, the pot can be cut away to minimize root ball disturbance.
- Remove any excess soil from above the root flare after removing plant(s) from container.
- Excavate a hole with a diameter 4" greater than the root ball, gently place the plant(s).
- If plant(s) have any circling roots from being pot bound, gently tease them loose without breaking them.
- If root ball has a root mat on the bottom, it should be shaved off with a knife just above the mat line.
- Plant the tree/shrub/grass with the top of the root ball 1" above surrounding media to allow for settling.
- All plants should have the main stem centered in the tree grate (where applicable) upon completion of installation.
- With all trees/shrubs, remove dead, diseased, crossed/rubbing, sharply crotched branches or branches growing excessively long or in wrong direction compared to majority of branches.
- To prevent transplant shock (especially if planting takes place in the hot season), it may be necessary to prune some of the foliage to compensate for reduced root uptake capacity. This is accomplished by pruning away some of the smaller secondary branches or a main scaffold branch if there are too many. Too much foliage relative to the root ball can dehydrate and damage the plant.
- Plant staking may be required.

Mulch Installation

- Only mulch that has been meeting Contech Engineered Solutions' mulch specifications can be used in the Filterra HC system.
- Mulch must be applied to a depth of 3" evenly over the surface of the media.

Irrigation Requirements

- Each Filterra HC system must receive adequate irrigation to ensure survival of the living system during periods of drier weather.
- Irrigation sources include rainfall runoff from downspouts and/or gutter flow, applied water through the tree grate or in some cases from an irrigation system with emitters installed during construction.
- At Activation: Apply about one (cool climates) to two (warm climates) gallons of water per inch of trunk diameter over the root ball.
- During Establishment: In common with all plants, each Filterra HC plant will require more frequent watering during the establishment period. One inch of applied water per week for the first three months is recommended for cooler climates (2 to 3 inches for warmer climates). If the system is receiving rainfall runoff from the drainage area, then irrigation may not be needed. Inspection of the soil moisture content can be evaluated by gently brushing aside the mulch layer and feeling the soil. Be sure to replace the mulch when the assessment is complete. Irrigate as needed**.
- Established Plants: Established plants have fully developed root systems and can access the entire water column in the media. Therefore, irrigation is less frequent but requires more applied water when performed. For a mature system assume 3.5 inches of available water within the media matrix. Irrigation demand can be estimated as 1" of irrigation demand per week. Therefore, if dry periods exceed 3 weeks, irrigation may be required. It is also important to recognize that plants which are exposed to windy areas and reflected heat from paved surfaces may need more frequent irrigation. Long term care should develop a history which is more site specific.

** Five gallons per square yard approximates 1 inch of water. Therefore, for a 6' by 6' Filterra HC approximately 20-60 gallons of water is needed. To ensure even distribution of water it needs to be evenly sprinkled over the entire surface of the filter bed, with special attention to make sure the root ball is completely wetted. NOTE: if needed, measure the time it takes to fill a five-gallon bucket to estimate the applied water flow rate then calculate the time needed to irrigate the Filterra HC system. For example, if the flow rate of the sprinkler is 5 gallons/minute then it would take 12 minutes to irrigate a 6' by 6' filter.

Notes

CONTECH®
ENGINEERED SOLUTIONS

Modular Wetlands® Linear
Operation & Maintenance Manual

MODULAR WETLANDS®

MODULAR WETLANDS® LINEAR
OPERATION & MAINTENANCE MANUAL

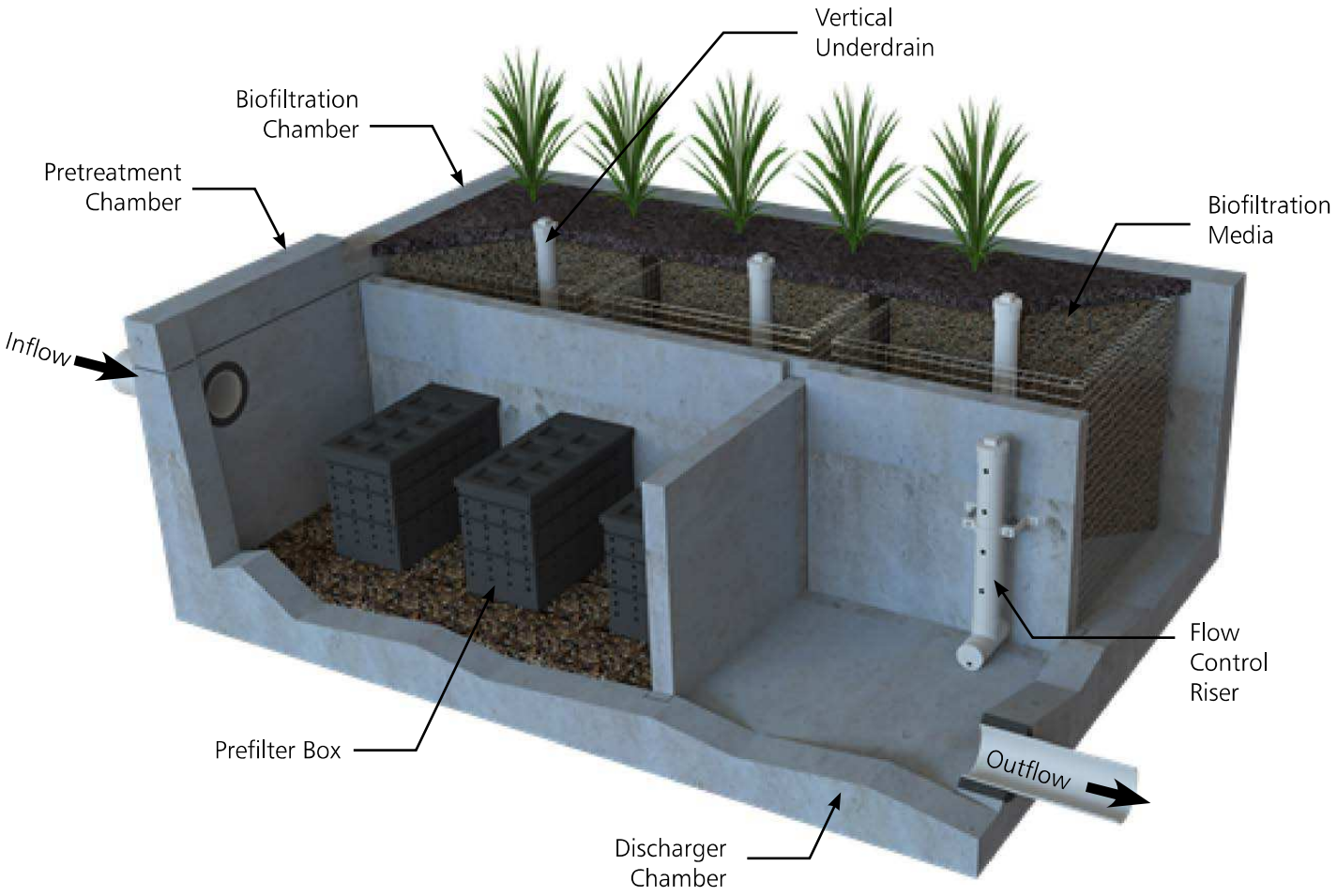
TABLE OF CONTENTS

OVERVIEW

The Modular Wetlands® Linear Biofilter is designed to remove high levels of trash, debris, sediments, nutrients, metals, and hydrocarbons. Its simple design allows for quick and easy installation. The system is housed in a standard precast structure and can be installed at various depths to meet site-specific conditions.

INTRODUCTION

This is the Modular Wetlands Linear Biofilter operation and maintenance manual. Before starting, read the instructions and equipment lists closely. It is important to follow all necessary safety procedures associated with state and local regulations. Some steps required confined space entry. Please contact Contech for more information on pre-authorized third party contractors who can provide installation services in your area. For a list of service providers in your area please visit: www.conteches.com/maintenance.



INSTRUCTIONS

INSPECTION SUMMARY

Stormwater regulations require BMPs be inspected and maintained to ensure they are operating as designed to allow for effective pollutant removal and provide protection to receiving water bodies. It is recommended that inspections be performed multiple times during the first year to assess the site specific loading conditions. The first year of inspections can be used to set inspection and maintenance intervals for subsequent years to ensure appropriate maintenance is provided.

- Inspect pre-treatment, biofiltration, and discharge chambers an average of once every six to twelve months. Varies based on site specific and local conditions.
- Average inspection time is approximately 15 minutes. Always ensure appropriate safety protocol and procedures are followed.

The following is a list of equipment required to allow for simple and effective inspection of the Modular Wetlands Linear:

- Modular Wetlands Linear Inspection Form
- Flashlight
- Manhole hook or appropriate tools to remove access hatches and covers
- Appropriate traffic control signage and procedures
- Measuring pole and/or tape measure
- Protective clothing and eye protection
- 7/16" open or closed ended wrench
- Large permanent black marker (initial inspections only - first year)

Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections of the system

INSPECTION AND MAINTENANCE NOTES

1. Following maintenance and/or inspection, it is recommended that the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.
2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.
3. Transport all debris, trash, organics, and sediments to approved facility for disposal in accordance with local and state requirements.
4. Entry into chambers may require confined space training based on state and local regulations.
5. No fertilizer shall be used in the biofiltration chamber.
6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may not require irrigation after initial establishment.

INSPECTION PROCESS

1. Prepare the inspection form by writing in the necessary information including project name, location, date & time, unit number and other information (see inspection form).
2. Observe the inside of the system through the access covers. If minimal light is available and vision into the unit is impaired, utilize a flashlight to see inside the system and all of its chambers.
3. Look for any out of the ordinary obstructions in the inflow pipe, pre-treatment chamber, biofiltration chamber, discharge chamber or outflow pipe. Write down any observations on the inspection form.
4. Through observation and/or digital photographs, estimate the amount of trash, debris accumulated in the pre-treatment chamber. Utilizing a tape measure or measuring stick, estimate the amount of sediment in this chamber. Record this depth on the inspection form.
5. Through visual observation, inspect the condition of the pre-filter cartridges. Look for excessive build-up of sediment on the cartridges, any build-up on the tops of the cartridges, or clogging of the holes. Record this information on the inspection form. The prefilter cartridges can be further inspected by removing the cartridge tops and assessing the color of the BioMediaGREEN filter cubes (requires entry into pre-treatment chamber - see notes previous notes regarding confined space entry). Record the color of the material. New material is a light green color. As the media becomes clogged, it will turn darker in color, eventually becoming dark brown or black. The closer to black the media is the higher percentage that the media is exhausted and is in need of replacement.

6. The biofiltration chamber is generally maintenance-free due to the system's advanced pre-treatment chamber. For units which have open planters with vegetation, it is recommended that the vegetation be inspected. Look for any plants that are dead or showing signs of disease or other negative stressors. Record the general health of the plants on the inspection form and indicate through visual observation or digital photographs if trimming of the vegetation is required.
7. The discharge chamber houses the orifice control structure, drain down filter (only in California - older models), and is connected to the outflow pipe. It is important to check to ensure the orifice is in proper operating conditions and free of any obstructions. It is also important to assess the condition of the drain down filter media which utilizes a block form of the BioMediaGREEN. Assess in the same manner as the cubes in the pre-filter cartridge as mentioned above. Generally, the discharge chamber will be clean and free of debris. Inspect the water marks on the side walls. If possible, inspect the discharge chamber during a rain event to assess the amount of flow leaving the system while it is at 100% capacity (pre-treatment chamber water level at peak HGL - top of bypass weir). The water level of the flowing water should be compared to the watermark level on the side walls, which is an indicator of the highest discharge rate the system achieved when initially installed. Record on the form if there is any difference in level from the watermark in inches.

NOTE: During the first few storms, the water level in the outflow chamber should be observed and a 6" long horizontal watermark line drawn (using a large permanent marker) at the water level in the discharge chamber while the system is operating at 100% capacity. The diagram below illustrates where the line should be drawn. This line is a reference point for future inspections of the system.

Water level in the discharge chamber is a function of flow rate and pipe size. Observation of the water level during the first few months of operation can be used as a benchmark level for future inspections. The initial mark and all future observations shall be made when the system is at 100% capacity (water level at maximum level in the pre-treatment chamber). If future water levels are below this mark when the system is at 100% capacity, this is an indicator that maintenance to the pre-filter cartridges may be needed.

8. Finalize the inspection report for analysis by the maintenance manager to determine if maintenance is required.

MAINTENANCE INDICATORS

Based upon the observations made during inspection, maintenance of the system may be required based on the following indicators:

- Missing or damaged internal components or cartridges
- Obstructions in the system or its inlet and/or outlet pipes
- Excessive accumulation of floatables in the pretreatment chamber in which the length and width of the chamber is fully impacted more than 18". See photo below.
- Excessive accumulation of sediment in the pretreatment chamber of more than 6" in depth.
- Excessive accumulation of sediment on the BioMediaGREEN media housed within the pretreatment cartridges. The following chart shows photos of the condition of the BioMediaGREEN contained within the pre-filter cartridges. When media is more than 85% clogged, replacement is required.
- Excessive accumulation of sediment on the BioMediaGREEN media housed within the pretreatment cartridges. When media is more than 85% clogged, replacement is required. The darker the BioMediaGREEN, the more clogged it is and in need of replacement.

INSPECTION PROCESS

- Excessive accumulation of sediment on the BioMediaGREEN media housed within the drain down filter (California only - older models). The following photos show the condition of the BioMediaGREEN contained within the drain down filter. When media is more than 85% clogged, replacement is required.

- Overgrown vegetation.

- Water level in the discharge chamber during 100% operating capacity (pretreatment chamber water level at max height) is lower than the water mark by 20%.

MAINTENANCE SUMMARY

The time has come to maintain your Modular Wetlands® Linear. All necessary pre-maintenance steps must be carried out before maintenance occurs. Once traffic control has been set up per local and state regulations and access covers have been safely opened, the maintenance process can begin. It should be noted that some maintenance activities require confined space entry. All confined space requirements must be strictly followed before entry into the system. In addition, the following is recommended:

- Prepare the maintenance form by writing in the necessary information including project name, location, date & time, unit number and other info (see maintenance form).
- Set up all appropriate safety and cleaning equipment.
- Ensure traffic control is set up and properly positioned.
- Prepared pre-checks (OSHA, safety, confined space entry) are performed.

The following is a list of equipment to required for maintenance of the Modular Wetlands® Linear:

- Modular Wetlands Linear Maintenance Form
- Manhole hook or appropriate tools to access hatches and covers
- Protective clothing, flashlight, and eye protection
- 7/16" open or closed ended wrench
- Vacuum assisted truck with pressure washer
- Replacement BioMediaGREEN for pre-filter cartridges if required (order from one of Contech's Maintenance Team members at https://www.conteches.com/maintenance).

MAINTENANCE | PRETREATMENT CHAMBER

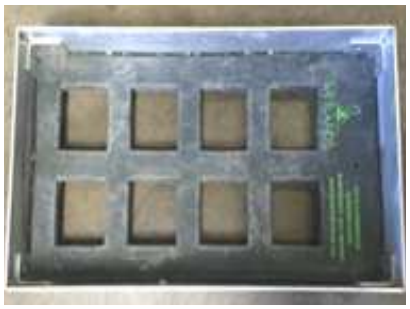
1. Remove access cover over pre-treatment chamber and position vacuum truck accordingly.
2. With a pressure washer, spray down pollutants accumulated on walls and pre-filter cartridges.
3. Vacuum out pre-treatment chamber and remove all accumulated pollutants including trash, debris, and sediments. Be sure to vacuum the floor until the pervious pavers are visible and clean.
4. If pre-filter cartridges require media replacement, continue to step 5. If not, replace access cover and move to step 11.

MAINTENANCE | PREFILTER CARTRIDGES

5. After successfully cleaning out the pre-treatment chamber (previous page) enter the pre-treatment chamber.
6. Unscrew the two bolts (circles shown below) holding the lid on each cartridge filter and remove lid.

7. Place the vacuum hose over each individual media filter to suck out filter media.

8. Once filter media has been sucked out, use a pressure washer to spray down the inside of the cartridge and it's media cages. Remove cleaned media cages and place to the side. Once removed, the vacuum hose can be inserted into the cartridge to vacuum out any remaining material near the bottom of the cartridge.
9. Reinstall media cages and fill with new media from the manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase. Utilize the manufacture-provided refilling tray and place on top of the cartridge. Fill the tray with new bulk media and shake down into place. Using your hands, lightly compact the media into each filter cage. Once the cages are full, remove the refilling tray and replace the cartridge top, ensuring bolts are properly tightened.



10. Exit the pre-treatment chamber. Replace access hatch or manhole cover.

MAINTENANCE | BIOFILTRATION CHAMBER

11. In general, the biofiltration chamber is maintenance-free with the exception of maintaining the vegetation. The Modular Wetlands Linear utilizes vegetation similar to surrounding landscape areas, therefore trim vegetation to match surrounding vegetation. If any plants have died, replace them with new ones.

12. Each vertical under drain on the biofiltration chamber has a removable (threaded cap) that can be taken off to check any blockages or root growth. Once removed, a jetting attachment can be used to clean out the under drain and orifice riser.
13. As with all biofilter systems, at some point the biofiltration media (WetlandMedia) will need to be replaced. Either because of physical clogging of sorptive exhaustion of the media ion exchange capacity (to remove dissolved metals and phosphorous). The general life of this media is 10 to 20 years based on site specific conditions and pollutant loading. Utilize the vacuum truck to vacuum out the media by placing the hose into the chamber. Once all the media is removed use the power washer to spray down all the netting on the outer metal cage. Inspect the netting for any damage or holes. If the netting is damaged it can be repaired or replaced with guidance by the manufacturer.
14. Contact one of Contech's Maintenance Team members at https://www.conteches.com/maintenance to order new WetlandMedia. The quantity of media needed can be determined by providing the model number and unit depth. Media will be provided in super sacks for easy installation. Each sack will weigh between 1000 and 2000 lbs. A lifting apparatus (backhoe, boom truck, or other) is recommended to position the super sack over the biofiltration chamber. Fill the media cages up to the same level as the old media. Replant with vegetation.

MAINTENANCE | DISCHARGE CHAMBER

15. Remove access hatch or manhole cover over discharge chamber.
16. Enter chamber to gain access to the drain down filter. Unlock the locking mechanism and lift up drain down filter housing to remove used BioMediaGREEN filter block as shown below. *NOTE: Drain down filter is only found on units installed in California prior to 2023. If no drain down filter is present, skip steps 16 and 17.*

17. Insert a new BioMediaGREEN filter block and lock drain down filter housing back in place.
18. Replace access hatch or manhole cover over discharge chamber.

NOTES

CONTECH® ENGINEERED SOLUTIONS

Inspection Report
Modular Wetlands Linear

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____ / ____ / ____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

For Office Use Only
(Reviewed By)
(Date) Office personnel to complete section to the left.

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): _____ Size (22', 14' or etc.): _____

Structural Integrity:	**Yes**	**No**	**Comments**
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
Other Inspection Items:			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	**Yes**	**No**
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: _____

CONTECH® ENGINEERED SOLUTIONS

Cleaning and Maintenance Report
Modular Wetlands Linear

Project Name _____

Project Address _____ (city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:	MWS Catch Basins						
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:

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SUPPORT

DRAWINGS AND SPECIFICATIONS ARE AVAILABLE AT WWW.CONTECHES.COM

Modular Wetlands Maintenance Guide 1/2023