

LONG-TERM STORMWATER POLLUTION PREVENTION AND OPERATION & MAINTENANCE PLAN TO COMPLY WITH STORMWATER STANDARDS 4, 6, & 9

APPLICABILITY

This document identifies constituents of concern that have the potential to contaminate stormwater from the proposed Single-family home at 31 Newton Road, Amesbury, and provides a framework of Best Management Practices (BMPs) for handling stormwater runoff. It also outlines an inspection and maintenance program to ensure the continued effectiveness of the proposed stormwater management system. The proposed BMP's are shown on the plans prepared by HD Design, Avon MA.

PROJECT OVERVIEW:

The proposed project located on the north side of Newton Road, in the City of Amesbury MA and includes the construction of a new single-family home with associated driveway, septic system and utility services. The project has been designed to meet State standards for TSS removal through the use of BMPs. Runoff from the roof and other impervious surfaces will be collected and treated by grass-lined conveyance channels equipped with check dams, then directed into an infiltration basin and constructed wetland area prior to discharging to the adjacent wetland area. Appended to this document is a sample maintenance form and a chart describing the anticipated frequency of tasks.

OWNER AND RESPONSIBLE PARTY:

Owner:

Homeowner

Day-to-day Operation and Maintenance:

Homeowner / Qualified Landscaping Contractor hired by the Homeowner.

ON-GOING MAINTENANCE CONTRACT

The non-structural and structural approaches recommended below, as well as the required BMP maintenance, will be completed by an appropriate contractor. Adequate personnel with appropriate training and access to proper equipment will be available to complete the tasks. Future responsible parties must be notified of their responsibility to operate and maintain the system in perpetuity.

LIVING DOCUMENT PROVISIONS

Due to the difficulty of identifying all sources of potential stormwater contamination and maintenance activities, this document should be updated as necessary to reflect new procedures, technologies or requirements.

MAINTENANCE LOG

The Responsible Party shall develop and maintain a log of inspections, maintenance, repairs, and disposal (including location of disposal) during the life of the project. Records will be maintained for at least 3 years and be made available to the Massachusetts Department of Environmental Protection or the City of Amesbury in accordance with the provisions of the Massachusetts Stormwater Handbook. Copies of the BMP inspection logs shall be provided to the Planning Board on an annual basis.

MINIMIZING EXPOSURE

The Responsible Party shall minimize exposure of potential pollutant sources, including debris from coming into contact with precipitation and being picked up by stormwater and carried into drains and surface waters using the following steps:

- Storing all containerized materials in a protected, secure location away from drains and plainly labeled.
- Containing all activities that can generate sources of contaminants from reaching the receiving water or the stormwater management system.
- Securing any equipment or supplies so that they are not transported during storm events into receiving waters or stormwater management system.

BEST MANAGEMENT PRACTICES (BMP) MAINTENANCE

The proposed stormwater management system has been designed with appropriate BMPs aimed at reducing the discharge of pollutants based on the intended use of the proposed development. All BMPs require regular maintenance to function as intended. Some management measures have simple maintenance requirements; others are more involved. The Responsible Party must have all BMPs regularly inspected to ensure they are operating properly on an as-needed basis, including during runoff events exceeding 0.5 inches of rainfall.

A description of the non-structural and structural approaches to be incorporated is indicated below. The following Best Management Practices are proposed to be incorporated into the stormwater management design to reduce source runoff and improve stormwater runoff discharge quality. The Responsible Party will regularly inspect all BMPs to ensure they are operating properly. If any deficiencies are identified during these inspections, action to resolve it will be initiated and documented on the maintenance log.

NON-STRUCTURAL BEST MANAGEMENT PRACTICES (BMPs)

STREET SWEEPING

This practice, considered by MassDEP to be a non-structural BMP, provides effective removal of Total Suspended Solids (TSS) in a comprehensive stormwater management program. A maintenance program of roadway/driveway sweeping with a High-Efficiency Vacuum Sweeper or a Regenerative Air Sweeper to reduce sediment accumulation in the deep sump catch basins and subsurface systems shall be implemented based on the owner discretion. Sweeping can be conducted on a quarterly basis (primarily in the spring and fall) to keep low impact BMPs operating effectively.

GRADING

Steep slopes will be permanently vegetated to dissipate energy and reduce potential erosion. No constructed vegetated slopes shall exceed 3H:1V without providing additional reinforcement. Steep slopes may require soil reinforcement and additional vegetation.

SNOW STORAGE AND DEICING

Snow storage will be located adjacent to driveway/ parking area as indicated; allowing snow melt to drain to pretreatment and conveyance devices prior to discharging into the proposed BMPs.

In the interest of reducing the volume of dissolved salt that enters the watershed, the operator of the development will rely on sand alone where traction on snowy surfaces is the primary objective. However, parking areas, driveways, and sidewalks which require deicing for safety during winter months will typically be treated with calcium magnesium acetate or another alternative as approved by the Conservation Commission.

FERTILIZER:

Due to the project's location within an environmentally sensitive area, any use of fertilizers will be prohibited onsite.

PESTICIDES/HERBICIDES:

Due to the project's location within an environmentally sensitive area, any use of pesticides/herbicides will be prohibited unless otherwise approved by the Conservation Commission.

WASTE MANAGEMENT:

Solid waste will be contained within enclosed containers. Waste deposition in these receptacles will be consistent with state and local permits. The covers and doors of the dumpsters will be kept closed to limit rainwater/wildlife intrusion.

VEHICLE WASHING CONTROLS:

The Massachusetts Stormwater Management Standards outline clear protocols for addressing vehicle washing activities, which have the potential to introduce harmful pollutants into the stormwater system. Vehicle washing can release contaminants such as oils, grease, detergents, heavy metals, and other harmful chemicals that, if allowed to flow untreated, can degrade water quality and harm aquatic ecosystems. To mitigate this risk, the Standards require that vehicle washing be conducted in controlled environments designed to capture and treat runoff before it enters the stormwater system.

Designated wash stations should be utilized and be equipped with impervious surfaces, proper drainage systems, and treatment mechanisms, such as oil/water separators or filtration devices, that treat wash water before discharge. These measures are vital for ensuring that pollutants are removed or neutralized before the water is released back into the environment.

Additionally, facilities should be designed to prevent wash water from entering storm drains or nearby water bodies. The use of environmentally friendly cleaning products, such as biodegradable soaps and detergents, is also strongly encouraged as part of the stormwater management plan, as these products reduce the environmental impact and minimize harmful chemical runoff.

MAINTENANCE OF LAWNS, GARDENS, AND LANDSCAPED AREAS:

Routine maintenance of lawns, gardens, and landscaped areas should focus on preventing chemical use, conserving water, and preventing erosion. Avoiding fertilizers and pesticides, especially near water bodies, helps protect water quality, while organic compost and mulch improve soil health naturally. Efficient irrigation systems, such as drip irrigation, should be used, and watering should be done early or late in the day to minimize evaporation. Maintaining ground cover with grass, mulch, or native drought-tolerant plants helps control erosion and reduces the need for chemicals. Stormwater management practices, including rain gardens and permeable pavements, can help absorb runoff and prevent sediment from entering waterways. Regular inspections should be conducted, and a Best Management Practices (BMP) Maintenance Log should be kept to track irrigation, fertilization, erosion control, and any necessary adjustments, ensuring long-term sustainability and compliance.

PET WASTE MANAGEMENT:

Homeowners play a crucial role in managing pet waste to prevent stormwater pollution and protect local water quality, as required by Massachusetts Stormwater Regulations. Pet waste contains harmful bacteria, nutrients, and pathogens that can contaminate stormwater when left on the ground, posing risks to both the environment and public health. To minimize these risks, homeowners should consistently pick up after their pets and dispose of waste properly in trash bins or designated pet waste stations. Waste should never be left on lawns, sidewalks, or near storm drains and water bodies, as rainwater can wash it into the stormwater system, leading to pollution of local rivers, lakes, and wetlands. Proper disposal not only prevents water contamination but also helps reduce unpleasant odors and pest infestations. Homeowners can further support responsible waste management by providing pet waste bags on their property, maintaining clean outdoor areas, and encouraging neighbors to follow best practices. Public education and clear signage in shared spaces can also help raise awareness about the environmental impact of improper pet waste disposal. By taking measures, homeowners contribute to cleaner communities, healthier ecosystems, and compliance with stormwater management regulations.

STRUCTURAL BEST MANAGEMENT PRACTICES:

Prior to final completion and full occupancy of the development, it is recommended that a representative of the Contractor, Manufacturer, and/or Engineer either designing or building the facility for the Owner properly instruct the Responsible Party as to the maintenance practices required to responsibly maintain the effectiveness of the drainage system. These frequencies and requirements are recommendations to maintain minimum effectiveness in most typical environments. Ultimately, the Responsible Party will implement the procedures and frequencies as they see fit under their current plan and inspect the systems as needed to maintain minimum effectiveness as recommended by the manufacturer. The following maintenance of structural BMPs

will be implemented:

STORM DRAIN INLETS:

Catch basins and area drains associated with the existing and/or proposed stormwater management system located within the project limits and the adjacent Right-of-Ways may collect and convey sediment and sediment-laden stormwater runoff. Therefore, all catch basins and area drains, existing and proposed, within construction zones, will be protected with silt sacks during construction and until final site stabilization is complete.

SEDIMENT BASINS/ CONSTRUCTED WETLAND:

The removal and disposal of collected water from construction areas is a potential source of sediment and can lead to erosion during construction activities. Temporary sedimentation basins shall be constructed according to the site plans and EPA regulations. The temporary sedimentation basins shall be monitored daily. Stormwater shall be directed toward the existing pipe conveyance system to help prevent overflow from leaving the construction work area.

Temporary sediment basins/traps are instrumental in controlling sediment-laden stormwater runoff during initial phases of construction involving earthmoving activities before permanent stormwater management systems are in place. Sediment basins and traps will be constructed in accordance with Environmental Protection Agency (EPA) guidelines (See Project Plans). Sediment traps should have a minimum volume, based on 0.5-inch of storage for each acre of drainage area. Temporary sedimentation basins/traps shall be monitored daily. Stormwater shall be directed towards the existing conveyance system to help prevent overflow from leaving the construction work area.

ROOF DRAIN GUTTERS AND DOWNSPOUTS:

Roof drain gutters and downspouts should be inspected and cleaned twice a year, once in the fall after leaf drop and in the spring after snow melt. Cleaning will take place at the completion of construction and in early spring after snow melt. Any obstructions, sediment, and debris that could potentially cause clogging shall be removed within the roof drain gutter and downspout system as necessary.

SC-740 ADS STORMTECH® SUBSURFACE CHAMBERS WITH ISOLATOR ROW PLUS:

The proposed subsurface system consists of high-density polyethylene plastic chambers (ADS StormTech®) set in a stone bed to remove total suspended solids (TSS) from stormwater runoff. The system is designed to fully drain between storm events due to the large footprint of the stone beds. To facilitate inspection and maintenance, manhole risers and manufacturer-recommended inspection ports will be installed at the ground surface. Once the system becomes operational, inspections should be conducted after each storm event for the first six months to ensure proper stabilization, functionality, and that outlets remain free of obstructions.

Preventative maintenance should be performed at least twice per year and after any major storm event exceeding 1.5 inches of rainfall. Regular inspections should focus on identifying differential settlement, cracking, structural breakout, clogged outlets or vents, root intrusion, and accumulated sediment. Additionally, water levels should be recorded and compared against rainfall amounts to confirm that the system drains within 72 hours. If drainage exceeds this timeframe, corrective action—such as sediment removal, jetting, or outlet adjustments—should be taken to restore proper function.

DEEP SUMP CATCH BASINS AND MANHOLE STRUCTURES:

Catch basins shall be cleaned, in dry weather, when half of the sump capacity is filled or at a minimum quarterly or as required through periodic inspection. Cleaning will take place at the completion of construction and in early spring after sanding of roadways has ceased or as needed depending on the frequency of major storm events (greater than 1-inch of rainfall). All manholes shall be inspected at least once annually. Any obstructions, sediment, and debris that could potentially cause clogging shall be removed within the conveyance system as necessary. Inverts, grates, and hoods shall be checked and replaced as necessary to maintain hydraulic effectiveness.

PLUNGE POOL/ENERGY DISSIPATER AND DOWNSTREAM SLOPES:

The level spreader/plunge pool/energy dissipaters are utilized at the outlet pipes prior to discharge to the wetland to prevent erosions. The level spreader/plunge pool/energy dissipaters should be inspected per the inspection and maintenance schedule (see section below) for sand accumulation and debris which may impact its effectiveness to slow water. In order to ensure that the level spreader systems are working, the outlets as well as slopes downstream should be inspected after every storm of 1" or greater to assure no erosion of the slope. If no erosion is evident, then the stone size and level spreader design is adequate. Should there be erosion of the level spreader, stone size should be increased, or additional large stones added to enhance energy dissipation of water. If downstream slopes exhibit signs of erosion, repairs to soils and slope should be made and then a treatment such as an erosion control matting should be instituted to reinforce soils until vegetative cover can be restored. The aprons and downstream slopes shall be inspected and cleaned at the completion of construction.

UNILOCK PREAMBLE PAVERS:

Permeable pavers require regular maintenance to ensure proper function and longevity. Quarterly inspections should check for debris, sediment buildup, pooling water, or clogged joints, while post-storm inspections assess surface ponding, displaced pavers, or edge erosion. Annual maintenance includes vacuum sweeping or power washing to remove sediment, replenishing joint materials, repairing displaced or damaged pavers, and stabilizing edges to prevent erosion. Vegetation management involves removing weeds and invasive plants from joints, with herbicides used as needed under local guidelines. Maintenance activities should be documented, including sediment removal volumes, cleaning methods, and repairs. A recommended schedule includes quarterly inspections and cleaning, additional checks after major storm events, and comprehensive annual maintenance to restore full

system functionality and maintain compliance with stormwater management standards. Refer to the manufacturer's maintenance requirement attached in Section 2 of this report for additional information.

GRASS-LINED CONVEYANCE CHANNELS WITH CHECK DAMS:

Grass-lined channels with gravel check dams require consistent maintenance to ensure proper stormwater conveyance and sediment control. Quarterly inspections should check for debris accumulation, sediment buildup, bare or eroded areas, and obstructions to flow within the channel and around check dams. After major storm events, inspect for displaced gravel, scouring, or structural damage to the check dams and surrounding areas. Vegetation in the channel should be mowed periodically to maintain a grass height of 4–6 inches, with replanting or reseeding as needed to address bare spots or erosion. Sediment should be removed from both the channel and check dams when it accumulates to 25% of the design depth. Gravel check dams should be regraded or replenished if displacement occurs or if the gravel becomes compacted and reduces permeability. Annual maintenance should include repairing eroded areas with stabilization techniques, reseeding the channel for dense vegetation cover, and checking the integrity of check dams. A recommended schedule includes quarterly inspections, mowing, and sediment removal, additional post-storm checks for erosion or blockages, and annual gravel replenishment, erosion repair, and vegetation management. Detailed documentation of all maintenance activities, including sediment removal volumes and gravel adjustments, ensures proper tracking and continued functionality of the system.

TRENCH DRAIN:

Trench drains with inline catch basins require regular maintenance to ensure proper stormwater management and prevent blockages. Quarterly inspections should check for debris, sediment accumulation, or blockages in the trench drain and catch basin. After major storm events, inspect for excessive sediment, standing water, or structural damage to the drain and basin components. Sediment and debris should be removed from the trench drain grates and catch basin to maintain optimal flow and prevent clogs. Annual maintenance should include a thorough cleaning of the trench drain using high-pressure water or vacuum equipment and sediment removal from the catch basin when sediment levels exceed 25% of the sump depth. Inspect the grates, basin structure, and connections for damage, and repair or replace components as necessary. A maintenance schedule includes quarterly inspections and cleaning, post-storm checks for blockages or damage, and annual deep cleaning and structural repairs. Documenting all activities, including sediment removal volumes and repairs, ensures continued functionality and compliance with stormwater management requirements.

SPILL CONTROL:

The development consists of a gas station and associated commercial building. It is recommended that if there is no existing contingency plan to address the spillage/release of petroleum products and any hazardous material be implemented for the development the one be fully developed. The recommendation includes that the Owner have all MassDEP emergency spill response information

posted onsite at all times. It is also recommended an emergency spill response kit including absorbent pillows be stored on-site along with instructions for the kit, a copy of applicable regulations regarding spills, and a list of individuals to contact (local and state officials) in the event of a spill.

Spills or leaks will be treated properly according to material type, volume of spillage, and location of the spill. Mitigation will include preventing further spillage, containing the spilled material in the smallest practical area, removing spilled material in a safe and environmentally friendly manner, and remediating any damage to the environment.

TRAINING FOR STAFF IMPLEMENTING THE LONG-TERM POLLUTION PREVENTION PLAN:

The purpose of this training is to ensure that all staff responsible for carrying out the Long-Term Pollution Prevention Plan (LTPPP) are well-equipped to comply with Massachusetts Stormwater Regulations. The training covers essential topics, including an overview of relevant regulations, best management practices (BMPs), spill prevention and response, site-specific procedures, and documentation requirements.

Staff will learn how to properly implement BMPs to reduce stormwater pollution, including regular inspections, maintenance routines, and responsible waste management. Spill prevention training will focus on identifying potential pollution sources, taking immediate containment actions, and following proper reporting procedures. Site-specific procedures will help employees understand the facility's drainage system, potential pollutant sources, and the correct use of materials and equipment in compliance with environmental standards.

Documentation and reporting are crucial for regulatory compliance. Employees will be trained on maintaining accurate records of inspections, training sessions, and incident reports. This ensures accountability and proper communication with regulatory agencies.

Training will be provided to all new personnel before they begin stormwater management tasks. Annual refresher training will keep staff updated on regulatory changes and best practices, with additional sessions conducted as needed for procedural updates or corrective actions.

To measure training effectiveness, attendance records, training materials, and assessments will be documented. Staff competency will be evaluated through quizzes, site inspections, and practical exercises. If any knowledge gaps or non-compliance issues arise, corrective training will be provided.

By ensuring all staff understand their role in pollution prevention, this training supports water quality protection and regulatory compliance. Regular education and assessments will help maintain the successful implementation of the Long-Term Pollution Prevention Plan.

LONG-TERM OPERATION AND MAINTENANCE BUDGET:

Consistent with Standard 9 of the Massachusetts Department of Environmental Protection Stormwater Handbook (February 2008) the approximate cost of inspections and maintenance based on the abovementioned post-construction activities and frequencies is as follows:

- Pavement Sweeping - \$750 per year based on annual sweepings.
- Deep Sump Catch Basins - inspection/cleaning - \$400 per year/per catch basin based on quarterly inspections and sediment removal of both single and double grate deep sump catch basins.
- Infiltration/Detention System - inspection - \$250 per year based on semi-annual inspections.
Cleaning/debris removal - \$500 per year for accumulated sediment and trash removal.

Additional costs may be incurred if it is determined during routine inspections of the BMP's that further corrective actions are necessary.

LONG TERM STRUCTURAL BEST MANAGEMENT PRACTICE INSPECTION & MAINTENANCE MATRIX AFTER CONSTRUCTION

Note: BMP's shall be visually inspected and repaired by a qualified party in accordance with the following chart. Note these are minimum inspection criteria/frequencies and should be adjusted throughout the project lifespan as required to maintain effectiveness. Refer to maintenance standards for drainage facilities and structural best management practices in the "Recommended Long-Term Stormwater Pollution Prevention Plan."

BMP ID #	Conventional & LID Best Management Practices	Recommended Minimum Inspection & Maintenance Frequency	Erosion/Scouring	Tree Growth Hazards	Differential Settlement/Seepage	Structural Damage/Obstructions	Trash & Debris	Removal of Accumulated Sediment	Slope Integrity	*Mow Vegetation/Poor Vegetation Coverage	Remove/Reset Filter Fabric & Stone As Required	Remove & Replace Hardwood mulch/media	Vac Truck Sediment & Contaminants	Remove/Reset Riprap as Required
#1	Catch Basin/ Area Drain/ Trench Drain	Semi-annually		☒	☒	☒	☒	☒					☒	
#2	Roof Drain Gutters and Downspouts	Semi-annually		☒	☒	☒	☒	☒					☒	
#3	Flared End / Plunge Pool/ Riprap Outlet	Semi-annually	☒	☒	☒	☒	☒	☒	☒		☒			☒
#4	Sediment Forebay/ Infiltration Basin/ Gravel Spillway	Semi-annually	☒	☒	☒	☒	☒	☒	☒	☒	☒			☒
#5	Constructed Wetland	Semi-annually	☒	☒	☒	☒	☒	☒	☒		☒			☒
#6	Swales/ Grass Channel/ Check Dams	Semi-annually	☒	☒	☒	☒	☒	☒	☒	☒	☒			☒
#7	Unilock Preamble Pavers	Annually	☒	☒	☒	☒	☒	☒	☒				☒	☒
#8	Gravel Diaphragm Shoulder	Annually	☒	☒	☒	☒	☒	☒	☒				☒	☒
#9	Driveway/parking Area sweeping	Semi-annually	☒	☒	☒	☒	☒	☒	☒				☒	
#10	LAWNS, GARDENS, AND LANDSCAPED AREAS	Regularly	☒	☒			☒	☒	☒	☒		☒	☒	

#11	ADS Subsurface Chamber Systems w/ Isolator Row PLUS	Annually												
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Stormwater BMP Inspection and Maintenance Log

Facility Name	
Address	
Begin Date	End Date

Date	BMP ID#	BMP Description	Inspected by:	Cause for Inspection	Exceptions Noted	Comments and Actions Taken

Instructions: Record all inspections and maintenance for all treatment BMPs on this form. Use additional log sheets and/or attach extended comments or documentation as necessary.

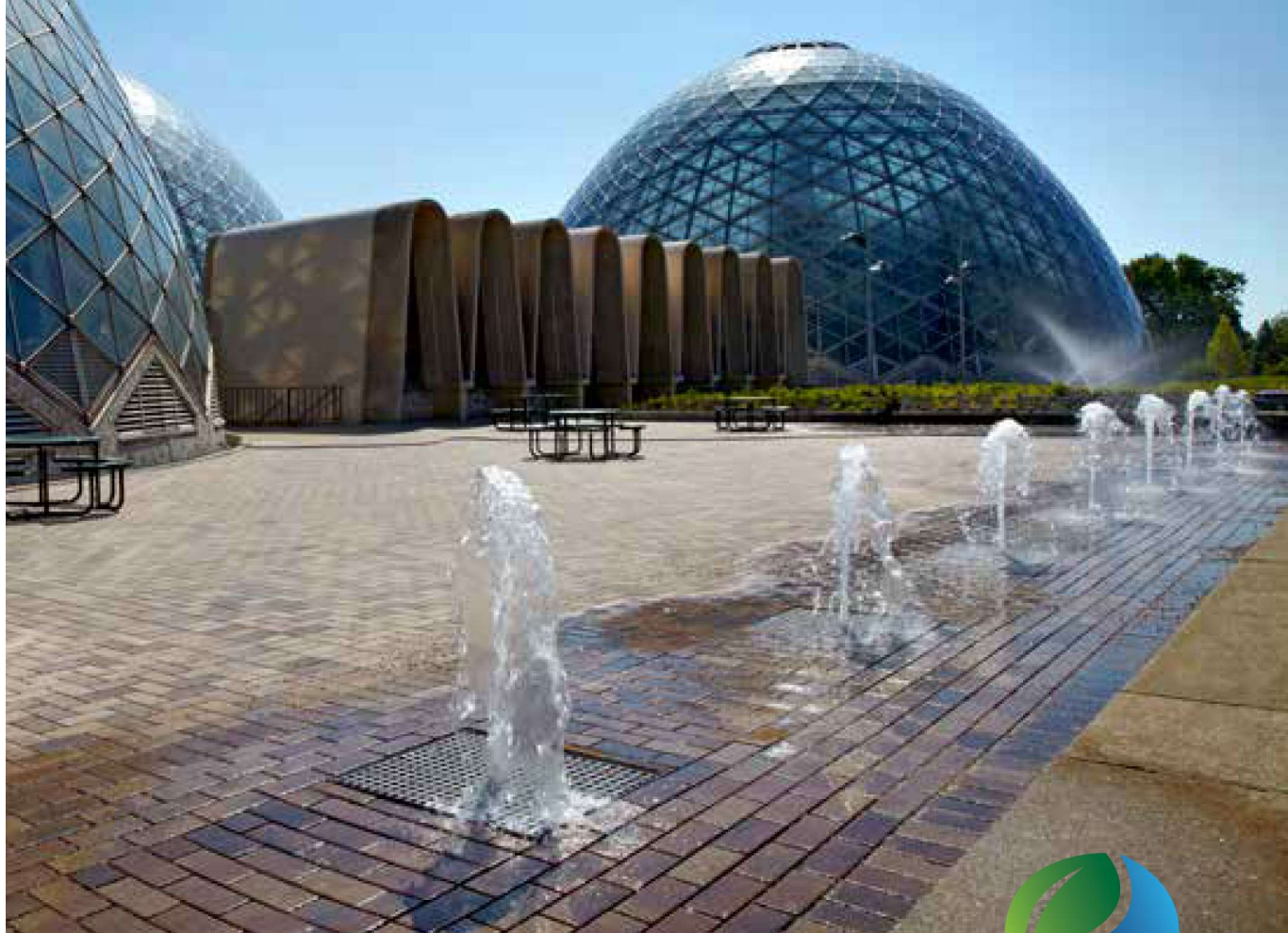
- BMP ID# — Always use ID# from the Operation and Maintenance Manual or Approved Plans.
- Inspected by — Note all inspections and maintenance on this form, including the required independent annual inspection.
- Cause for inspection — Note if the inspection is routine, pre-rainy-season, post-storm, annual, or in response to a noted problem or complaint.
- Exceptions noted — Note any condition that requires correction or indicates a need for maintenance.
- Comments and actions taken — Describe any maintenance done and need for follow-up.



PERMEABLE PAVER

MAINTENANCE GUIDE

UNILOCK®
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PERMEABLE PAVER

MAINTENANCE GUIDE

This guide is specific to Unilock® permeable pavers as a maintainable system for stormwater runoff and does not cover cleaning concrete pavers themselves. Please see the Unilock Paver Maintenance for Commercial Installations (available for download at www.unilock.com) for information on cleaning concrete pavers. The maintenance information in this guide is intended for Unilock permeable paver systems only and not for other types of permeable pavers or pervious systems.

Maintenance is necessary for any type of permeable pavement system, much like any impervious pavement with catch basins and underground infrastructure. Over the lifetime of the permeable paver system, there will be a need to clean any sediment, soil, dirt and debris from the joint aggregate material to maintain a sufficient infiltration rate. Every project will vary in performance needs, as well as to the frequency in which the joint material must be cleaned. The surface infiltration rate must be greater than the regional 100-year rainfall intensity to adequately ensure no runoff is generated, which is only one goal for using permeable pavers. Unilock suggests establishing a maintenance plan using the techniques in this document to prevent clogging.

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PRECEDING MAINTENANCE

Before providing maintenance on permeable paver systems, proper installation and protection during construction is required. Here are a few conditions to observe, require and prevent for establishing a successful system:

1. Verify correct installation and materials

- Hire contractors with knowledgeable experience installing permeable pavers
- Review and approve all sub-base, base and joint aggregate materials
- Do not allow sand and dense-graded aggregates

2. Prevent construction damage

- Limit sub-grade soil compaction when infiltration is necessary
- Restrict vehicles with muddy tires from driving over newly placed pavers
- Do not mix aggregate materials

3. Refill joint material

- Once, between 3 and 6 months after initial installation
- Repeat as needed - approximately every 5-10 years

4. Avoid stockpiling of materials such as

- Topsoil
- Mulch

The proper materials and installation execution can be found in the Unilock specifications for permeable pavers. Both residential and commercial projects will utilize the same base, setting bed and joint aggregates. Some projects may not require sub-base materials, under drainage or geotextile. It is not necessary to separate the setting bed from the base aggregates with a geotextile.

EXAMPLES OF COMMON MAINTENANCE ISSUES

Below are several warning signs and visual clues of common maintenance issues which must be prevented and addressed or remediated to ensure continued surface infiltration. These common problems can often be easily remedied by maintaining the proper joint aggregate level.



1. SLOW DRAINING/RUNOFF

- Verify with simple infiltration testing or observe after rain storms
- Surface should drain immediately



2. PONDING AND BIRD BATHS

- Rule of thumb: if more than a nickel deep one minute after a rainfall event, maintenance is necessary
- Verify correct materials were installed
- Exceptions at bottom of slopes



3. SURFACE CRUSTING

- Identify if there is a problem such as run-on sediments
- Increase cleaning frequency in troubled areas
- Remove debris immediately



4. WEEDS

- Weeds will not germinate unless there is a collection of soil or moisture
- Remove weeds immediately
- Clean sediment from joint material
- Chemical treatment may be required prior to maintenance removal



5. COVERED JOINT MATERIAL

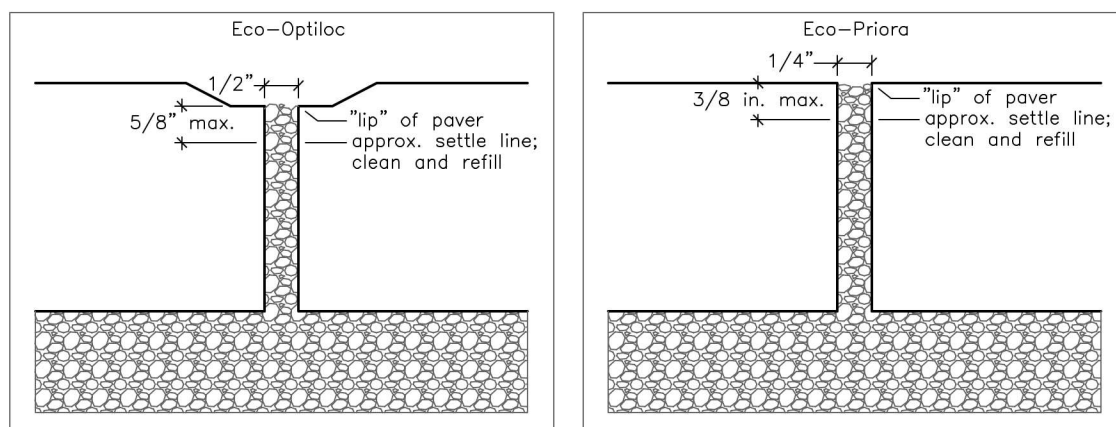
- Identify problem and correct
- Remove immediately
- Joint material should appear topped up as photo on left

MAINTENANCE TYPES

There are two service types for maintaining the integrity of a permeable paver system:

- 1. Preventative** – removes most miscellaneous debris before being trapped in the joint aggregate material causing clogging. This usually does not require removal of any joint material to restore infiltration.
- 2. Restorative** – requires some removal or complete removal of the joint material to renew infiltration. Occurs after miscellaneous debris has been captured and lodged in the joint aggregate.

Note: Both maintenance types will be most effective when the joint aggregate material is filled to the “lip” of the paver. If the joint material has settled more than the joint width, plus 1/8 inch below the paver lip, the maintenance equipment is significantly less effective and potentially more expensive.



MAINTENANCE EQUIPMENT

Maintenance equipment requirements will vary according to project size, age and product type.

PROJECT TYPE 1: For smaller pedestrian type areas such as sidewalks, driveways, plazas, patios or similar:

PREVENTATIVE



1. HAND-HELD BRISTLE BROOM

- Available at any hardware store
- Sweep as needed to keep the surface clear of debris
- Approximate cost: \$15



2. LEAF BLOWER

- Electric or gas powered
- Minimum air speed of 120 mph
- Joint aggregate material will remain in place while removing debris from paver surface
- Approximate cost: \$50 to \$300



3. ROTARY BRUSH

- Poly bristles only
- Flips debris from joint
- Will require slight refilling of the joint aggregate material
- Approximate cost: varies depending on attachment vehicle

RESTORATIVE



1. WET/DRY SHOP VACUUM

- Minimum 4 HP (peak) motor with 130 cubic feet per minute suction
- Will remove some joint aggregate material
- Replenish removed joint aggregate material to "lip" of paver
- Approximate cost: \$50 to \$150



2. RIDING LITTER VACUUM

- Tennant ATLV 4300
- 48 inch wide vacuum head
- 110 gallon capacity
- Can also be used as a preventative technique
- Will evacuate most debris from joint except for aggregate material
- Approximate cost: \$25K new



3. POWER WASHER

- Capable of spraying 1,400 to 1,800 psi
- Spray at a 30 degree angle approximately 18 to 24 inches from the surface
- Will evacuate joint material
- Use a strong vacuum to clean up all dislodged debris to eliminate resettling
- Replenish removed joint aggregate material to "lip" of paver
- Approximate cost: \$125 to \$500

PROJECT TYPE 2: Among the considerations for your heavy-duty permeable projects Unilock now offers products designed for easier cleaning. Dura-Flow™ Rapid Clean™ has specially designed joints for easier cleaning and maintenance. Ask your Unilock Representative for more information.

Maintenance for larger vehicular areas such as roads, parking lots, alleys, plazas or similar that can support vehicles:

PREVENTATIVE



1. ROTARY BRUSH

- Poly bristles only
- Flips debris from joint
- Will require slight refilling of the joint aggregate material
- Approximate cost: varies depending on attachment vehicle



2. BROOM SWEEPERS

- Typical “street sweeper” type
- Rotating curb brushes with center pickup
- Poly bristles only
- Do not utilize water to clean the surface as this can have detrimental effects on the cleaning
- Approximate cost: \$100 to \$120 per hour from a service company



3. REGENERATIVE AIR SWEEPERS

- Light duty suction cleaning
- Utilizes stream of air blowing horizontally across surface and vacuuming
- No rotating brushes
- Approximate cost: \$45 to \$65 per hour from a service company

RESTORATIVE



Vacall® Dynamic Multi-Purpose Vacuum



Elgin® Whirlwind

1. VACUUM SWEEPERS

- Heavy duty cleaning
- Minimum suction of 14,000 cubic feet per minute
- Complete evacuation of joint aggregate material
- Replenish removed joint aggregate material to “lip” of paver
- Approximate cost: \$2.50 to \$4.50 per parking space



2. POWER WASHERS

- Capable of spraying 1,400 to 1,800 psi
- Spray at a 30 degree angle approximately 18 to 24 inches from the surface
- Will evacuate joint aggregate material
- Use a strong vacuum to clean up all dislodged debris to eliminate resettling
- Replenish removed joint aggregate material to “lip” of paver

STRATEGIC PROCEDURES FOR MAINTAINING INFILTRATION

Observe and implement the following habitual procedures to ensure longevity of the system:

1. WEEKLY

Prevent contamination from routine landscape maintenance such as grass clippings from mowing, hedge trimming, mulching plant beds, etc., by implementing the following joint-opening cleaning procedures immediately after contamination occurs:

- Hand broom debris from the paver surface
- Blow debris from the paver surface with backpack blower type device, collect and dispose
- Mechanically sweep paver surface

2. MONTHLY

Observe any collection areas of debris, dirt, topsoil, mulch, etc., after seasonal events such as snowfall, rain storms, leaf litter, etc., and investigate if clogging is occurring. Immediately restore infiltration using the following cleaning options:

- Break up any crust covering the joint aggregate material with hand broom for smaller areas, or mechanically with a rotary sweeper for larger areas. Remove debris material.
- When necessary, restore infiltration using wet/dry shop-vacuum for small areas or vacuum truck for larger areas by removing debris from joint aggregate material.
- Replenish joint aggregate material to “lip” of paver

3. YEARLY

Establish a seasonal maintenance schedule that includes the following:

- Sweep entire permeable paving surface with appropriate preventative sweeping devices
- Replenish joint aggregate material to “lip” of paver

4. TEN YEARS PLUS

Plan long-term maintenance to rejuvenate infiltration rates:

- Complete restoration of the joint aggregate material
- Replenish joint with cleaned or new aggregate material to “lip” of paver

RECOMMENDED SEASONAL

MAINTENANCE SCHEDULE

Unilock® suggests establishing a best practices maintenance program to ensure longevity of the systems before restorative action is required. Biannual preventative maintenance is suggested as shown in the schedule below. This includes sweeping once in the early spring and once again in the late fall. Below is a preventative maintenance timeline that includes four maintenance suggestions:

1. AFTER THE SNOW MELT - MARCH 1 THROUGH APRIL 15

- Broom, blow, rotary brush or sweep entire surface
- Clean debris from paver surface in location of snow stockpile area
- Replenish joint aggregate material after cleaning
- Every fifth year, vacuum or power wash problem areas and refill joint material

2. LATE SPRING - APRIL 1 THROUGH MAY 15

- Broom, blow, rotary brush or sweep flowers from trees and shrubs
- Collect any additional debris from areas mulched or planted with annual flowers
- Replenish joint aggregate material as necessary

3. LATE SUMMER - JULY 15 THROUGH AUGUST 30

- Broom, blow, rotary brush or sweep lawn and shrub clippings or tree fruits
- Collect any additional debris from summer activities such as charcoal coals inadvertently dumped on the permeable surface, beach sand, etc.
- Replenish joint aggregate material as necessary

4. LATE FALL - OCTOBER 15 THROUGH NOVEMBER 30

- Broom, blow, rotary brush or sweep plant leaves
- Replenish joint aggregate material as necessary

Various factors will affect each project's preventative maintenance timeline and must be reviewed individually.

Recommended Seasonal Maintenance Schedule Chart

Recommended Maintenance Schedule		Seasonal BMP			
		After Snow Melt	Late Spring	Late Summer	Late Fall
Techniques	Project Type 1: Preventative - choose one		1x per season	optional	1x per season
	Bristle Broom	**	*	*/**	*
	Leaf Blower	**	*	*/**	*
	Rotary Brush		*	*/**	*
	Project Type 1: Restorative		**		**
	Wet-Dry Vacuum	**	**	**	**
	Riding Litter Vacuum		*	** 1x every 5 yrs.	*
	Power Washer	**	**	**	**
	Project Type 2: Preventative - choose one		1x per season	optional	1x per season
	Rotary Brush		*	*	*
	Broom Sweepers		*		*
	Regenerative Air Sweepers		*		*
	Project Type 2: Restorative				
	Vacuum Sweepers			** 1x every 10 yrs.	
	Power Washer	**	**	**	**

* recommended

** as needed per Strategic Procedures

WINTER MAINTENANCE AND DE-ICING

DEALING WITH SNOW

Equip plow scrapers and blades with shoes or high-density plastic blades to reduce the risk of damaging paver joints and the surface of the pavement. While scraping the surface without this protection will not compromise the structural integrity of Unilock pavers, it may affect the aesthetics of the surface by leaving behind rust marks and further damage the finish.

In contrast, a rotational snow broom (non-metal) can be used to remove snow safely from the paver surface.



Snow Broom for snow removal



Over salted pavers

DEALING WITH ICE

Rock Salt - Sodium Chloride (NaCl) for temperatures as low as 20°F (-7°C)

Calcium Chloride (CaCl_2) only when necessary when temperatures are below 20°F (-7°C) to -2°F (-19°C)

Follow the directions listed on the deicing product bag but use sparingly. Only apply the minimum amount necessary to melt the snow and ice. Over applying the product can still result in damage to concrete. Sweep and remove any excess deicing chemical after the ice and snow melts. After the winter season, thoroughly wash the paver surface to remove any excess deicing chemical remaining.

DO NOT USE:

- Magnesium Chloride (MgCl_2)
- Calcium Magnesium Acetate (CMA)
- Potassium Chloride (KCl)
- Potassium Acetate (KA)
- Fertilizers containing Ammonium Nitrate and Ammonium Sulfate

These chemicals rapidly attack and disintegrate concrete.





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Isolator[®] Row Plus

O&M Manual



The Isolator[®] Row Plus

Introduction

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row Plus is a technique to inexpensively enhance Total Suspended Solids (TSS), Total Phosphorus (TP), Total Petroleum Hydrocarbons (TPH) and Total Nitrogen (TN) removal with easy access for inspection and maintenance.

The Isolator Row Plus

The Isolator Row Plus is a row of StormTech chambers, either SC-160, SC-310, SC-310-3, SC-740, DC-780, SC-800, MC-3500, MC-4500 or MC-7200 models, are lined with filter fabric and connected to a closely located manhole for easy access. The fabric lined chambers provide for sediment settling and filtration as stormwater rises in the Isolator Row Plus and passes through the filter fabric. The open bottom chambers allow stormwater to flow vertically out of the chambers. Sediments are captured in the Isolator Row Plus protecting the adjacent stone and chambers storage areas from sediment accumulation.

ADS Isolator Row and Plus fabric are placed between the stone and the Isolator Row Plus chambers. 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 Isolator Row Plus 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 Isolator Row Plus and includes a high/low concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator Row Plus bypass through a manifold to the other chambers. This is achieved with an elevated bypass manifold or a high-flow weir. This creates a differential between the Isolator Row Plus row of chambers and the manifold to the rest of the system, thus allowing for settlement time in the Isolator Row Plus. After Stormwater flows through the Isolator Row Plus and into the rest of the chamber system it is either exfiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

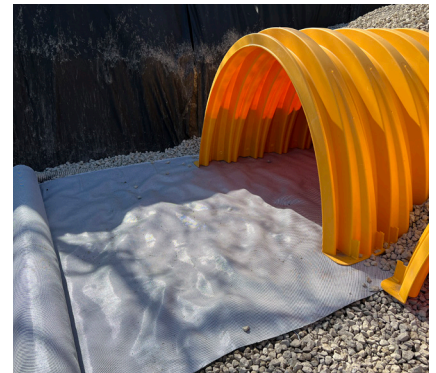
The Isolator Row Plus Flamp[™] is a flared end ramp apparatus attached to the inlet pipe on the inside of the chamber end cap. The FLAMP provides a smooth transition from pipe invert to fabric bottom. It is configured to improve chamber function performance by enhancing outflow of solid debris that would otherwise collect at the chamber's end, or more difficult to remove and require confined space entry into the chamber area. It also serves to improve the fluid and solid flow into the access pipe during maintenance and cleaning and to guide cleaning and inspection equipment back into the inlet pipe when complete.

The Isolator Row Plus 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, StormTech recommend using the Isolator Row Plus to minimize maintenance requirements and maintenance costs.

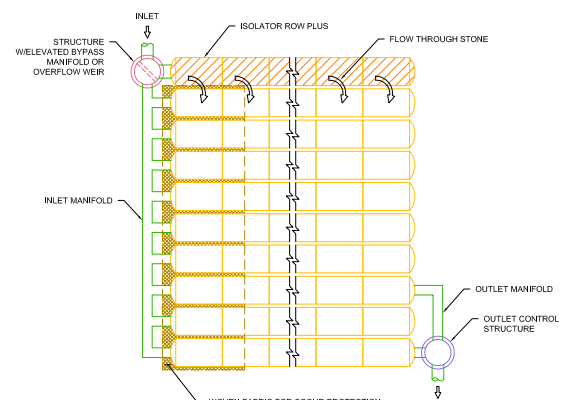
Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row Plus.



Looking down the Isolator Row Plus from the manhole opening, ADS Plus Fabric is shown between the chamber and stone base.



StormTech Isolator Row Plus with Overflow Structure (not to scale)



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

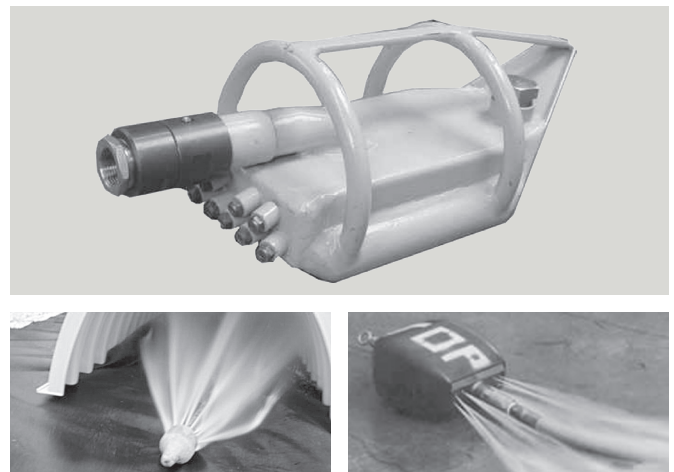
If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3" (75 mm) throughout the length of the Isolator Row Plus, clean-out should be performed.

Maintenance

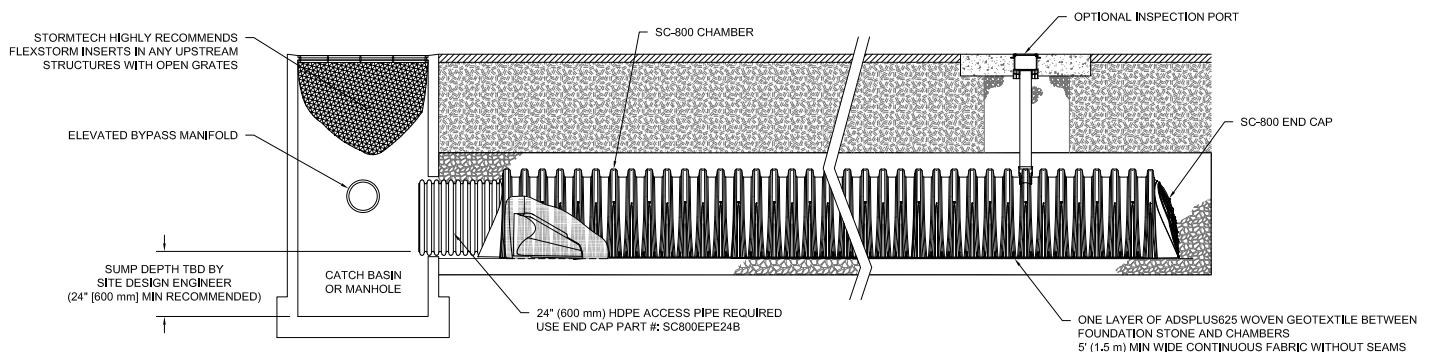
The Isolator Row Plus was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided

via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entry.

Maintenance is accomplished with the JetVac process. 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, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. StormTech recommends a maximum nozzle pressure of 2000 psi be utilized during cleaning. JetVac reels can vary in length. For ease of maintenance, ADS recommends Isolator Row Plus lengths up to 200' (61 m). **The JetVac process shall only be performed on StormTech Isolator Row Plus that have ADS Plus Fabric (as specified by StormTech) over their angular base stone.**



StormTech Isolator Row Plus (not to scale)



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 and record results on maintenance log.
 - iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.
- B) All Isolator Row Plus
 - 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. Mirrors on poles or cameras may be used to avoid a confined space entry
 - 2. Follow OSHA regulations for confined space entry if entering manhole
 - iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2.
 - 2. If not, proceed to Step 3.

Step 2

Clean out Isolator Row Plus using the JetVac process.

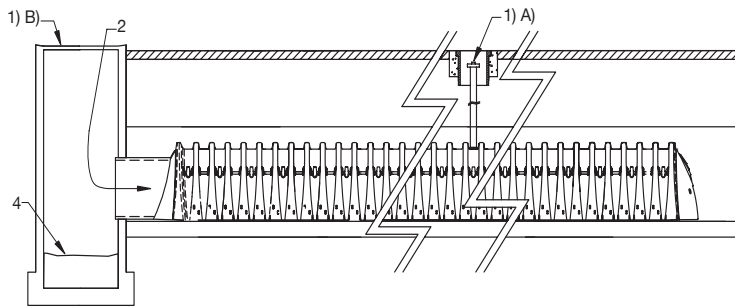
- A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
- B) Apply multiple passes of JetVac until backflush water is clean
- C) Vacuum manhole sump as required

Step 3

Replace all caps, lids and covers, record observations and actions.

Step 4

Inspect & clean catch basins and manholes upstream of the StormTech system.

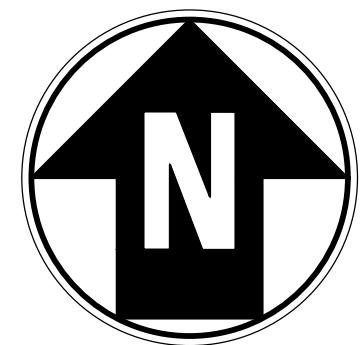
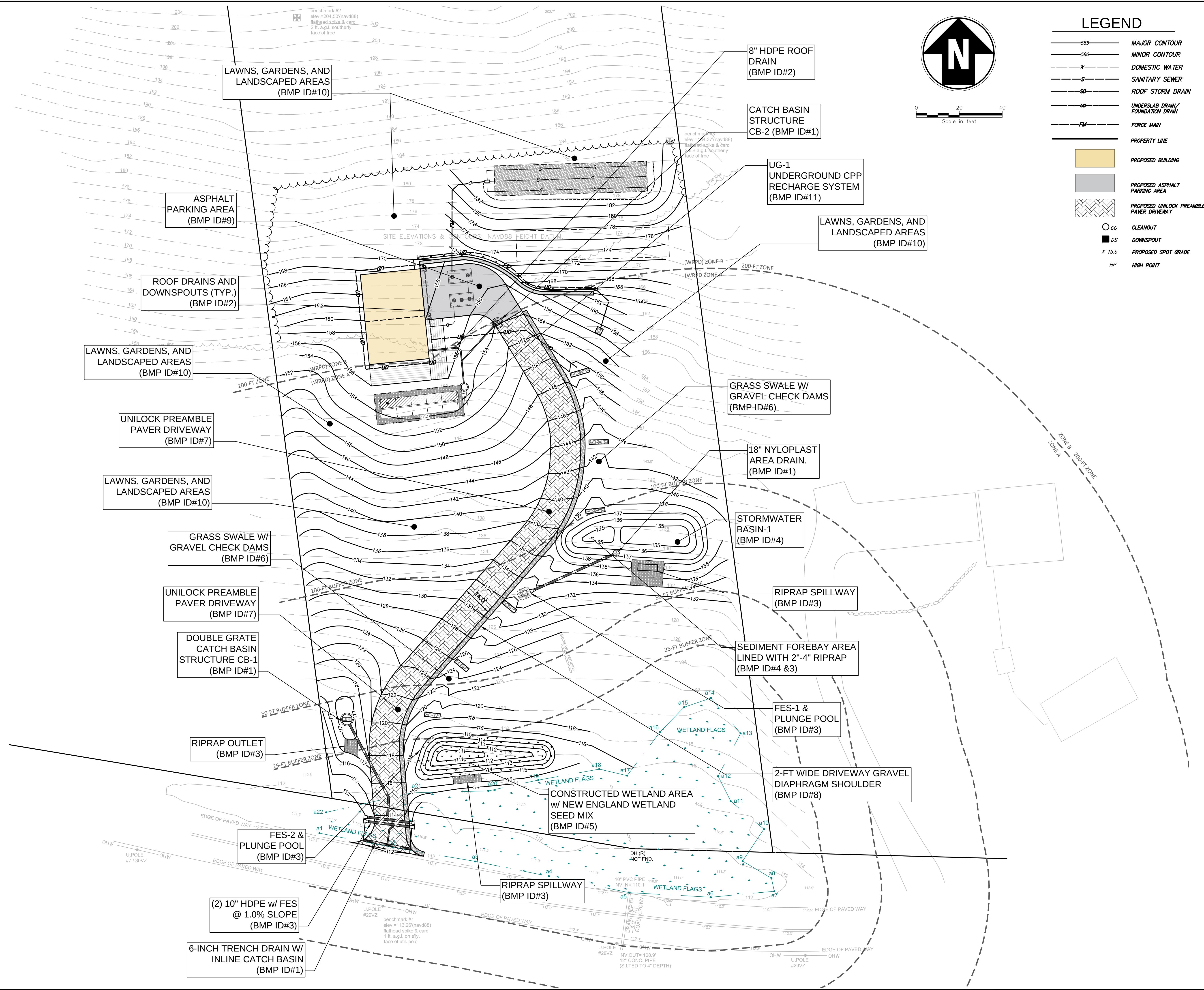


Sample Maintenance Log

Date	Stadia Rod Readings		Sediment Depth (1)-(2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row Plus, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

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0 20 40
Scale in feet

LEGEND

- MAJOR CONTOUR
- MINOR CONTOUR
- DOMESTIC WATER
- SANITARY SEWER
- ROOF STORM DRAIN
- UNDERSLAB DRAIN/FOUNDATION DRAIN
- FORCE MAIN
- PROPERTY LINE
- PROPOSED BUILDING
- PROPOSED ASPHALT PARKING AREA
- PROPOSED UNILOCK PREAMBLE PAVER DRIVEWAY
- CLEANOUT
- DOWNSPOUT
- PROPOSED SPOT GRADE
- HIGH POINT

HD Design

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No.	Submitted / Revision	App'd.	By	Date
0	NOTICE OF INTENT FILING	HD	HD	7/15/2024
1	Planning Board Special Permit App.	HD	HD	08/09/2024
2	Planning Board Response to Comments	HD	HD	01/02/2025
3	Planning Board Response to Comments	HD	HD	02/18/2025

PREPARED FOR:

AC LAND LLC



15 LINCOLN STREET,
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SITE PLANS 5-BEDROOM SINGLE-FAMILY DWELLING

31 NEWTON ROAD,
AMESBURY, MA

OPERATION AND MAINTENANCE PLAN

Designed By: HD	Drawn By: HD	Checked By: -
Issue Date: 07/01/2024	Project No: 13023	Scale: 1" = 20'

Drawing No:

O&M Plan