# STORMWATER OPERATION AND MAINTENANCE PLAN
# LONG TERM POLLUTION PREVENTION PLAN

## ROSEBROOK COMMONS
## 1747 WEST MAIN ROAD
## MIDDLETOWN, RHODE ISLAND

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**April 2022**

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# STORMWATER OPERATION AND MAINTENANCE PLAN

## General Operation and Maintenance Notes

Following construction, the completion of the inspection and maintenance requirements below shall be the responsibility of the Owner (See Attachment OM-1).

1. The parking lot and entry drives shall be swept by the Owner once in the spring and once during the fall to remove sediments.

2. Trash, litter, sediment and other debris shall be removed from any stormwater facility (including area drains, manholes, and outlet structures) at least twice a year, once in the month of April and once in the month of October, at the cost of the Owner.

3. All sediments removed shall be disposed of at an approved and permitted location.

4. Snow storage is prohibited in the stormwater BMP's.

5. All cleaning and maintenance of drainage system BMP's shall be the responsibility of the property owner. See additional inspection, maintenance, and repair notes for the stormwater system.

## Area drains with Sump Inspection, Maintenance, and Repair Notes

1. Inspections shall be performed a minimum of two times per year (spring/fall). Units shall be cleaned annually and whenever the depth of sediment is greater than or equal to half the sump depth.

2. The inlet grate shall not be welded to the frame or paved over so that the sump can be easily inspected and maintained.

3. Care shall be taken to avoid damaging and displacing hoods placed on hooded outlets during cleaning.

## Sediment Forebay Inspection, Maintenance, and Repair Notes

1. Sediment forebay shall be inspected a minimum of two times per year and after every storm of 2.8" inch or greater for trash, debris, sediment, erosion, standing water, and overall performance. Defects shall be repaired by the owner.

2. Sediment forebays shall be cleaned if sediment reaches half the design depth.

3. Sediment forebay check dams shall be replaced if drawdown times within the sediment forebay exceed 48 hours following the storm event.

4. All sediments removed shall be disposed of at an approved and permitted location.

5. Vegetation shall not exceed 18" in height in the sediment forebays.

**Bioretention Area Inspection, Maintenance, and Repair Notes**

1. Following first 6 months after construction
    - Inspect bioretention area after first two rainfall events of 1" or more.

2. Following storm events with rainfall exceeding 2.8"
    - Inspect bioretention area for trash, debris, sediment, erosion, standing water, and overall performance. Defects shall be repaired by the Owner.

3. Bi-annually
    - Inspect bioretention area a minimum of two times per year, preferably once in April and October. Sediment shall be removed from bioretention area if the sediment exceeds 1".
    - Mow side slopes and bottom of bioretention area a minimum of two times per year.

4. Quarterly
    - Inspect bioretention area outlet control structure and all overflow channels. the Owner shall stabilize eroded banks and repair eroded areas at inflow and outflow structures as necessary.

5. If sediment build-up has limited the filtering capabilities to below the design rate or ponding has exceeded 48 hours the following shall be completed:
    - The top 6" of soil shall be removed and disposed at a permitted location.
    - The exposed surface shall be scarified.
    - The top 6" shall be restored to the original design specifications with a sandy loam topsoil.

6. Trash and debris shall be removed from bioretention area as necessary.

**Tree Filter Inspection, Maintenance, and Repair Notes**

1. Following first 6 months after construction
    - Inspect tree filter after first two rainfall events of 1" or more.

2. Tree filter shall be inspected after every storm of 2.8" inch or greater for trash, debris, sediment, erosion, standing water, and overall performance. Defects shall be repaired by the owner.

3. Annually

- Remove accumulated sediment from the tree filter area annually in the spring or if sediment exceeds 1” in the filter area.
- Owner Shall re-mulch tree box filter ion spring every year

4. Quarterly
    - Remove accumulated sediment from the sediment forebay quarterly or if sediment reaches half the design depth or more.

5. If ponding exceeds 48 hours on the surface of the tree filter remove and replace discolored surface material.

6. If runoff takes more than 36 hours to flow from the sediment forebay to the tree filter, the spillway shall be replaced.

7. All sediments removed shall be disposed of at an approved and permitted location.

**Infiltration Basin Inspection, Maintenance, and Repair Notes**

1. Following first 6 months after construction
    - Inspect infiltration basin after first two rainfall events of 1" or more.

2. Following storm events with rainfall exceeding 2.8"
    - Inspect infiltration basin for trash, debris, sediment, erosion, standing water, and overall performance. Defects shall be repaired by the Owner.

3. Bi-annually
    - Inspect infiltration basin a minimum of two times per year, preferably in April and October. Sediment shall be removed from the top of the infiltration trench if the sediment exceeds 1".
    - Mow side slopes and bottom of infiltration basin a minimum of two times annually.

4. Quarterly
    - Inspect infiltration basin outlet control structure and all overflow channels. the owner shall stabilize eroded banks and repair eroded areas at inflow and outflow structures as necessary.

5. If sediment build-up has limited the infiltration capabilities to below the design rate or ponding has exceeded 48 hours the following shall be completed:
    - The top 6" of soil shall be removed and disposed at a permitted location.
    - The exposed surface shall be scarified.
    - The basin bottom shall be restored to the original design specifications with a sandy loam topsoil.
6. Trash and debris shall be removed from infiltration trench as necessary.

**Underground Detention System Inspection, Maintenance, and Repair Notes**

1. The system shall be maintained as recommended by the manufacturer.
2. Following storm events with rainfall exceeding 2.8"
    - Inspect detention system for trash, debris, sediment, erosion, standing water, and overall performance. Defects shall be repaired by the Owner.

3. Bi-annually
    - Inspections shall be performed a minimum of two times per year on the inspection ports and drainage structures of the underground detention system to ensure proper operation of the system.
4. The inlets at the UGDS-03 shall be inspected following storm events with rainfall exceeding 2.8". The inlet filter shall be inspected to remove trash or other debris. If the filter is damaged the filter shall be replaced. The filter shall be replaced every year to ensure the necessary stormwater capacity can enter the detention system.

**Detention Basin (With Infiltration) Inspection, Maintenance, and Repair Notes**

1. Bi-annually
    - Inspect basin a minimum of two times per year, preferably once in April and once in October.
    - Mow side slopes and bottom of basin a minimum of two times per year.
    - Removed accumulated sediment from the detention basin two time per year, preferably in late spring and early fall, or if sediment exceeds 1" in the detention basin

2. Owner shall stabilize eroded banks and repair eroded areas at inflow and outflow structures as necessary.

3. Trash and debris shall be removed from detention basin as necessary.

4. If ponding has exceeded 48 hours the following shall be completed:
    - The top 6" of soil shall be removed and disposed at a permitted location.
    - The exposed surface shall be scarified.
    - The basin bottom shall be restored to the original design specifications with a sandy loam topsoil.

**Qualifying Pervious Area Inspection, Maintenance, and Repair Notes**

1. The QPA's must be inspected a minimum of two times per year for sediment, ponding, erosion, and vegetation.

2. Remove accumulated sediment from the QPA's if sediment exceeds 1".

3. Owner shall repair any slopes that have been damaged due to erosion or other means. Owner shall replace any vegetation that has died or been damaged.

4. Owner shall mow grass within the QPA a minimum of two times per year to maintain a minimum grass height of 6".

5. Trash and debris shall be removed from the QPA's as necessary.

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**Pollution Prevention and Source Controls**

In addition, the following site specific controls and performance procedures shall be followed. From *Appendix G: Pollution Prevention and Source Controls* from the *Rhode Island Stormwater Design and Installation Standards Manual* (See Attachment).

G.2 General Pollution Prevention Design Features

An inspection and maintenance schedule shall be developed by the owner to prevent trash and debris from backing up the stormwater management system.

G.3 Solid Waste Containment

Trash and recycling receptacles will be placed throughout the site.

G.4 Roads and Parking Area Management

Snow shall not be dumped and/or stored in the water quality best management practices.

*G.4.1 Street and Parking Lot Sweeping*

The roads shall be swept to remove sediment and debris.

*G.4.2 Deicing and Salt Storage*

Deicing and sanding materials create water quality problems. Refer to Table G-1 in the Appendix when selecting a deicer. All deicing materials shall be stored under cover.

*G 4.3 Snow Disposal*

Snow shall not be dumped and/or stored in the stormwater BMPS.

*G.4.4 Driveway and Parking Lot Sealants*

DEM recommends asphalt based sealant rather coal-tar based sealants to be used on driveways and parking lots

G.5 Hazardous Materials Containment

Stormwater shall be prevented from entering areas with hazardous materials to the maximum extent feasible. Spill containment is provided in areas where a spill might occur.

G.6 Lawn, Garden and Landscape Management

No lawn fertilizer shall be used on-site. Low-impact pest management strategies shall be implemented whenever damage is detected or harmful organisms are present.

## APPENDIX A

Maintenance Agreement
Appendix G:  Pollution Prevention and Spill Controls
BMP, Maintenance and Management Inspection Checklist
OM – 1 Operation and Maintenance Plan (11” x 17”)

Maintenance Agreement

The Maintenance Agreement below is taken from Appendix E of the Rhode Island Department of Environmental Management's Rhode Island Stormwater Design and Installation Standards Manual Dated December 2010. This agreement shall be reviewed by an attorney prior to being signed and made a legal document.

THIS AGREEMENT, made and entered into this ___ day of _____, 20___, by and between (Insert Full Name of Owner)
_____ hereinafter called the "Landowner", and the State of Rhode Island, hereinafter called the RIDEM
WITNESSETH, that WHEREAS, the Landowner is the owner of certain real property described as (Tax Map/Parcel Identification Number) _____ as recorded by deed in the land records of State of Rhode Island Deed Book _____Page _____, hereinafter called the "Property".

WHEREAS, the Landowner is proceeding to build on and develop the property; and WHEREAS, the Site Plan/Subdivision Plan known as **Rosebrook Commons,** hereinafter called the "Plan", which is expressly made a part hereof, as approved or to be approved by the RIDEM, provides for detention of stormwater within the confines of the property; and WHEREAS, the RIDEM and the Landowner, its successors and assigns, including any homeowners association, agree that the health, safety, and welfare of the residents of State of Rhode Island require that on-site stormwater management facilities be constructed and maintained on the Property; and WHEREAS, the RIDEM requires that on-site stormwater management facilities as shown on the Plan be constructed and adequately maintained by the Landowner, its successors and assigns, including any homeowners association.

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The on-site stormwater management facilities shall be constructed by the Landowner, its successors and assigns, in accordance with the plans and specifications identified in the Plan.

2. The Landowner, its successors and assigns, including any homeowners association, shall adequately maintain the stormwater management facilities in accordance with the required Operation and Maintenance Plan. This includes all pipes, channels or other conveyances built to convey stormwater to the facility, as well as all structures, improvements, and vegetation provided to control the quantity and quality of the stormwater. Adequate maintenance is herein defined as good working condition so that these facilities are performing their design functions. The Stormwater Best Management Practices Operation, Maintenance and Management Checklists are to be used to establish what good working condition is acceptable to the RIDEM.

3. The Landowner, its successors and assigns, shall inspect the stormwater management facility and submit an inspection report annually. The purpose of the inspection is to assure safe and proper functioning of the facilities. The inspection shall cover the entire facilities, berms, outlet structure, basin areas, access roads, etc. Deficiencies shall be noted in the inspection report.

4. The Landowner, its successors and assigns, hereby grant permission to the RIDEM, its authorized agents and employees, to enter upon the Property and to inspect the stormwater management facilities whenever the RIDEM deems necessary. The purpose of inspection is to follow-up on reported deficiencies and/or to respond to citizen complaints. The RIDEM shall provide the Landowner, its successors and assigns, copies of the inspection findings and a directive to commence with the repairs if necessary.

5. In the event the Landowner, its successors and assigns, fails to maintain the stormwater management facilities in good working condition acceptable to the RIDEM, the RIDEM may enter upon the Property and take whatever steps necessary to correct deficiencies identified in the inspection report and to charge the costs of such repairs to the Landowner, its successors and assigns. This provision shall not be construed to allow the RIDEM to erect any structure of permanent nature on the land of the Landowner outside of the easement for the stormwater management facilities. It is expressly understood and agreed that the RIDEM is under no obligation to routinely maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the RIDEM.

6. The Landowner, its successors and assigns, will perform the work necessary to keep these facilities in good working order as appropriate. In the event a maintenance schedule for the stormwater management facilities (including sediment removal) is outlined on the approved plans, the schedule will be followed.

7. In the event the RIDEM pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner, its successors and assigns, shall reimburse the RIDEM upon demand, within thirty (30) days of receipt thereof for all actual costs incurred by the RIDEM hereunder.

8. This Agreement imposes no liability of any kind whatsoever on the RIDEM and the Landowner agrees to hold the RIDEM harmless from any liability in the event the stormwater management facilities fail to operate properly.

9. This Agreement shall be recorded among the land records of State of Rhode Island and shall constitute a covenant running with the land, and shall be binding on the Landowner, its administrators, executors, assigns, heirs and any other successors in interests, including any homeowners association.

WITNESS the following signatures and seals:

_____
Company/Corporation/Partnership Name (Seal)

By: _____

_____
(Type Name and Title)
The foregoing Agreement was acknowledged before me this ____ day of _____, 20___, by _____.

_____
NOTARY PUBLIC
My Commission Expires: _____

By: _____

_____
(Type Name and Title)
The foregoing Agreement was acknowledged before me this ____ day of _____, 20___, by _____.

_____
NOTARY PUBLIC
My Commission Expires: _____

Approved as to Form:

_____ _____
RIDEM Attorney Date

# APPENDIX G: POLLUTION PREVENTION AND SOURCE CONTROLS

## G.1 OVERVIEW

Pollution prevention techniques must, to the extent practicable, be incorporated into all site designs, especially at commercial and light industrial sites, to minimize the potential impact those activities may have on stormwater runoff quality. Preventative source controls must also be applied in residential development, particularly in preventing floatables (trash and debris) from entering storm sewer drainage systems.

## G.2 GENERAL POLLUTION PREVENTION DESIGN FEATURES

Inlets to stormwater management systems should incorporate trash racks wherever practicable. Storm drain marking (e.g., stenciling) to discourage dumping must also be provided at each inlet. Maintenance plans must include a schedule for regular maintenance and inspection of trash racks.

## G.3 SOLID WASTE CONTAINMENT

Proper containment of solid waste will prevent it from entering drainage systems and polluting waterways. At a minimum, apply the following pollution prevention practices:

- Trash and recycling receptacles must be provided with regular collection at all sites;
- Industrial and commercial sites must include regular street sweeping (at least annually) in their maintenance plans; and
- Pet waste stations that provide bags and waste containers are recommended at all residential developments and must be provided at multiunit dwellings, such as apartments, town houses, and condominiums.

## G.4 ROADS AND PARKING AREA MANAGEMENT

Roads and parking areas constitute a large portion of Rhode Island's impervious surfaces and are often directly connected to storm drain systems. These impervious areas contribute relatively high concentrations of a wide variety of pollutants, including sediment, nutrients, metals, and volatile organic compounds (VOCs), among other constituents. The discussion below addresses guidance requirements related to road and parking area management:

### G.4.1 Street and Parking Lot Sweeping

Street sweeping helps to remove sediment and debris from paved surfaces, reducing potential pollutant transport to waterbodies. Street and parking lot sweeping may also reduce the need for maintenance of pretreatment devices, such catch basins and forebays that precede WVTSs or bioretention areas.

Street sweeping is a requirement for municipalities pursuant to Phase II of the RIPDES Stormwater Regulations and is also recommended for private entities. Currently, available street sweeping technology is not considered to meet the water quality treatment standard and should not be relied on for TSS removal, but does help as a pretreatment practice.

Debris collected from some streets and parking lots (e.g., LUHPPLs) may be regulated as a hazardous waste. For these cases, debris must be disposed of in accordance with appropriate practice and applicable regulatory standards. Appendix A of the *Rules and Regulations for Composting Facilities and Solid Waste Management Facilities,* which is entitled "Management of Street Sweepings in Rhode Island," should be reviewed. For further information, contact the DEM Office of Waste Management.

### G.4.2 Deicing and Salt Storage

Deicing and sanding operations are often necessary for safety during winter storms; however, the materials used create water quality problems. Use deicing chemicals and sand judiciously. Consider the information in Table G-1 when selecting a deicer.

**Table G-1 Comparison of Environmental Effects of Common Roadway Deicers**

| Media | Sodium Chloride ($NaCl$) | Calcium Chloride ($CaCl_2$) | Calcium magnesium acetate (CMA) ($CaMgC_2H_3O_2$) | Sand ($SiO_2$) |
|---|---|---|---|---|
| Soils | Cl complexes release heavy metals; Na can breakdown soil structure and reduce permeability | Ca can exchange with heavy metals, increase soil aeration and permeability. | Ca and Mg can exchange with heavy metals. | Gradually will accumulate on soil. |
| Vegetation | Salt spray/splash can cause leaf scorch and browning or dieback of new plant growth up to 50 feet from road; osmotic stress can result from salt uptake; grass is more tolerant than trees and woody plants. | | Little effect. | Accumulates on and around low vegetation. |
| Groundwater | Mobile Na and Cl ions readily reach groundwater, and concentration levels can temporarily increase in areas of low flow during spring thaws. Ca and Mg can release heavy metals from soil. | | | No known effect. |
| Surface Water | Can cause density stratification in small lakes having closed basins, potentially leading to anoxia in lake bottoms; often contain nitrogen, phosphorus, and trace metals as impurities, often in concentrations greater than 5 ppm. | | Depletes dissolved oxygen in small lakes and streams when degrading. | Accumulated sand alters stream geometry and habitat |

| Media | Sodium Chloride (NaCl) | Calcium Chloride ($CaCl_2$) | Calcium magnesium acetate (CMA) ($CaMgC_2H_3O_2$) | Sand ($SiO_2$) |
|---|---|---|---|---|
| Aquatic Biota | Little effect in large or flowing bodies at current road salting amounts; small streams that are end points for runoff can receive harmful concentrations of Cl; Cl from NaCl generally not toxic until it reaches levels of 1,000-36,000 ppm. | | Can cause oxygen depletion. | Accumulation of particles to stream bottoms degrades habitat, clogs gills. |

Source: Adapted from Ohrel, 2000

Sand and deicing chemicals should be stored under cover so as to prevent their exposure to stormwater; the DEM Groundwater Quality Rules require that deicer materials be covered in areas where the groundwater is classified GAA or GA. Table G-2 provides recommendations appropriate for storage and use of deicers. Storage of these materials may be regulated as an industrial activity. Contact DEM's Stormwater Program in the Office of Water Resources for further information.

**Table G-2 Recommendations to Reduce Deicer Impacts**

| Activity | Recommendation |
|---|---|
| Storage | • Salt storage piles should be completely covered, ideally by a roof, and at a minimum, by a weighted tarp, and stored on impervious surfaces. The DEM Groundwater Quality Rules require that deicer materials be covered in areas where the groundwater is classified GAA or GA.<br>• Runoff should be contained in appropriate areas.<br>• Spills should be cleaned up after loading operations. The material may be directed to a sand pile or returned to salt piles.<br>• Avoid storage in drinking water supply areas, water supply aquifer recharge areas, and public wellhead protection areas. |
| Application | • Application rate of deicing materials should be tailored to road conditions (i.e., high versus low volume roads).<br>• Trucks should be equipped with sensors that automatically control the deicer spread rate.<br>• Drivers and handlers of salt and other deicers should receive training to improve efficiency, reduce losses, and raise awareness of environmental impacts. |

| Activity | Recommendation |
|---|---|
| Other | • Identify ecosystems such as wetlands that may be sensitive to salt.<br>• Use calcium chloride and CMA in sensitive ecosystem areas.<br>• To avoid over-application and excessive expense, choose deicing agents that perform most efficiently according to pavement temperature.<br>• Monitor the deicer market for new products and technology. |

Source: Adapted from Ohrel, 2000.

### G.4.3 Snow Disposal

Improper snow disposal can be a threat to public health and the environment. Disposal should consider site selection, site preparation and maintenance, and emergency snow disposal locations and procedures. Refer to DEM's Snow Disposal Policy for more details on these topics, which are summarized below.

#### G.4.3.1 Site Selection

The key to selecting effective snow disposal sites is to locate them adjacent to or on pervious surfaces in upland areas away from water resources and wells. At these locations, snow meltwater can filter in to the soil, leaving behind sand and debris, which can be removed in the springtime. When selecting a site for snow disposal, adhere to the following guidelines:

- Avoid dumping snow into any waterbody, including rivers, reservoirs, ponds, lakes, wetlands, bays, or the ocean. In addition to water quality impacts and flooding, snow disposed of in open water can cause navigational hazards when it freezes.
- Do not dump snow within a Wellhead Protection Area (WHPA) of a public water supply well, or within 200 feet of a private well, where road salt may contaminate water supplies.
- Avoid dumping snow in sanitary landfills and gravel pits. Snow meltwater will create more contaminated leachate in landfills posing a greater risk to groundwater. In gravel pits, there is little opportunity for pollutants to be filtered out of the meltwater because groundwater is close to the land surface.
- Avoid disposing of snow on top of storm drain catch basins or in stormwater drainage swales or ditches. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. In addition, a high volume of sand, sediment, and litter released from melting snow may be quickly transported through the drainage system into surface water.

### G.4.3.2 Site Selection Procedures

It is important that the municipal Department of Public Works or Highway Department, and other appropriate municipal offices work together to select appropriate snow disposal sites. The following steps should be taken:

- Estimate how much snow disposal capacity is needed for the season so that an adequate number of disposal sites can be selected and prepared;
- Identify sites that could potentially be used for snow disposal such as municipal open space (e.g., parking lots or parks);
- Sites located in upland locations that are not likely to impact sensitive environmental resources should be selected first; and
- If more storage space is needed, prioritize the sites with the least environmental impact (using the site selection criteria and the online Environmental Resource Map as a guide).

**Environmental Resource Map**

An interactive map containing a wide variety of GIS data layers of interest to local planning or zoning board members, consultants, or anyone else needing a general mapping of soils, wetlands, land use patterns, regulatory overlay districts and other environmental information can be accessed via the internet at the following address: http://www.state.ri.us/dem/maps/index.htm.

This interactive map can be used to identify publicly owned open spaces and approximate locations of sensitive environmental resources (locations should be field verified where possible).

### G.4.3.3 Site Preparation and Maintenance

In addition to carefully selecting disposal sites before the winter begins, it is important to prepare and maintain these sites to maximize their effectiveness. The following maintenance measures should be undertaken for all snow disposal sites:

- A silt fence or equivalent barrier should be placed securely on the down-gradient side of the snow disposal site;
- To filter pollutants out of the meltwater, a 50-foot vegetative buffer strip should be maintained during the growth season between the disposal site and adjacent waterbodies;
- Debris should be cleared from the site prior to using the site for snow disposal; and
- Debris should be cleared from the site and properly disposed of at the end of the snow season.

### G.4.3.4 Emergency Snow Disposal

Under normal winter conditions, storage, and disposal of snow should be done

exclusively in upland areas, not in or adjacent to waterbodies or wetlands. However, under extraordinary conditions when upland snow storage options are exhausted, it may be necessary to dispose of snow near or in certain waterbodies. The following guidance does not constitute a Clean Water Act permit for such disposal. However, in an emergency situation, DEM is unlikely to pursue an enforcement action for snow disposal by governmental entities into or near certain waters if conducted in accordance with the conditions identified below.

As mentioned earlier, it is important to estimate the amount of snow disposal capacity you will need so that an adequate number of upland disposal sites can be selected and prepared. If despite your planning, designated upland disposal sites have been exhausted, snow may be disposed of at other locations that meet the criteria in Section G.4.3.2.

Under extraordinary conditions, when all upland snow disposal options are exhausted, disposal of snow that is not obviously contaminated with road salt, sand, and other pollutants may be allowed near (within 50 feet of) or in certain waterbodies under certain conditions. In these dire situations, notify the DEM – Office of Water Resources, RIPDES Program at 222-4700 (or 222-3070 after normal business hours) before disposing of snow in a waterbody. If upland disposal is not available, and snow needs to be removed/relocated for safety reasons, then as a last resort waterways may be used in accordance with the following conditions:

- Dispose of snow in open water with adequate flow and mixing to prevent ice dams from forming;
- Do not dispose of snow in coastal or freshwater wetlands, eelgrass beds, vegetated shallows, vernal pools, shellfish beds, mudflats, outstanding resource waters, drinking water reservoirs and their tributaries, Wellhead Protection Areas (WHPAs), or other areas designated by the State as being environmentally sensitive;
- In coastal communities, preference should be given to disposal in salt water if it is available;
- Do not dispose of snow where trucks may cause shoreline damage or streambank damage or erosion; and
- Consult with appropriate municipal officials to ensure that snow disposal in water complies with local ordinances and bylaws.

### G.4.4 Driveway and Parking Lot Sealants

Driveway and parking lot sealants are a major source of polycyclic aromatic hydrocarbons (PAHs) in our environment. There are two types of sealant: asphalt based and coal-tar based. Both types of sealant contain PAHs, but the coal-tar based sealants have a far higher concentration of PAHs (as much as 70 times higher than asphalt based). As the sealants wear down, small particles of sealant are washed off by stormwater into surface waters. PAHs have been found to be toxic to aquatic life, with bottom dwelling organisms most at risk since PAHs tend to attach to sediment

rather than dissolve in water. Also, in recognition of the human health effects of PAHs, DEM has adopted the US EPA water column human health criteria for PAHs in the DEM Water Quality Regulations. Because of the high concentrations of PAHs in coal-tar based sealants, DEM recommends that coal-tar based sealants not be used. For more information, see: US Geological Survey Fact Sheet 2005-3147, "Parking Lot Sealcoat: A Major Source of Polycyclic Aromatic Hydrocarbons (PAHs) in Urban and Suburban Environments."

## G.5 Hazardous Materials Containment

As applicable, project proponents must provide a completed Stormwater Pollution Prevention Plan in accordance with the Rhode Island Pollution Discharge Elimination System Regulations. At a minimum, the following practices should be incorporated as part of site design:

- Site designs must incorporate adequate indoor storage of hazardous materials as the primary method for preventing problems related to stormwater;
- Diversion through devices such as curbing and berms should be incorporated wherever stormwater has the potential to runoff into hazardous materials storage areas; and
- Secondary containment must be included wherever spills might occur (e.g., fueling and hazardous materials transfer and loading areas). Oil/grit separators and other manufactured treatment devices may temporarily contain certain spills and contaminated stormwater. However, these devices should be used as backup for tighter containment practices.

## G.6 Septic System Management

Approximately one-third of Rhode Islanders use some form of onsite wastewater treatment system (i.e., septic system, cesspool, etc.). When septic systems fail, they may become a major source of pollution to surface and groundwater. Discharge from failed systems is often carried to surface water via stormwater runoff. Stormwater management plans must discuss appropriate operation and management for all onsite wastewater treatment systems (OWTSs) on the project site. Use of regular inspections in accordance with the procedures of *Septic System Checkup: The Rhode Island Manual for Inspections* is recommended.

## G.7 Lawn, Garden, and Landscape Management

Lawns are a significant feature of urban landscapes. Estimates of turf and lawn coverage in the United States are as high as 30 million acres, which, if lawns were classified as a crop, would rank as the fifth largest in the country after corn, soybeans, wheat, and hay (Swann and Schueler, 2000). This large area of managed landscape has the potential to contribute to urban runoff pollution due to overfertilization, overwatering, overapplication of pesticides, and direct disposal of lawn clippings, leaves, and trimmings. Also, erosion from bare patches of poorly managed lawns

contribute sediment to watercourses, and disposal of lawn clippings in landfills can reduce the capacity of these facilities to handle other types of waste.

The following standards for grounds management must be incorporated into stormwater management plans:

**Lawn conversion** - Grasses require more water and attention than alternative groundcovers, flowers, shrubs, or trees. Alternatives to turf are especially recommended for problem areas such as lawn edges, frost pockets, shady spots, steep slopes, and soggy areas. Vegetation that is best suited to the local conditions should be selected.

**Soil building** - Grounds operation and maintenance should incorporate soil evaluation every 1 to 3 years to determine suitability for supporting a lawn, and to determine how to optimize growing conditions. Consider testing soil characteristics such as pH, fertility, compaction, texture, and earthworm content.

**Grass selection** - Grass seed is available in a wide range of cultivated varieties, so homeowners, landscapers, and grounds managers are able to choose the grass type that grows well in their particular climate, matches site conditions, and is consistent with the property owner's desired level of maintenance. When choosing ground cover, consideration should be given to seasonal variations in rainfall and temperature. Table G-3 lists turfgrass types and their level of tolerance to drought:

**Table G-3 Drought Tolerance of Turfgrass Types**

| Turfgrass Type | Drought Tolerance |
|---|---|
| Fine-leaved Fescues<br>Tall Fescue<br>Kentucky Bluegrass<br>Perennial Ryegrass<br>Bentgrasses | High<br>↓<br>Low |

**Mowing and thatch management** - To prevent insects and weed problems, property owners should mow high, mow frequently, and keep mower blades sharp. Lawns should not be cut shorter than 2 to 3 inches, because weeds can grow more easily in short grasses. Grass can be cut lower in the spring and fall to stimulate root growth, but not shorter than 1 ½ inches.

**Fertilization** - If fertilizing is desired, consider the following points:

- Most lawns require little or no fertilizer to remain healthy. Fertilize no more than twice a year - once in May-June, and once in September-October;
- Fertilizers are rated on their labeling by three numbers (e.g., 10-10-10 or

12-4-8), which refer to their Nitrogen (N) – Phosphorus (P) – Potassium (K) concentrations. Fertilize at a rate of no more than ½ pound of nitrogen per 1000 square feet, which can be determined by dividing 50 by the percentage of nitrogen in the fertilizer;

- Apply fertilizer carefully to avoid spreading on impervious surfaces such as paved walkways, patios, driveways, etc., where the nutrient can be easily washed into stormdrains or directly into surface waters;
- To encourage more complete uptake, use slow-release fertilizers that is those that contain 50 percent or more water-insoluble nitrogen (WIN);
- Grass blades retain 30-40 percent of nutrients applied in fertilizers. Reduce fertilizer applications by 30 percent, or eliminate the spring application of fertilizer and leave clippings on the lawn where they will degrade and release stored nutrients back to the soil; and
- Fertilizer should not be applied when rain is expected. Not only does the rain decrease fertilizer effectiveness, it also increases the risk of surface and ground water contamination.

**Weed management** - A property owner must decide how many weeds can be tolerated before action is taken to eradicate them. To the extent practicable, weeds should be dug or pulled out. If patches of weeds are present, they can be covered for a few days with a black plastic sheet; a technique called solarization. Solarization kills the weeds while leaving the grass intact. If weeds blanket a large enough area, the patch can be covered with clear plastic for several weeks, effectively "cooking" the weeds and their seeds. The bare area left behind after weeding should be reseeded to prevent weeds from growing back. As a last resort, homeowners can use chemical herbicides to spot-treat weeds.

**Pest management** - Effective pest management begins with maintenance of a healthy, vigorous lawn that is naturally disease resistant. Property owners should monitor plants for obvious damage and check for the presence of pest organisms. Learn to distinguish beneficial insects and arachnids, such as green lacewings, ladybugs, and most spiders, from ones that will damage plants.

When damage is detected or when harmful organisms are present, property owners should determine the level of damage the plant is able to tolerate. No action should be taken if the plant can maintain growth and fertility. If controls are needed, there are a variety of low-impact pest management controls and practices to choose from, including the following:

- Visible insects can be removed by hand (with gloves or tweezers) and placed in soapy water or vegetable oil. Alternatively, insects can be sprayed off a plant with water, or in some cases vacuumed off of larger plants;
- Store-bought traps, such as species-specific, pheromone-based traps or colored sticky cards, can be used;

- Sprinkling the ground surface with abrasive diatomaceous earth can prevent infestations by soft-bodied insects and slugs. Slugs can also be trapped by falling or crawling into small cups set in the ground flush with the surface and filled with beer;
- In cases where microscopic parasites, such as bacteria and fungi, are causing damage to plants, the affected plant material can be removed and disposed of. (Pruning equipment should be disinfected with bleach to prevent spreading the disease organism);
- Small mammals and birds can be excluded using fences, netting, tree trunk guards, and, as a last resort, trapping. (In some areas trapping is illegal. Property owners should check local codes if this type of action is desired); and
- Property owners can encourage/attract beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seedhead weevils, and spiders that prey on detrimental pest species. These desirable organisms can be introduced directly or can be attracted to the area by providing food and/or habitat.

If chemical pesticides are used, property owners should try to select the least toxic, water soluble, and volatile pesticides possible. All selected pesticides should be screened for their potential to harm water resources. Although organophosphate pesticides, such as diazinon and chlorpyrifos, are popular because they target a broad range of pests and are less expensive than newer, less toxic pesticides, they rank among the worst killers of wildlife, and often pose the greatest health risk. Synthetic pyrethroids are more selective, and typically much less toxic than organophosphates, yet they can harm beneficial insects. When possible, pesticides that pose the least risk to human health and the environment should be chosen. A list of popular pesticides, along with their uses, their toxicity to humans and wildlife, EPA's toxicity rating, and alternatives to the listed chemicals, is available from *The Audubon Guide to Home Pesticides*, (http://www.audubon.org/bird/pesticides/).

**Sensible irrigation** - Most New England lawns will survive without irrigation. Grasses will normally go dormant in warm, dry periods (June-September) and resume growth when moister is more plentiful. However, if watering is desired, consider the following points:

Established lawns need no more than one inch of water per week (including precipitation) to prevent dormancy in dry periods. Watering at this rate should wet soil to approximately 4-6 inches and will encourage analogous root growth. If possible, use timers to water before 9:00 a.m., preferably in the early morning to avoid evaporative loss. Use drought-resistant grasses (see "grass selection" above) and cut grass at 2-3 inches to encourage deeper rooting and heartier lawns.

## Infiltration System Operation, Maintenance, and Management Inspection Checklist

Project:

Location:

Site Status:

Date:

Time:

Inspector:

| MAINTENANCE ITEM | SATISFACTORY / UNSATISFACTORY | COMMENTS |
|---|---|---|
| 1. Debris Cleanout (Annual) | | |
| Trench/chamber or basin surface clear of debris | | |
| Inflow pipes clear of debris | | |
| Overflow spillway clear of debris | | |
| Inlet area clear of debris | | |
| 2. Sediment Traps or Forebays (Annual) | | |
| Obviously trapping sediment | | |
| Greater than 50% of storage volume remaining | | |
| 3. Dewatering (Annual) | | |
| Trench/chamber or basin dewaters between storms | | |
| 4. Sediment Cleanout of Trench/Chamber or Basin (Annual) | | |

| MAINTENANCE ITEM | SATISFACTORY / UNSATISFACTORY | COMMENTS |
|---|---|---|
| No evidence of sedimentation in trench/chamber or basin | | |
| Sediment accumulation doesn't yet require cleanout | | |
| 5. Inlets (Annual) | | |
| Good condition | | |
| No evidence of erosion | | |
| 6. Outlet/Overflow Spillway (Annual) | | |
| Good condition, no need for repair | | |
| No evidence of erosion | | |
| 7. Aggregate Repairs (Annual) | | |
| Surface of aggregate clean | | |
| Top layer of stone does not need replacement | | |
| Trench/Chamber or basin does not need rehabilitation | | |

Comments:

Actions to be Taken:

## Bioretention Operation, Maintenance, and Management Inspection Checklist

Project:

Location:

Site Status:

Date:

Time:

Inspector:

| MAINTENANCE ITEM | SATISFACTORY / UNSATISFACTORY | COMMENTS |
|---|---|---|
| 1. Debris Cleanout (Annual, After Major Storms) | | |
| Bioretention and contributing areas clean of debris | | |
| No dumping of yard wastes into practice | | |
| Litter (branches, etc.) have been removed | | |
| 2. Vegetation (Annual, After Major Storms) | | |
| Plant height not less than design water depth | | |
| Fertilized per specifications | | |
| Plant composition according to approved plans | | |
| No placement of inappropriate plants | | |
| Grass height not greater than 10 inches | | |

| MAINTENANCE ITEM | SATISFACTORY / UNSATISFACTORY | COMMENTS |
|---|---|---|
| No evidence of erosion | | |
| 3. Check Dams/Energy Dissipaters/Sumps (Annual, After Major Storms) | | |
| No evidence of sediment buildup | | |
| Sumps should not be more than 50% full of sediment | | |
| No evidence of erosion at downstream toe of drop structure | | |
| 4. Dewatering (Semi-annually) | | |
| Dewaters between storms | | |
| No evidence of standing water | | |
| 5. Sediment Deposition (Annual, after Major Storms) | | |
| Swale clean of sediments | | |
| Sediments should not be > 20% of swale design depth | | |
| 6. Outlet/Overflow Spillway (Annual, After Major Storms) | | |
| Good condition, no need for repair | | |
| No evidence of erosion | | |
| No evidence of any blockages | | |
| 7. Integrity of Filter Bed (Annual, After Major Storms) | | |
| Filter bed has not been blocked or filled inappropriately | | |

Comments:

Actions to be Taken:

## Tree Box Filter Operation, Maintenance, and Management Inspection Checklist

Project:

Location:

Site Status:

Date:

Time:

Inspector:

| MAINTENANCE ITEM | SATISFACTORY / UNSATISFACTORY | COMMENTS |
|---|---|---|
| 1. Debris Cleanout (Annual, After Major Storms) | | |
| Tree Box Filter and contributing areas clean of debris | | |
| No dumping of yard wastes into practice | | |
| Litter (branches, etc.) have been removed | | |
| 2. Vegetation (Annual, After Major Storms) | | |
| Plant height not less than design water depth | | |
| Fertilized per specifications | | |
| Plant composition according to approved plans | | |
| No placement of inappropriate plants | | |
| Grass height not greater than 10 inches | | |

| MAINTENANCE ITEM | SATISFACTORY / UNSATISFACTORY | COMMENTS |
|---|---|---|
| No evidence of erosion | | |
| 3. Check Dams/Energy Dissipaters/Sumps (Annual, After Major Storms) | | |
| No evidence of sediment buildup | | |
| Sumps should not be more than 50% full of sediment | | |
| No evidence of erosion at downstream toe of drop structure | | |
| 4. Dewatering (Semi-annually) | | |
| Dewaters between storms | | |
| No evidence of standing water | | |
| 5. Sediment Deposition (Annual, after Major Storms) | | |
| Swale clean of sediments | | |
| Sediments should not be > 20% of swale design depth | | |
| 6. Outlet/Overflow Spillway (Annual, After Major Storms) | | |
| Good condition, no need for repair | | |
| No evidence of erosion | | |
| No evidence of any blockages | | |
| 7. Integrity of Filter Bed (Annual, After Major Storms) | | |
| Filter bed has not been blocked or filled inappropriately | | |

Comments:

Actions to be Taken:

## STORMWATER MANAGEMENT SYSTEM INSPECTION AND MAINTENANCE NOTES

DURING CONSTRUCTION (CONTRACTOR'S RESPONSIBILITY)

1. THE CONTRACTOR SHALL REMOVE SEDIMENT AND DEBRIS FROM ALL CATCH BASINS, MANHOLES, AND THE DRAINAGE SYSTEM ON A ROUTINE BASIS, IMMEDIATELY FOLLOWING SITE STABILIZATION, AND PRIOR TO PROJECT COMPLETION AND ACCEPTANCE.
2. THE CLOSED DRAINAGE SYSTEM AND ASSOCIATED STRUCTURES SHALL BE CLEANED AND FLUSHED BY THE CONTRACTOR AT THE COMPLETION OF CONSTRUCTION, AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSPECTION AND MAINTENANCE OF THE DRAINAGE SYSTEM UNTIL ACCEPTANCE OF THE SYSTEM BY THE ENGINEER AND THE TOWN OF MIDDLETOWN. FOLLOWING ACCEPTANCE OF THE PROPOSED DRAINAGE SYSTEM, THE OWNER OF THE SITE SHALL BE RESPONSIBLE FOR THE LONG-TERM INSPECTION AND MAINTENANCE OF THE DRAINAGE SYSTEM.
3. ANY ACCUMULATION OF PONDING WATER IN AREAS WITHIN THE LIMITS OF DISTURBANCE, OTHER THAN DESIGNATED AREAS, SHALL BE REMOVED ACCORDINGLY AND PREVENTED IN THE FUTURE.

POST CONSTRUCTION (OWNER'S RESPONSIBILITY)

1. TRASH, LITTER, SEDIMENT AND OTHER DEBRIS SHALL BE REMOVED FROM ANY STORMWATER MANAGEMENT SYSTEM FACILITY (INCLUDING BUT NOT LIMITED TO AREA DRAINS, MANHOLES, INLET, OUTLET AND DIVERSION STRUCTURES, AND STORMWATER BEST MANAGEMENT PRACTICES (BMPs)) A MINIMUM OF TWO TIMES PER YEAR, PREFERABLY IN THE SPRING AND FALL.
2. THE PARKING LOT AND ENTRY DRIVE SHALL BE SWEPT BY THE OWNER AS EARLY AS POSSIBLE EVERY SPRING AND ONCE IN THE FALL TO REMOVE SEDIMENTS.
3. ALL CLEANING AND MAINTENANCE OF STORMWATER MANAGEMENT SYSTEMS POST-CONSTRUCTION SHALL BE THE RESPONSIBILITY OF THE OWNER.

## AREA DRAINS WITH SUMPS INSPECTION, MAINTENANCE, AND REPAIR NOTES

1. INSPECTIONS SHALL BE PERFORMED A MINIMUM OF TWO TIMES PER YEAR (SPRING/FALL). UNITS SHALL BE CLEANED ANNUALLY AND WHENEVER THE DEPTH OF SEDIMENT IS GREATER THAN OR EQUAL TO HALF THE SUMP DEPTH.
2. THE INLET GRATE SHALL NOT BE WELDED TO THE FRAME OR PAVED OVER SO THAT THE SUMP CAN BE EASILY INSPECTED AND MAINTAINED.
3. CARE SHALL BE TAKEN TO AVOID DAMAGING AND DISPLACING HOODS PLACED ON HOODED OUTLETS DURING CLEANING.

## SEDIMENT FOREBAY INSPECTION, MAINTENANCE, AND REPAIR NOTES

FOLLOWING CONSTRUCTION, THE COMPLETION OF THE INSPECTION AND MAINTENANCE REQUIREMENTS BELOW SHALL BE THE RESPONSIBILITY OF THE OWNER.

1. SEDIMENT FOREBAY SHALL BE INSPECTED A MINIMUM OF TWO TIMES PER YEAR AND AFTER EVERY STORM OF 2.8" INCH OR GREATER FOR TRASH, DEBRIS, SEDIMENT, EROSION, STANDING WATER, AND OVERALL PERFORMANCE. DEFECTS SHALL BE REPAIRED BY THE OWNER.
2. SEDIMENT FOREBAYS SHALL BE CLEANED IF SEDIMENT REACHES HALF THE DESIGN DEPTH.
3. SEDIMENT FOREBAY CHECK DAMS SHALL BE REPLACED IF DRAWDOWN TIMES WITHIN THE SEDIMENT FOREBAY EXCEED 48 HOURS FOLLOWING THE STORM EVENT.
4. ALL SEDIMENTS REMOVED SHALL BE DISPOSED OF AT AN APPROVED AND PERMITTED LOCATION.
5. VEGETATION SHALL NOT EXCEED 18" IN HEIGHT IN THE SEDIMENT FOREBAYS.

## BIORETENTION AREA INSPECTION, MAINTENANCE, AND REPAIR NOTES

1. FOLLOWING FIRST 6 MONTHS AFTER CONSTRUCTION
   - INSPECT BIORETENTION AREA AFTER FIRST TWO RAINFALL EVENTS OF 1" OR MORE.
2. FOLLOWING STORM EVENTS WITH RAINFALL EXCEEDING 2.8"
   - INSPECT BIORETENTION AREA FOR TRASH, DEBRIS, SEDIMENT, EROSION, STANDING WATER, AND OVERALL PERFORMANCE. DEFECTS SHALL BE REPAIRED BY OWNER.
3. BI-ANNUALLY
   - INSPECT BIORETENTION AREA A MINIMUM OF TWO TIMES PER YEAR, PREFERABLY IN APRIL AND OCTOBER. SEDIMENT SHALL BE REMOVED FROM BIORETENTION AREA IF THE SEDIMENT EXCEEDS 1"
   - MOW SIDE SLOPES AND BOTTOM OF BIORETENTION AREA A MINIMUM OF TWO TIMES PER YEAR.
4. QUARTERLY
   - INSPECT BIORETENTION AREA OUTLET CONTROL STRUCTURE AND ALL OVERFLOW CHANNELS. THE OWNER SHALL STABILIZE ERODED BANKS AND REPAIR ERODED AREAS AT INFLOW AND OUTFLOW STRUCTURES AS NECESSARY.
5. IF SEDIMENT BUILD-UP HAS LIMITED THE FILTERING CAPABILITIES TO BELOW THE DESIGN RATE OR PONDING HAS EXCEEDED 48 HOURS THE FOLLOWING SHALL BE COMPLETED:
   - THE TOP 6" OF SOIL SHALL BE REMOVED AND DISPOSED AT A PERMITTED LOCATION.
   - THE EXPOSED SURFACE SHALL BE SCARIFIED.
   - THE TOP 6" SHALL BE RESTORED TO THE ORIGINAL DESIGN SPECIFICATIONS WITH A SANDY LOAM TOPSOIL.
6. TRASH AND DEBRIS SHALL BE REMOVED FROM BIORETENTION AREA AS NECESSARY.

## UNDERGROUND DETENTION SYSTEM BASIN INSPECTION, MAINTENANCE, AND REPAIR NOTES

FOLLOWING CONSTRUCTION, THE COMPLETION OF THE INSPECTION AND MAINTENANCE REQUIREMENTS BELOW SHALL BE THE RESPONSIBILITY OF THE OWNER.

1. THE SYSTEM SHALL BE MAINTAINED AS RECOMMENDED BY THE MANUFACTURER.
2. FOLLOWING STORM EVENTS WITH RAINFALL EXCEEDING 2.8"
   - INSPECT INFILTRATION/DETENTION SYSTEM FOR TRASH, DEBRIS, SEDIMENT, EROSION, STANDING WATER, AND OVERALL PERFORMANCE. DEFECTS SHALL BE REPAIRED BY THE OWNER.
3. BI-ANNUALLY
   - INSPECTIONS SHALL BE PERFORMED A MINIMUM OF TWO TIMES PER YEAR ON THE INSPECTION PORTS AND DRAINAGE STRUCTURES OF THE UNDERGROUND DETENTION SYSTEM TO ENSURE PROPER OPERATION OF THE SYSTEM.

## DETENTION BASIN (WITH INFILTRATION) INSPECTION, MAINTENANCE, AND REPAIR NOTES

1. BI-ANNUALLY
   - INSPECT BASIN A MINIMUM OF TWO TIMES PER YEAR, ONCE IN APRIL AND ONCE IN OCTOBER.
   - MOW SIDESLOPES AND BOTTOM OF INFILTRATION BASIN A MINIMUM OF TWO TIMES PER YEAR.
   - REMOVED ACCUMULATED SEDIMENT FROM THE DETENTION BASIN TWO TIME PER YEAR, PREFERABLY IN LATE SPRING AND EARLY FALL, OR IF SEDIMENT EXCEEDS 1" IN THE DETENTION BASIN
3. OWNER SHALL STABILIZE ERODED BANKS AND REPAIR ERODED AREAS AT INFLOW AND OUTFLOW STRUCTURES AS NECESSARY.
4. TRASH AND DEBRIS SHALL BE REMOVED FROM DETENTION BASIN AS NECESSARY.
5. IF PONDING HAS EXCEEDED 48 HOURS THE FOLLOWING SHALL BE COMPLETED:
   - THE TOP 6" OF SOIL SHALL BE REMOVED AND DISPOSED AT A PERMITTED LOCATION.
   - THE EXPOSED SURFACE SHALL BE SCARIFIED.
   - THE BASIN BOTTOM SHALL BE RESTORED TO THE ORIGINAL DESIGN SPECIFICATIONS WITH A SANDY LOAM TOPSOIL.

## INFILTRATION BASIN INSPECTION, MAINTENANCE, AND REPAIR NOTES

1. FOLLOWING FIRST 6 MONTHS AFTER CONSTRUCTION
   - INSPECT INFILTRATION PRACTICES AFTER FIRST TWO RAINFALL EVENTS OF 1" OR MORE.
2. FOLLOWING STORM EVENTS WITH RAINFALL EXCEEDING 2.8"
   - INSPECT INFILTRATION BASIN FOR TRASH, DEBRIS, SEDIMENT, EROSION, STANDING WATER, AND OVERALL PERFORMANCE. DEFECTS SHALL BE REPAIRED BY OWNER.
3. BI-ANNUALLY
   - INSPECT INFILTRATION BASIN A MINIMUM OF TWO TIMES PER YEAR, PREFERABLY IN APRIL AND OCTOBER. SEDIMENT SHALL BE REMOVED FROM INFILTRATION BASIN IF THE SEDIMENT EXCEEDS 1".
   - MOW SIDESLOPES AND BOTTOM OF INFILTRATION BASIN A MINIMUM OF TWO TIMES PER YEAR.
4. QUARTERLY
   - INSPECT INFILTRATION BASIN OUTLET CONTROL STRUCTURE AND ALL OVERFLOW CHANNELS. THE OWNER SHALL STABILIZE ERODED BANKS AND REPAIR ERODED AREAS AT INFLOW AND OUTFLOW STRUCTURES AS NECESSARY
5. IF SEDIMENT BUILD-UP HAS LIMITED THE INFILTRATION CAPABILITIES TO BELOW THE DESIGN RATE OR PONDING HAS EXCEEDED 48 HOURS THE FOLLOWING SHALL BE COMPLETED:
   - THE TOP 6" OF SOIL SHALL BE REMOVED AND DISPOSED AT A PERMITTED LOCATION.
   - THE EXPOSED SURFACE SHALL BE SCARIFIED.
   - THE BASIN BOTTOM SHALL BE RESTORED TO THE ORIGINAL DESIGN SPECIFICATIONS WITH A SANDY LOAM TOPSOIL.
6. TRASH AND DEBRIS SHALL BE REMOVED FROM INFILTRATION BASIN AS NECESSARY.

## TREE BOX FILTER INSPECTION, MAINTENANCE, AND REPAIR NOTES

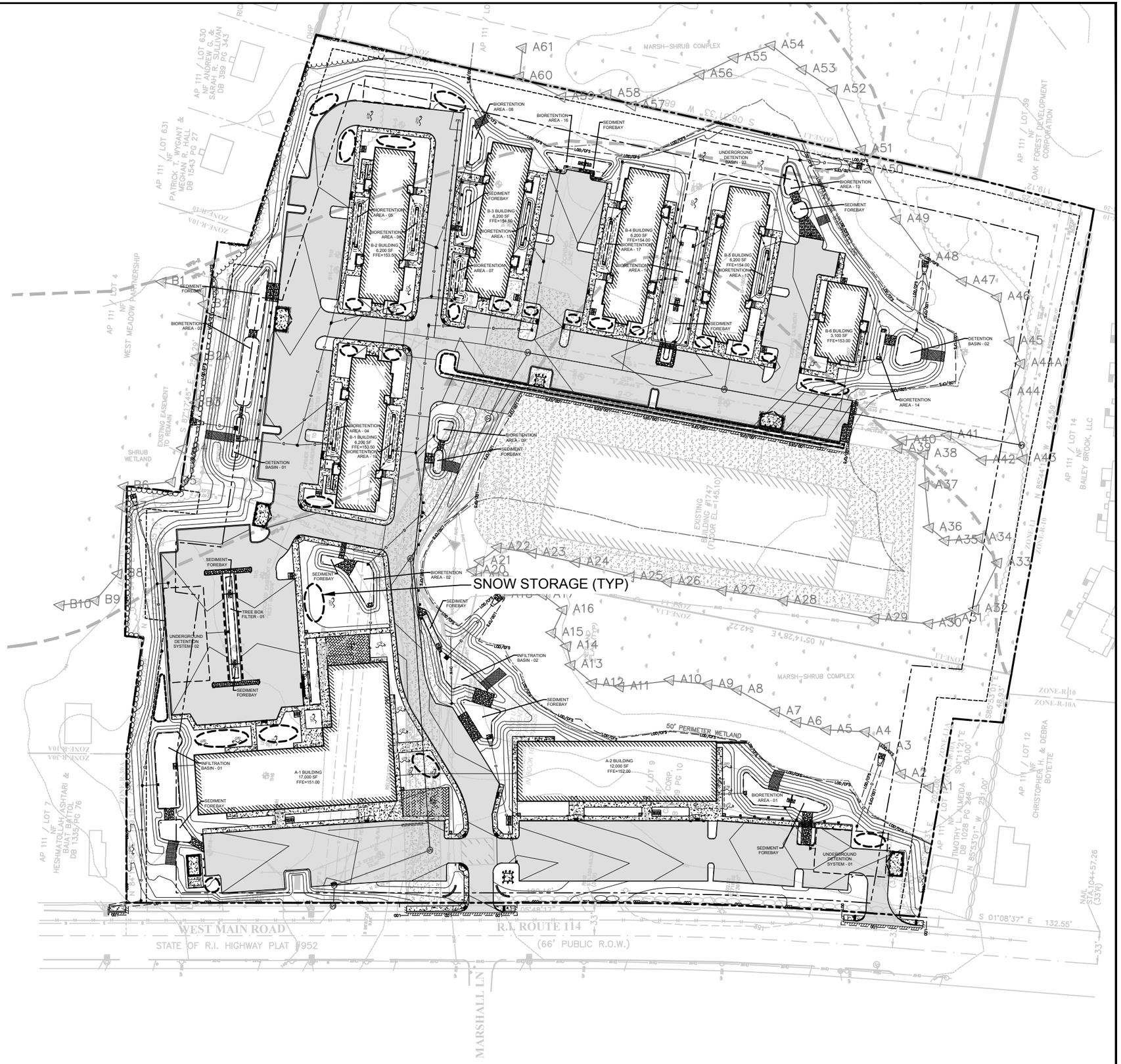
FOLLOWING CONSTRUCTION, THE COMPLETION OF THE INSPECTION AND MAINTENANCE REQUIREMENTS BELOW SHALL BE THE RESPONSIBILITY OF THE OWNER.

1. THE TREE BOX FILTER SHALL BE INSPECTED AFTER EVERY MAJOR STORM OF 2.8" OR GREATER FOR TRASH, DEBRIS, SEDIMENT, EROSION, STANDING WATER, AND OVERALL PERFORMANCE. DEFECTS SHALL BE REPAIRED BY THE OWNER.
2. OWNER SHALL RE-MULCH TREE BOX FILTERS IN SPRING EVERY YEAR.
3. REMOVE ACCUMULATED SEDIMENT FROM THE FILTER AREA ANNUALLY IN THE SPRING OR IF SEDIMENT EXCEEDS 1 INCH IN THE FILTER AREA. REMOVE ACCUMULATED SEDIMENT FROM THE SEDIMENT FOREBAY QUARTERLY OR IF SEDIMENT REACHES HALF THE DESIGN DEPTH OR MORE.
4. THE TREE BOX FILTERS SHALL BE INSPECTED AFTER THE FIRST TWO STORM EVENTS OF 1" OR MORE IN THE FIRST 6 MONTHS AFTER CONSTRUCTION.
5. IF PONDING EXCEEDS 48 HOURS, REMOVE AND REPLACE DISCOLORED SURFACE MATERIAL.
6. IF RUNOFF TAKES MORE THAN 36 HOURS TO FLOW FROM THE SEDIMENT FOREBAY TO THE TREE BOX FILTERS, THE SEDIMENT FOREBAY WITH WEIR SHALL BE CLEANED.

## QUALIFYING PERVIOUS AREA INSPECTION, MAINTENANCE, AND REPAIR NOTES

FOLLOWING CONSTRUCTION, THE COMPLETION OF THE INSPECTION AND MAINTENANCE REQUIREMENTS BELOW SHALL BE THE RESPONSIBILITY OF THE OWNER.

1. THE QUALIFYING PERVIOUS AREAS (QPA'S) MUST BE INSPECTED A MINIMUM OF TWO TIMES PER YEAR FOR SEDIMENT, PONDING, EROSION, AND VEGETATION.
2. REMOVE ACCUMULATED SEDIMENT FROM THE QPA'S IF SEDIMENT EXCEEDS 1".
3. OWNER SHALL REPAIR ANY SLOPES THAT HAVE BEEN DAMAGED DUE TO EROSION OR OTHER MEANS. OWNER SHALL REPLACE ANY VEGETATION THAT HAS DIED OR BEEN DAMAGED.
4. OWNER SHALL MOW GRASS WITHIN THE QPA A MINIMUM OF TWO TIMES ANNUALLY TO MAINTAIN A MINIMUM GRASS HEIGHT OF 6".
5. TRASH AND DEBRIS SHALL BE REMOVED FROM THE QPA'S AS NECESSARY.





PARE

PARE CORPORATION
ENGINEERS - SCIENTISTS - PLANNERS
8 BLACKSTONE VALLEY PLACE, LINCOLN, RI 02865, 401-334-4100
55 LINCOLN ROAD, SUITE 2-II, ROCHESTER, NH 03839, 508-542-2755


OWNER/APPLICANT:
MESOLELLA
DEVELOPMENT CORP.
4 FOX PLACE
PROVIDENCE, RI 02903

SCALE ADJUSTMENT GUIDE
0" 1"
BAR IS ONE INCH ON ORIGINAL DRAWING

# Rosebrook Commons
## Mixed Use Development
### AP 111, Lots 8 & 9
### 1747 West Main Road
### Middletown, Rhode Island

REVISIONS:

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| PROJECT NO.: | 13018.01 |
| DATE: | APRIL 8, 2022 |
| SCALE: | 1"=50' |
| DESIGNED BY: | ACB |
| CHECKED BY: | JW |
| DRAWN BY: | AKL |
| APPROVED BY: | VAH |

DRAWING TITLE:

OPERATION AND MAINTENANCE PLAN

DRAWING NO.:
OM-1

SHEET NO. ___ OF ___