



December 10, 2024

Stormwater System Operation & Maintenance

232 Tiogue Avenue & 0 Tiffany Rd. Coventry, RI

Assessors Plat 32, Lots 149, 150, 151, 153

Applicant:

Deblois Building Company
420 Scrabbletown Road, Suite G
North Kingstown, RI 02852





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Operation & Maintenance Plan Overview

An essential component of a successful Stormwater System (SS) is the ongoing Operation and Maintenance (O&M) of the various components of the stormwater drainage, control, and conveyance systems. These components include swales, pipes, catch basins, and treatment/ control devices are commonly referred to as Best Management Practices (BMPs). Failure to provide effective maintenance can reduce the hydraulic capacity and the pollutant removal efficiency of stormwater practices.

Many people expect that stormwater facilities will continue to function correctly forever. However, it is inevitable that deterioration of the stormwater system will occur once it becomes operational. The question is not whether stormwater system maintenance is necessary but how often.

This plan has been developed to proactively address operations and maintenance to minimize potential problems and maximize potential stormwater runoff treatment and management. Ongoing inspections and maintenance will extend the service life of the Best Management Practices.

This plan addresses:

1. Stormwater management system(s) owners;
2. The party or parties responsible for operation and maintenance, including how future property owners will be notified of the presence of the stormwater management system and the requirement for proper operation and maintenance;
3. A description and delineation of public safety features;
4. The routine (scheduled) and non-routine (corrective) maintenance tasks for each BMP to be undertaken after construction is complete and a schedule for implementing those tasks;
5. A plan that is drawn to scale and shows the location of all stormwater BMPs in each treatment train along with the discharge point;
6. An estimated operation and maintenance budget; and
7. Funding source for operation and maintenance activities and equipment.

A major contributor to unmaintained stormwater facilities is a lack of clear ownership and responsibility definition. In order for an inspection and maintenance program to be effective, the roles for each responsibility must be clearly defined prior to construction of a system. This can be accomplished with a maintenance agreement between the site owners and the responsible authority.

This report is suitable for recording as an attachment to a maintenance agreement between the site owner and the responsible authority. A copy of a sample agreement prepared by RIDEM is attached to this report as Appendix B.



Stormwater System Owner / Party Responsible for O&M

Stormwater BMPs are maintained during construction by the site contractor as identified in the Soil Erosion and Sediment Control Plan (SESC) for the site. A copy of the SESC is required to be kept on site during construction. The SESC requires maintenance and inspection of the BMPs during the construction phase of project and requires a log be kept of these activities. Once construction is complete and the contractor's warranty period is elapsed, the contractor must obtain the signature of the stormwater system's owner releasing the contractor from his maintenance and inspection responsibilities. A copy of this release of contractor's responsibility must be attached to this document.

The Owners Association will be the owner of the stormwater system located outside of public right of ways and all stormwater BMP. Upon completion of construction, and creation of the Owners Association, their legal name along with mailing and emergency contact information must be added below.

Owner; _____

Mailing Address; _____

Emergency Contact Name; _____

Phone; _____

Transfer of Ownership

In the event that the owner of any property included in the Owner's Association changes, the current owner (grantor) must provide a copy of this document to the new owner (grantee). In addition, the Owners Association must provide all new members with a copy of this document.

The Stormwater System Owner is the Party Responsible for the ongoing O&M of the system.

The two key components to adequately maintain the stormwater infrastructure are:

1. Performance of periodic and scheduled inspections
2. Performance of scheduled maintenance

The actual operation and maintenance of the system may be performed by a third party designated by the owner. If the owner contracts with a third party for O&M the name, address, and emergency contact information must be added below, and updated if the third party designee changes.

Name: _____

Mailing Address: _____

Emergency Contact Name: _____

Phone: _____



Public Safety

Public safety was a critical factor in designing the stormwater system. Public safety features included in this design are:

- Accessibility to Stormwater BMPs
- Winter & Non-Winter Maintenance

Accessibility to Stormwater BMPs

As shown on the site plans, a dedicated path is proposed to provide access to all stormwater BMPs from the roadway. This access has been sized to accommodate vehicle access to the BMPs.

Winter Maintenance

The following tasks must be performed to protect public safety during the winter season:

- Roadways and parking lots will be salted/ sanded/ plowed in accordance with applicable Town of Coventry and RIDOT guidelines;
- Inspect the open and closed drainage networks adjacent to the snow stockpiles to ensure they are free of clogging and debris;
- Inspect roadways and drainage structures post-storm event to alleviate any signs of icing or damming.

Non-Winter Maintenance

The following tasks must be performed to protect public safety during the non-winter seasons:

- Roadways and parking lots will be swept in accordance with applicable Town of Coventry and RIDOT guidelines;
- The stormwater management systems must be inspected and maintained in accordance with the enclosed Operations & Maintenance Plan.

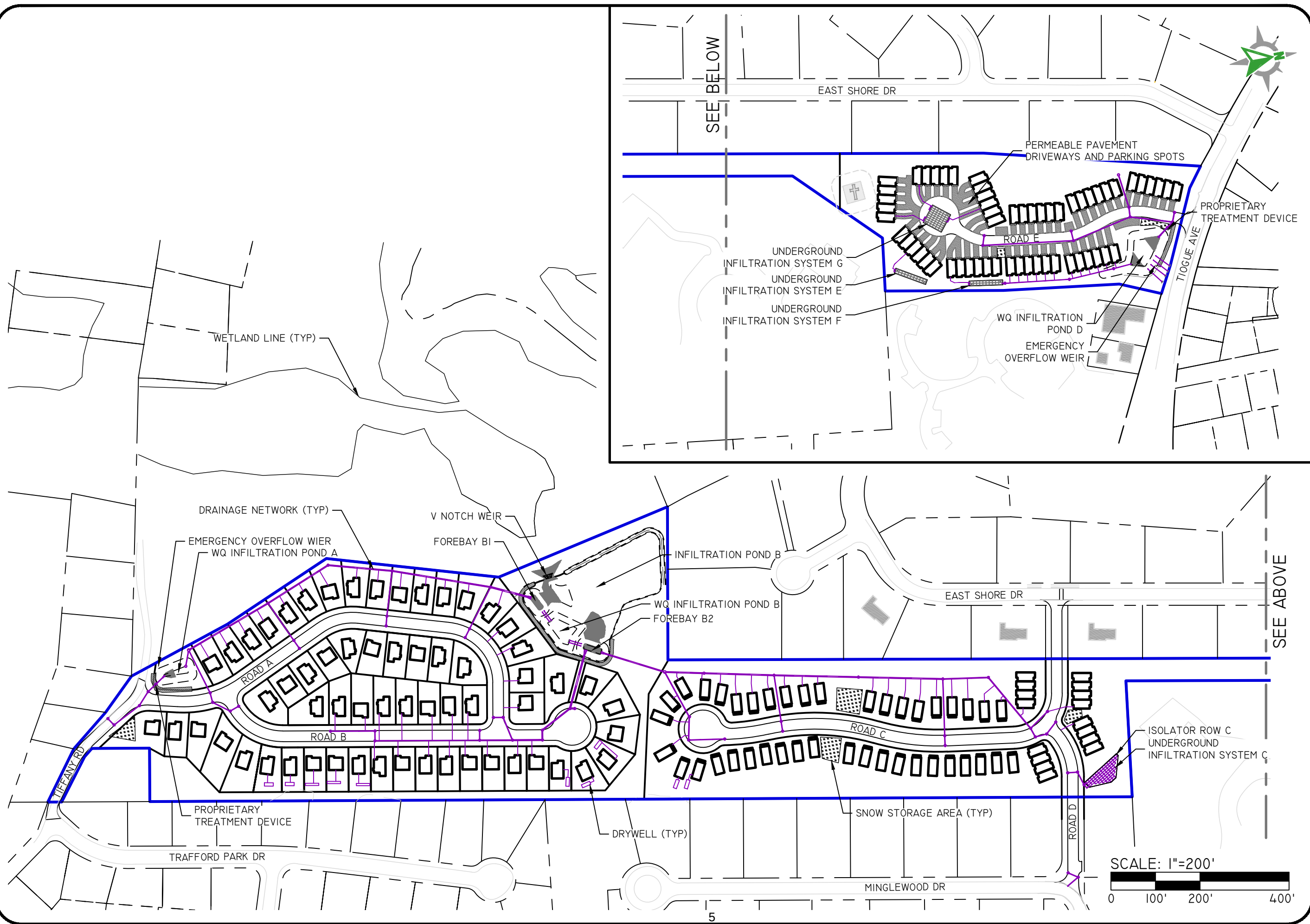
Particular care must be taken in the operation and maintenance of these features.



Stormwater System Plan

A plan identifying each component of the stormwater system is included on the following page.

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OPERATIONS AND MAINTENANCE

VILLAGE AT TIOGUE

COVENTRY, RHODE ISLAND

PREPARED FOR:

232 REALTY ASSOCIATES

420 SCRABBLETOWN RD, SUITE G, NORTH KINGSTOWN, RHODE ISLAND

DATE:

12-10-2024

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Inspections & Maintenance

Inspections must be performed on a regular basis and scheduled based on the BMP type and configuration. It is not mandatory that all inspectors be trained engineers, but they must have some knowledge or experience with stormwater systems and in general, trained stormwater engineers should direct the inspectors. Follow-up inspections by registered professional engineers must be performed where a routine inspection has revealed a question of structural or hydraulic integrity affecting public safety.

Not all inspections can be conducted by direct human observation. For subsurface systems, video equipment may be required. There may be cases where other specialized equipment is necessary. The inspection program must be tailored to address the operational characteristics of the system.

The inspection process must document observations made in the field and must cover structural conditions, hydraulic operational conditions, evidence of vandalism, condition of vegetation, occurrence of obstructions, unsafe conditions, and build-up of trash, sediments and pollutants.

Maintenance of the stormwater management system is essential and can be divided into two types, scheduled and corrective.

Scheduled maintenance tasks are those that are typically accomplished on a regular basis and can generally be scheduled without referencing inspection reports. These items consist of such things as vegetation maintenance (such as mowing) and trash and debris removal. These tasks are required at well-defined time intervals and are a requirement for all stormwater structural facilities.

Corrective maintenance tasks consist of items such as sediment removal, stream bank stabilization, and outlet structure repairs that are done on an as-needed basis. These tasks are typically scheduled based on inspection results or in response to complaints.

Since specialized equipment may be required, some maintenance tasks can be effectively handled on a contract basis with an outside entity specializing in that field. In addition, some maintenance may also require a formal design and bid process to accomplish the work.

Appendix A provides an "Inspection Schedule & Maintenance Checklist" for the stormwater system components on this site. Completed checklists must be maintained as an ongoing record of inspections for each component of the stormwater system.

In addition to the maintenance of the stormwater system, maintenance of other site improvements can significantly enhance the ability for the BMPs to function as designed. Several of these have been listed below, along with the recommended maintenance.



Lawn, Garden and Landscape Management

- Lawns should be cut no shorter than 1-1/2" in the spring and fall to stimulate root growth, and no shorter than 2 to 3 inches throughout the summer.
- Infiltration ponds should be mowed at least twice per year.
- Fertilize no more than twice per year, once in May-June and once in September-October.
- Avoid spreading fertilizer on impervious surfaces.
- Weeds should be dug or pulled out. Large areas of weeds can be removed by covering with large plastic sheet(s) for a few days.
- Chemical pesticides should be used as a last resort. A healthy lawn is naturally disease resistant.
 - Visible insects can be removed by hand, by spraying with water, or even vacuum cleaning.
 - Store bought traps, specific for a species, can be used.
 - Slugs and other soft bodied insects can be eliminated using diatomaceous earth.
 - Plants infected with bacteria and fungi should be removed and disposed of.
 - Beneficial organisms should be maintained on the property and should be encouraged/ attracted to the property. Homeowners and property facility maintenance personal should become familiar with beneficial organisms.
- Irrigation should be minimal if required at all. Most lawns do not require watering and will become dormant during dry periods.
 - Established lawns require no more than one inch of water per week.
 - Areas should be watered before 9am to avoid evaporation.

Road and Parking Area Management

Street and Parking Lot Sweeping

- All street and parking areas on site must be swept a minimum of 2 times per year.

Deicing:

- Salt storage areas must be completely covered and located on an impervious surface.
- Runoff must be contained in appropriate areas.
- See The Rhode Island Stormwater Design and Installation Standards Manual Appendix G for approved deicing agents and ways to reduce deicer impacts. The manual Appendices can be found online at:

<http://www.dem.ri.gov/programs/benviron/water/permits/ripdes/stwater/pdfs/swdsnapd.pdf>

**Sealants:**

- Only asphalt based sealants are permitted, no coal-tar based asphalt sealants can be used on site.

Snow Removal:

- Snow must not be dumped in any water body including rivers, reservoirs, ponds, lakes, wetlands, bays, or the ocean.
- Avoid disposing of snow on top of storm drain catch basins or stormwater drainage swales or ditches.
- Snow must be stored in upland areas, not in or adjacent to water bodies or wetlands. Snow must be stored in a location that will allow snow melt and enter the onsite drainage system so it can be treated by onsite BMPs.

Solid Waste Containment

- Trash and recycling receptacles must be located onsite for all commercial areas.

Reference; Additional information relating to operation and maintenance of specific BMPs can be found in the Rhode Island Stormwater Design and Installation Standards Manual.

www.dem.ri.gov/pubs/regs/regs/water/swmanual.pdf



Estimated Inspections & Maintenance Budget

It is important to be able to budget for the O&M costs associated with the stormwater system. To assist the owner in budgeting, below is an estimate of the costs that may be incurred in maintaining the system. The costs have been estimated on a Yearly basis.

Periodic inspections, if performed by an outside entity will cost approximately \$X/yr.

Infiltration Structure:

(Drywells)- Residential Lots (per one lot):

For a 25-year finance period, Infiltration Structures cost approximately \$1,277.77 per acre of tributary area per year. For the above lot numbers, each residential lot contains approximately 0.106 acres of area flowing to infiltration structures. This equates to an approximate cost of \$136 per year to maintain the infiltration structures. [KD1]

Underground infiltration chambers:

For a 25 year finance period, Infiltration Structures cost approximately \$1,277.77 per acre of tributary area per year. The site contains approximately 0.795 acres of area flowing to infiltration structures. This equates to an approximate cost of \$1016 per year to maintain the infiltration structures.

Pervious Pavement:

Pervious pavement costs approximately \$3,960 per acre of tributary area per year. The site contains approximately 0.552 acres of area flowing to porous pavement. This equates to an approximate cost of \$2185 per year to maintain the pervious pavement

Cascade Separator™:

The recommended inspection and maintenance interval for Cascade separators is twice per year, and the approximate cleaning cost is \$500.00 per unit. Two Cascade separators are proposed to serve the site, so the annual maintenance cost is approximately \$2000 per year.

Based on the costs outlined above, the stormwater system will cost approximately \$5337 per year to maintain. This is only an estimate and costs may vary.

These costs are the responsibility of the stormwater system owner. Funding for the costs will be provided by the owner.

Reference; Maintenance costs are based on information provided by Horsley Witten during the January 19, 2011 Stormwater Manual Training.

(<http://www.dem.ri.gov/programs/benviron/water/permits/ripdes/stwater/t4guide/slides/sess210.ppt>)



Appendix A – Inspection Schedule & Maintenance Checklists

**Drainage Structures
(Catch Basins, Manholes, etc.)
Operation, Maintenance, and Management
Inspection Checklist**

Project:

Date:

Location:

Time:

Site Status:

Inspector:

Notes:

- Beyond inspection frequency noted, inspections shall be completed after storms equal to or greater than the 1-year 24-hour Type III storm event (2.7" of rain fall)
- All Checklist Maintenance items are MANDATORY.
- During inspections, if maintenance items are found not to be applicable, note as N/A in comments
- All removed sediments shall be disposed at an approved and permitted location.
- All hazardous debris removed shall be disposed of in accordance with state and federal regulations by a properly licensed contractor

MAINTENANCE ITEM	SATISFACTORY (YES/NO)	COMMENTS
Semi-annually inspect drainage structures for damage		
Use a vacuum truck or other means to clean out any sediment or debris present in any drainage structure or whenever sediments reach ½ of the sump depth, which ever comes first.		
Semi-annually inspect drainage structures for debris and remove as necessary		

**Drainage Structures
(Catch Basins, Manholes, etc.)
Operation, Maintenance, and Management
Inspection Checklist**

Project:

Date:

Location:

Time:

Site Status:

Inspector:

COMMENTS:

ACTIONS TO BE TAKEN:

Drywell Operation, Maintenance, and Management Inspection Checklist

Project:

Date:

Location:

Time:

Site Status:

Inspector:

Notes:

- Beyond inspection frequency noted in parenthesis, i.e. (quarterly), inspections shall be completed after storms equal to or greater than the 1-year 24-hour Type III storm event (2.7" of rain fall)
- All Checklist Maintenance items are MANDATORY.
- During inspections, if maintenance items are found not to be applicable, note as N/A in comments
- All removed sediments shall be disposed at an approved and permitted location.
- All hazardous debris removed shall be disposed of in accordance with state and federal regulations by a properly licensed contractor

MAINTENANCE ITEM	SATISFACTORY (YES/NO)	COMMENTS
1. Debris Cleanout (Quarterly)		
Roof gutters clear of debris		
Overflow outlets clear of debris		
2. Sedimentation (Quarterly)		
No evidence of sedimentation in drywell		
Drywell dewaterers between storms		
3. Overflow Outlet (Quarterly)		
Inlet and outlet devices are free of debris		
Good condition, no need for repair		
No evidence of erosion		

Drywell
Operation, Maintenance, and Management
Inspection Checklist

Project:	Date:
Location:	Time:
Site Status:	Inspector:

COMMENTS:

ACTIONS TO BE TAKEN:

Sediment Forebay Operation, Maintenance, and Management Inspection Checklist

Project:

Date:

Location:

Time:

Site Status:

Inspector:

Notes:

- Beyond inspection frequency noted in parenthesis, i.e. (quarterly), inspections shall be completed after storms equal to or greater than the 1-year 24-hour Type III storm event (2.7" of rain fall)
- All Checklist Maintenance items are MANDATORY.
- During inspections, if maintenance items are found not to be applicable, note as N/A in comments
- All removed sediments shall be disposed at an approved and permitted location.
- All hazardous debris removed shall be disposed of in accordance with state and federal regulations by a properly licensed contractor

MAINTENANCE ITEM	SATISFACTORY (YES/NO)	COMMENTS
1. Debris Cleanout (Quarterly)		
The sediment forebay and sediment trap isolation chamber clear of debris or		
Inflow pipes / inlet area clear of debris		
Outflow pipes / outlet area clear of debris		
Overflow Weir / outlet area clear of debris		
2. Sedimentation (Quarterly)		
Obvious trapping of sediment		
Greater than 50% of storage volume remaining. If less than 50% of storage volume remaining, sediments to be removed and disposed of. (see notes at end of Forebay		

**Sediment Forebay
Operation, Maintenance, and Management
Inspection Checklist**

Project:

Location:

Site Status:

Date:

Time:

Inspector:

3. Vegetation (Quarterly)		
Vegetation within sediment forebay to be limited to 18" in height.		
4. Embankments (Quarterly)		
Evidence of erosion		
Seeps/leaks on downstream face		
Slope protection or riprap failure		
Slopes stabilized with vegetation, slope protection, riprap, etc		

COMMENTS:

**Sediment Forebay
Operation, Maintenance, and Management
Inspection Checklist**

Project:

Location:

Site Status:

Date:

Time:

Inspector:

ACTIONS TO BE TAKEN:

Underground System Operation, Maintenance, and Management Inspection Checklist

Project:

Date:

Location:

Time:

Site Status:

Inspector:

Notes:

- Beyond inspection frequency noted in parenthesis, i.e. (quarterly), inspections shall be completed after storms equal to or greater than the 1-year 24-hour Type III storm event (2.7" of rain fall)
- All Checklist Maintenance items are MANDATORY.
- During inspections, if maintenance items are found not to be applicable, note as N/A in comments
- All removed sediments shall be disposed at an approved and permitted location.
- All hazardous debris removed shall be disposed of in accordance with state and federal regulations by a properly licensed contractor
- Repair or complete replacement to Underground Infiltration System Practice is required if system fails to infiltrate fully within 48 hours.
- Inspection Ports are provided over each row of the chambers for inspections. Manholes are provided at one end of each isolator row for access and maintenance.

MAINTENANCE ITEM	SATISFACTORY (YES/NO)	COMMENTS
1. Debris Cleanout (Quarterly)		
The isolator row chamber(s) clear of debris/ floatables or accumulated sediment.		
Inflow pipes clear of debris/ floatables		
Overflow spillway clear of debris/ floatables		
Inlet area clear of debris/ floatables		
2. Dewatering (Annual)		
Chamber dewaterers between storms		
Outlet devices shall be cleaned/repared when draw down exceeds 36 hours.		

Underground System Operation, Maintenance, and Management Inspection Checklist

Project:

Date:

Location:

Time:

Site Status:

Inspector:

3. Sediment Cleanout of Chamber (Annual)		
No evidence of sedimentation in chamber		
Sedimentation accumulation doesn't yet require cleanout		
Sediment Shall be removed from the system when sediment volume exceeds 10% of the total vault volume		
Remove sediments by hydro-jetting of sediments and vactoring (vacuuming)		
4. Inlets (Quarterly)		
Good condition		
No evidence of disrepair (presence of structural damage)		
5. Aggregate Repairs (Annual)		
Annual inspection for damage		
Annual inspection for hydrocarbon build-up and removal if detected.		
Annual inspection for sediment accumulation in the facility		
Surface of aggregate clean		
Top layer of stone does not need replacement		
Chamber does not need rehabilitation (presence of structural damage)		

**Underground System
Operation, Maintenance, and Management
Inspection Checklist**

Project:

Date:

Location:

Time:

Site Status:

Inspector:

COMMENTS:

ACTIONS TO BE TAKEN:

Underground System – Isolator Row TM Operation, Maintenance, and Management Inspection Checklist

Project:

Date:

Location:

Time:

Site Status:

Inspector:

Notes:

- Beyond inspection frequency noted in parenthesis, i.e. (quarterly), inspections shall be completed after storms equal to or greater than the 1-year 24-hour Type III storm event (2.7" of rain fall)
- All Checklist Maintenance items are MANDATORY.
- During inspections, if maintenance items are found not to be applicable, note as N/A in comments
- All removed sediments shall be disposed at an approved and permitted location.
- All hazardous debris removed shall be disposed of in accordance with state and federal regulations by a properly licensed contractor
- Repair or complete replacement to Underground Infiltration System Practice is required if system fails to fully infiltrate fully within 48 hours.
- Manholes are provided at one end of each isolator row for access and maintenance

MAINTENANCE ITEM	SATISFACTORY (YES/NO)	COMMENTS
1. Debris Cleanout (Quarterly)		
The isolator row chamber(s) clear of debris/ floatables or accumulated sediment.		
Inflow pipes clear of debris/ floatables		
Overflow spillway clear of debris/ floatables		
Inlet area clear of debris/ floatables		
2. Dewatering (Annual)		
Chamber dewaterers between storms		
Outlet devices shall be cleaned/repared when draw down exceeds 36 hours.		

Underground System – Isolator Row TM
Operation, Maintenance, and Management
Inspection Checklist

Project:

Date:

Location:

Time:

Site Status:

Inspector:

3. Sediment Cleanout of Chamber (Annual)		
No evidence of sedimentation in chamber		
Sedimentation accumulation doesn't yet require cleanout		
Sediment Shall be removed from the system when sediment volume exceeds 10% of the total vault volume		
Remove sediments by hydro-jetting of sediments and vactoring (vacuuming)		
4. Inlets (Quarterly)		
Good condition		
No evidence of disrepair (presence of structural damage)		
5. Aggregate Repairs (Annual)		
Annual inspection for damage		
Annual inspection for hydrocarbon build-up and removal if detected.		
Annual inspection for sediment accumulation in the facility		
Surface of aggregate clean		
Top layer of stone does not need replacement		
Chamber does not need rehabilitation (presence of structural damage)		

Underground System – Isolator Row TM
Operation, Maintenance, and Management
Inspection Checklist

Project:

Date:

Location:

Time:

Site Status:

Inspector:

COMMENTS:

ACTIONS TO BE TAKEN:

Permeable Pavement Operation, Maintenance, and Management Inspection Checklist

Project:

Date:

Location:

Time:

Site Status:

Inspector:

Notes:

- Beyond inspection frequency noted in parenthesis, i.e. (quarterly), inspections shall be completed after storms equal to or greater than the 1-year 24-hour Type III storm event (2.7" of rain fall)
- All Checklist Maintenance items are MANDATORY.
- During inspections, if maintenance items are found not to be applicable, note as N/A in comments
- All removed sediments shall be disposed at an approved and permitted location.
- All hazardous debris removed shall be disposed of in accordance with state and federal regulations by a properly licensed contractor

MAINTENANCE ITEM	SATISFACTORY (YES/NO)	COMMENTS
1. Sediment and Debris Cleanout (Quarterly or Manufacturer's Recommendation)		
Contributing area free of sediment and debris		
Contributing area stabilized and mown, with grass clippings removed		
Surface free of sediment and debris (e.g. mulch, leaves, trash, etc.)		
No signs of clogging (e.g., standing water)		
Surface does not require vacuuming		
2. Dewatering (Monthly)		
Permeable pavement dewateres between storms		
3. Underdrain Outfall, If Present (Annual)		
No evidence of erosion		

**Permeable Pavement
Operation, Maintenance, and Management
Inspection Checklist**

Project:

Date:

Location:

Time:

Site Status:

Inspector:

4. Surface repairs (annual)		
Surface has not been sealed		
No evidence of surface deterioration or spalling		
Surface (top and base course) does not need to be Replaced		
5. Vacuum Sweeping or Hosing (Quarterly)		
Quarterly Vacuum Sweeping or Hosing per manufacturer		
6. Miscellaneous		
Minimize use of sand and salt in winter months		
Post signs identifying permeable pavement		
Attached rollers to the bottoms of snowplows to prevent them from catching on the edges of grass pavers and some paving stones		
Annual inspection for damaged and clogged voids		

**Permeable Pavement
Operation, Maintenance, and Management
Inspection Checklist**

Project:	Date:
Location:	Time:
Site Status:	Inspector:

COMMENTS:

ACTIONS TO BE TAKEN:

Infiltration Pond Operation, Maintenance, and Management Inspection Checklist

Project:

Date:

Location:

Time:

Site Status:

Inspector:

Notes:

- Beyond inspection frequency noted in parenthesis, i.e. (quarterly), inspections shall be completed after storms equal to or greater than the 1-year 24-hour Type III storm event (2.7" of rain fall)
- All Checklist Maintenance items are MANDATORY.
- During inspections, if maintenance items are found not to be applicable, note as N/A in comments
- All removed sediments shall be disposed at an approved and permitted location.
- All hazardous debris removed shall be disposed of in accordance with state and federal regulations by a properly licensed contractor
- Sediment shall be removed from stormwater basins when the sediment volume exceeds 10% of the total basin volume. Sediment shall be disposed of in an acceptable manner at an approved and permitted location.
- Infiltration Ponds Only: When infiltration rates decrease below design infiltration rates, remove accumulated surface sediments and rototill pond bottom. Revegetate bottom of infiltration pond as needed

MAINTENANCE ITEM	SATISFACTORY (YES/NO)	COMMENTS
1. Embankment and Emergency Spillway (Annual)		
Vegetation and Ground Cover Adequate		
Embankment Erosion		
Animal Burrows		
Unauthorized Planting		
Cracking, bulging or sliding of dam		
• Upstream face		
• Downstream face		

Infiltration Pond Operation, Maintenance, and Management Inspection Checklist

Project:

Date:

Location:

Time:

Site Status:

Inspector:

• At or beyond toe		
• Downstream		
• Upstream		
• Emergency Spillway		
Basin, toe & chimney drains clear and functioning		
Seeps/leaks on downstream face		
Slope protection or riprap failure		
Vertical/horizontal alignment of top of dam "As-Built"		
Emergency Spillway clear of obstructions and debris		
2. Riser and Principal Spillway (Annual)		
Type: Reinforced Concrete____ Corrugated Pipe_____ Masonry_____ Low-flow orifice obstructed		
Internal Low-flow orifice obstructed. Remove filter sock and riser to check.		
Low-flow trash rack • Debris removal necessary		
• Corrosion control		
Low Flow Filter Sock (Filter Fabric) • Signs of deterioration, replace if necessary		
Weir trash rack maintenance • Debris removal necessary		
• Corrosion control		

Infiltration Pond Operation, Maintenance, and Management Inspection Checklist

Project:

Date:

Location:

Time:

Site Status:

Inspector:

Excessive Sediment accumulation inside riser		
Concrete/Masonry condition riser and barrels		
cracks or displacement		
Minor spalling (<1")		
Major spalling (rebars exposed)		
Joint failures		
Water tightness		
Metal pipe Condition		
Control Valve		
Operational/ Exercised		
Chained and Locked		
Basin Drain Valve		
Operational/ Exercised		
Outfall channels functioning		
3. Dry Basin Areas (Annual)		
Vegetation adequate		
Undesirable vegetative growth		
Undesirable woody vegetation		
Low-flow channels clear of obstructions		
Standing water or wet spots		
Annual mowing of vegetation along the maintenance access roads.		

Infiltration Pond Operation, Maintenance, and Management Inspection Checklist

Project:

Date:

Location:

Time:

Site Status:

Inspector:

Annual inspection of vegetation within basin.		
Prune all dead or dying vegetation within the extents of the basin or WVTS.		
Sediment and/or trash accumulation *		
Remove all herbaceous vegetation root stock when overcrowding of the maintenance access to the facility, remove any vegetation that has a negative impact on stormwater flowage through facility, and trim any overgrown vegetation within the basin.		
Replace any/all original vegetation that has died off or has not fully established, as determined at the time of the inspection.		
Vegetation should be reinforced to its original design standards if less than 50% of the original vegetation is established after two years.		
Any invasive vegetation encroaching upon the perimeter of the facility should be pruned or removed if it is prohibiting access to the facility, compromising sight visibility and/or compromising original design vegetation.		
4. Condition of Outfalls (Annual)		
Riprap Failures		
Slope erosion		
Storm drain pipes		
Endwalls/ Headwalls		
Other (specify)		
1. Emergent Vegetation (Annual)		

Infiltration Pond Operation, Maintenance, and Management Inspection Checklist

Project:

Date:

Location:

Time:

Site Status:

Inspector:

Annual mowing of vegetation: Annual mowing of the basin setback is only required along maintenance rights-of-way and the embankment. The remaining setback can be managed as rangeland (mowing every other year) or forest		
Vegetation healthy and growing maintaining 50% surface area coverage of emergent plants after the second growing season (If unsatisfactory, reinforcement plantings needed)		
Dominant emergent plants: Survival of desired emergent plant species. Distribution according to planting plan?		
Evidence of invasive species		
Maintenance of adequate water depths for desired emergent plant species		
Harvesting of emergent plantings needed		
Have sediment accumulations reduced pool volume significantly or are plants "choked" with sediment		

**Infiltration Pond
Operation, Maintenance, and Management
Inspection Checklist**

Project:	Date:
Location:	Time:
Site Status:	Inspector:

COMMENTS:

ACTIONS TO BE TAKEN:

Street Sweeping Operation, Maintenance, and Management Inspection Checklist

Project:

Date:

Location:

Time:

Site Status:

Inspector:

Notes:

- Beyond inspection frequency noted in parenthesis, i.e. (quarterly), inspections shall be completed after storms equal to or greater than the 1-year 24-hour Type III storm event (2.7" of rain fall)
- All Checklist Maintenance items are MANDATORY.
- During inspections, if maintenance items are found not to be applicable, note as N/A in comments
- All removed sediments shall be disposed at an approved and permitted location.
- All hazardous debris removed shall be disposed of in accordance with state and federal regulations by a properly licensed contractor

MAINTENANCE ITEM	SATISFACTORY (YES/NO)	COMMENTS
Sweep all roadways two times per year. One of these sweepings must occur after winter sanding operations have concluded.		

COMMENTS:

**Street Sweeping
Operation, Maintenance, and Management
Inspection Checklist**

Project:	Date:
Location:	Time:
Site Status:	Inspector:

ACTIONS TO BE TAKEN:

**Proprietary Device
(See Manufacturer Manual/Requirements)
Inspection Checklist**

Project:

Date:

Location:

Time:

Site Status:

Inspector:

Notes:

- Notwithstanding any recommended inspection frequencies in the guidance document, this unit must be inspected monthly during the first year of operation to determine, on average, how often the sediment accumulation reaches 15% of the unit sedimentation capacity.
- Monthly notes must be taken to record the amount of monthly sedimentation.
- Subsequent years of operation must have inspections and maintenance performed at the average 15% sedimentation accumulation frequency determined during the first year of operation. Minimum quarterly.
- All Checklist Maintenance items are MANDATORY.
- All removed sediments shall be disposed at an approved and permitted location.
- All hazardous debris removed shall be disposed of in accordance with state and federal regulations by a properly licensed contractor

MAINTENANCE ITEM	SATISFACTORY (YES/NO)	COMMENTS
1. Post Construction		
Post construction inspection in accordance with manufacturer manuals		
2. In the event of an oil spill (immediately)		
Inspection in accordance with manufacturer manuals		

**Proprietary Device
(See Manufacturer Manual/Requirements)
Inspection Checklist**

Project:

Date:

Location:

Time:

Site Status:

Inspector:

3. First year of Operation (Monthly)		
Monthly inspections and maintenance to assess performance and sedimentation accumulation has not exceeded 50% of unit storage volume (see attached guidance document for model capacity). If sedimentation exceeds 50% capacity for 2 months, increase frequency to bi-weekly. If over 50% storage capacity, clean out system per manufacturer requirements.		
4. Subsequent years of Operation (Based on how often sediments reach 15% of unit capacity during first year of operation) Note: Minimum Quarterly		
Regular inspections to assess performance and sedimentation accumulation has not exceeded 50% of unit storage capacity. If over 50% storage capacity, clean out system per manufacturer requirements. (see attached document for model capacity)		

**Proprietary Device
(See Manufacturer Manual/Requirements)
Inspection Checklist**

Project:

Date:

Location:

Time:

Site Status:

Inspector:

COMMENTS:

ACTIONS TO BE TAKEN:

Cascade Separator™ Inspection and Maintenance Guide



CASCADE
separator™

Maintenance

The Cascade Separator™ system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects sediment and debris will depend upon on-site activities and site pollutant characteristics. For example, unstable soils or heavy winter sanding will cause the sediment storage sump to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (i.e. spring and fall). However, more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment wash-down areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

A visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet chamber, flumes or outlet channel. The inspection should also quantify the accumulation of hydrocarbons, trash and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided in this Inspection and Maintenance Guide.

Access to the Cascade Separator unit is typically achieved through one manhole access cover. The opening allows for inspection and cleanout of the center chamber (cylinder) and sediment storage sump, as well as inspection of the inlet chamber and slanted skirt. For large units, multiple manhole covers allow access to the chambers and sump.

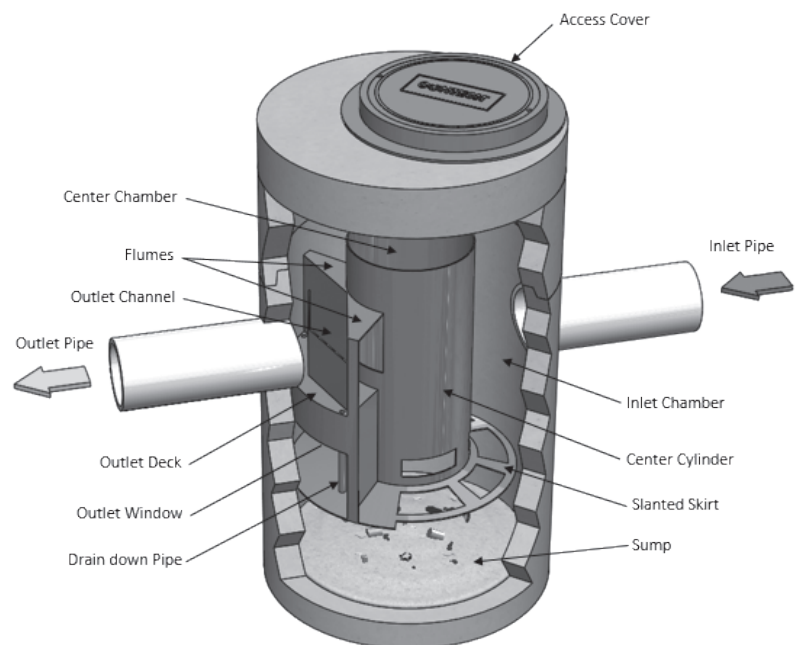
The Cascade Separator system should be cleaned before the level of sediment in the sump reaches the maximum sediment depth and/or when an appreciable level of hydrocarbons and trash has accumulated. If sorbent material is used, it must be replaced when significant discoloration has occurred. Performance may be impacted when maximum sediment storage capacity is exceeded. Contech recommends maintaining the system when sediment level reaches the 50% storage volume. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Finer, silty particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine if the height of the sediment pile off the bottom of the sump floor exceeds 50% of the total height of sediment storage sump.

Cleaning

Cleaning of a Cascade Separator system should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole cover and insert the vacuum hose down through the center chamber and into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The areas outside the center chamber and the slanted skirt should also be washed off if pollutant build-up exists in these areas.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. Then the system should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and to ensure proper safety precautions. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the Cascade Separator system must be done in accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal. If any components are damaged, replacement parts can be ordered from the manufacturer.



Cascade Separator Inspection & Maintenance Log

[illegible]

1. The depth to sediment is determined by taking a measurement from the manhole opening to the top of the sediment pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine if the height of the sediment pile off the bottom of the sump floor exceeds 50% of the total height of sediment storage sump. Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.
2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.



A Cascade Separator unit can be easily cleaned in less than 30 minutes.



A vacuum truck excavates pollutants from the systems.

SUPPORT

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from our engineers.

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Appendix B – RIDEM Sample Stormwater Facility Maintenance Agreement

****A site-specific Stormwater Facility Maintenance Agreement between the Owner and the responsible authority must be developed prior to construction****

Sample Stormwater Facility Maintenance Agreement

THIS AGREEMENT, made and entered into this ____ day of _____, 20____, by and between (Insert Full Name of Owner)

_____, hereinafter called the "Landowner", and the [Local Jurisdiction], hereinafter called the "[Town/City]".
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 [Local Jurisdiction] 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 _____, (Name of Plan/Development) hereinafter called the "Plan", which is expressly made a part hereof, as approved or to be approved by the [Town/City], provides for detention of stormwater within the confines of the property; and

WHEREAS, the [Town/City] and the Landowner, its successors and assigns, including any homeowners association, agree that the health, safety, and welfare of the residents of [Local Jurisdiction] require that on-site stormwater management facilities be constructed and maintained on the Property; and

WHEREAS, the [Town/City] 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 [Town/City].



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 [Town/City], its authorized agents and employees, to enter upon the Property and to inspect the stormwater management facilities whenever the [Town/City] deems necessary. The purpose of inspection is to follow-up on reported deficiencies and/or to respond to citizen complaints. The [Town/City] 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 [Town/City], the [Town/City] 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 [Town/City] 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 [Town/City] 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 [Town/City].

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 [Town/City] 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 [Town/City] upon demand, within thirty (30) days of receipt thereof for all actual costs incurred by the [Town/City] hereunder.

8. This Agreement imposes no liability of any kind whatsoever on the [Town/City] and the Landowner agrees to hold the [Town/City] 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 [Local Jurisdiction] 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:

[Town/City] Attorney Date