Stormwater Facility Maintenance Manual

Updated August 2021
(2015 Edition)

For Private Stormwater Facilities

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If any information or recommendations found within this document conflict with requirements recorded in an Operation & Maintenance agreement for your facility, the requirements within the O&M Agreement should prevail. If you are unsure if an O&M agreement exists for your facility you may contact the Town of Mooresville Stormwater Program Specialist.

Maintaining Stormwater Facilities

All stormwater facilities need to be maintained. Regular maintenance ensures proper functioning and keeps the facility aesthetically appealing. This Stormwater Facility Maintenance Guide was designed to help explain how stormwater facilities work and provide user-friendly guidance on how to maintain facilities to keep them functional and up to standards.

As a facility owner or homeowner's association, you are responsible for regularly maintaining your privately-owned drainage facilities such as ponds, catch basins and pipes.

Maintenance Checklists

The checklists in this guide are for you to use when inspecting and maintaining the stormwater facilities in your neighborhood. If you are missing a particular checklist, or if you have additional facilities not identified or addressed in this guide, please contact your site developer, design engineer, or local jurisdiction.

The checklists are in table format for ease of use and brevity. Each checklist tells you what part of the feature to check, how often to check, what to check for, and what to do about it. Log sheets are included to help you keep track of when you last surveyed the storm drainage system.

Although it is not intended for the maintenance survey to involve anything too difficult or strenuous, there are a few tools that will make the job easier and safer. These tools include:

- Gloves.
- A flashlight (to look into catch basins, manholes or pipes).
- A long pole or broom handle (see below).
- Some kind of pry bar or lifting tool for pulling manhole and grate covers.
- Standard yard tools, such as a rake and a shovel
- Tape measure or yardstick

A listing of resources is also included within this packet (see next page). Here you will find the phone numbers of the agencies referred-to in the tables.

SAFETY WARNING:

Due to OSHA regulations, you should never stick your head or any part of your body into a manhole or other type of confined space. When looking into a manhole or catch basin, stand above it and use the flashlight to help you see. Use a pole or broom handle that is long enough when you are checking sediment depths in confined spaces. Always properly replace grates and lids.

NO PART OF YOUR BODY SHOULD BREAK THE PLANE OF THE OPEN HOLE.

Checklist Instructions

The following pages contain maintenance checklists covering most of the needs for the components of your drainage system, as well as for some components that you may not have (you can ignore those that don't apply to your system). Let us know if there are any components of your drainage system that you do not recognize or are missing from these pages.

You should plan to complete a check for all system components on the following schedule, as per the "How Often" column in the checklists:

Quarterly – Plan to inspect the facility at least once per season, preferably during the following months – January, May, August, and November.

Annually – The best time for an annual inspection is in the late summer, preferably August.

After Storms – Also check all stormwater facilities after major storm events, defined as about 1 inch or more of precipitation in 24 hours.

Using photocopies of these checklists and the log sheet, check off the problems that you look for each time you do an inspection. Add comments regarding problems found and actions taken on the log sheet. Keep the completed forms in your files for future reference.

Resource Listing

If you are unsure whether a problem exists, please contact the Town or County at the appropriate number below and ask for technical assistance with your situation. Other resources are listed for your convenience and as references associated with the checklists.

Town of Mooresville Engineering Department
(704) 663-7282

Iredell County Household Hazardous Waste (HHW) Collection Facility (oil, paint, pesticides, etc.)
(704) 878-5430

Iredell County Solid Waste Facility (yard waste, construction waste, contaminated soils, etc.)
(704)878-5430

Mooresville Extension (Water Resource Ed. Programs, Envir. Stewardship info.)
(704) 799-4195

Log Sheet

Location:_____ **Date Checked:**
Checked By:
Name:_____ _____/_____/20_____
Address: _____ **Phone:**

City:_____**Zip:**_____ (_____) _____

Facility and Component Checked	Observations (List things that should be done)	Follow-up Actions Taken	Date Action Taken

Stormwater Facility Inspection & Maintenance Procedure

Stormwater facilities play an important role in managing the rainfall we receive in the Town of Mooresville in an average year. The term "stormwater facility" refers to any landscaped or structural feature that collects, conveys, cleans or infiltrates runoff water. There are many types of stormwater facilities, ranging from simple swales and ponds to more complicated filter systems and flow control devices. Your on-site stormwater facilities work together to control runoff water, reduce flooding and prevent pollution.

Owners of commercial property, multifamily residential property, or single-family residential properties with privately-owned drainage and stormwater facilities are required by Town of Mooresville Codes to maintain their facilities to established standards for full functionality. Facility owners are responsible for performing annual inspections of stormwater facilities, and for performing any maintenance identified by the inspections.

Basic maintenance work may be performed by the owner or property manager, although some tasks are best left to an experienced contractor. For example, annual required inspections of facilities, must be done by qualified personnel as defined in the Town of Mooresville Post Construction and Illicit Discharge and Connection Ordinance. Annual inspections of stormwater facilities and any required maintenance work must be completed on the Town provided forms and submitted to the Town of Mooresville Stormwater Program Specialist by March 31st of each calendar year.

Instructions and helpful tips for successful facility inspections and maintenance are described in the following four steps:

Step 1. Identify

The first step is facility identification, so you know what types of stormwater facilities you have. Look on the site plan of your property and note the main facility types indicated (such as wet ponds and infiltration basins), along with related drainage components (such as catch basins, pipes and debris barriers). Locate the various facilities on the ground.

Note that most drainage systems consist of components for four main purposes: stormwater collection (such as catch basins), conveyance (e.g., pipes and swales), water quality treatment (e.g. wet ponds) and flow control (via infiltration and/or surface discharge).

To assist you in identifying components, refer to the definitions and illustrations on the pages that follow.

Step 2. Inspect

For all facility components that you have identified, conduct an inspection. Annual inspections are to be completed on Town provided inspection forms and by qualified personnel, as defined in the Town of Mooresville Post Construction and Illicit Discharge and Connection Ordinance. Routine inspections may be completed by

property owners, landscapers, contract workers, etc. utilizing the checklists on the following pages. Refer to the maintenance standards for each on site component, and also identify and describe defects and their remedies.

For each facility, note on the Inspection & Maintenance Checklist the condition of the facility (good, fair or poor), and any problems or other observations.

Step 3. Maintain

For all facility components, if the inspection indicates maintenance is needed, have the work performed by competent personnel. Basic maintenance tasks may be performed by the property owner(s) or property manager, but difficult or potentially dangerous tasks should be performed by a qualified vendor. Be safe! Use caution when inspecting and working on or near facilities, and stay out of confined spaces such as catch basins and manholes.

Note the action taken and the date, and record this information on the Log Sheet. Mark the check boxes on the Inspection & Maintenance Checklist corresponding to the maintenance accomplished on each facility.

Step 4. Submit

If an annual inspection was completed by qualified personnel on Town provided forms. Forms can be found on the Town website at https://www.mooresvillenc.gov/578/Post-Construction-BMP-Forms. Please submit the completed Inspection Report by March 31st each year to the Town of Mooresville Stormwater Program Specialist.

If any areas on the inspection were noted as 'Work Needed", relevant maintenance should be completed and a reinspection form be submitted by the noted date of compliance on the initial inspection.

If a routine inspection was completed, maintain the included log with condition and any maintenance completed

* * *

Common Stormwater Facilities: Identification and Actions

Note: General actions are described for each facility type below. Please refer to the Stormwater Facility Maintenance Standards for further details.

Ditch:
A V-shaped channel, usually along the side of a road, that collects and conveys runoff.





Actions to keep Ditches functioning:

- Remove debris, litter and flow obstructions from the ditch.
- Do Not fill-in the ditch – prevent dirt, rocks and weeds from accumulating.
- Repair erosion on ditch side-slopes.

Culvert:
A pipe that continues conveyance flow from a ditch or swale under the ground surface, typically under driveways and cross-streets. Usually connects ("daylights") to another ditch, swale or pond. The end of a pipe or culvert is often surrounded by rock "rip rap" (as in photo below, right) to prevent soil erosion.



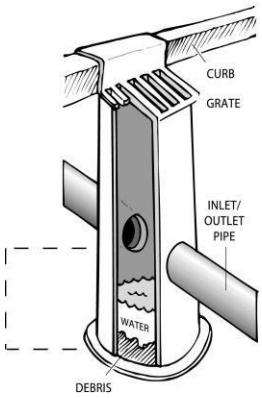


Actions to keep Culverts functioning:

- Remove debris, litter and obstructions from the openings at the culvert-ends.
- Remove soil, sod and vegetation buildup from the culvert openings.
- Replace rock riprap at the culvert ends.
- Repair any damage to the culvert ends.

Catch Basin:
An underground concrete box structure with a slotted metal grate on top that collects runoff water from the ground surface. Typically located within pavement in parking lots and in the street gutter, usually next to a curb. Grate on top lets water in and keeps larger debris out. Sediment settles in the sump in the bottom (below the pipe openings) and must be removed periodically. Catch basins (CBs) have an outlet pipe between the grate and the sump, to let the cleaner water flow out to a storm pond or other location. Some CBs have both inflow and outflow pipes, to convey collected runoff water through.





Actions to keep Catch Basins functioning:

- Remove litter, leaves, debris and obstructions from catch basin grates.
- Hire a professional to remove sediment buildup from sump (if road is privately owned; catch basins in the public right-of-way are maintained by the City).

Biofiltration Swale (or Bio-Swale):
A wide, shallow channel with gently-sloping sides and a flat bottom, lined with grass. Swales are designed to provide water quality treatment as the grass filters-out sediment and pollutants. Water infiltrates into the soil as it slowly flows along the swale.





Actions to keep Swales functioning:

- Remove debris, litter and flow obstructions from the swale.
- Mow the swale and maintain healthy grass cover.
- Prevent dirt, rocks and weeds from accumulating, but do not use herbicides.
- Do not fill-in the swale with rocks, bark, etc.
- Aerate the soil to preserve infiltration capacity.

Wetpond:
A constructed pond with an impermeable liner to maintain a permanent pool of water, which provides for water quality treatment by settling and retention of sediment particles and other pollutants. The cleaner surface water is then conveyed to a nearby infiltration facility (such as, a "dry pond") or surface discharge. A wetpond provides a basic level of treatment, and is common in many neighborhoods.





Actions to keep Wetponds functioning:

- Remove litter and yard debris from within and around the pond.
- Check inflow and outflow systems, and remove any obstructions.
- Remove excess vegetation such as cattails from within the pond.
- Remove noxious weeds, but do not use herbicides (contact Town for advice).

Constructed Wetland:
A created wetland with a permanent pool of water, similar to a wet pond but generally shallower and with aquatic emergent plants which provide for a higher level of water quality treatment of collected stormwater through biological processes.





Actions to keep Constructed Wetlands functioning:

- Remove litter and yard debris from within and around the wetland.
- Check inflow and outflow systems, and remove any obstructions.
- Remove excess vegetation such as cattails from within the wetland.
- Remove noxious weeds, but do not use herbicides (contact Town for advice).

Bioretention Cell (or "Rain Garden"):
A garden-like landscaped excavation backfilled with specified soil mixture and plantings. Bioretention is a "low-impact development" (LID) practice that is integrated into a site to retain stormwater near its source. It provides treatment and infiltration of runoff water by passing it slowly through the soil mix and plant roots into the native soil below.





Actions to keep Bioretention Cells and Rain Gardens functioning:

- Remove litter, weeds and fallen leaves. Do not use herbicides or pesticides.
- Check inflow and outflow systems, and remove any obstructions.
- Repair erosion, cover bare spots with organic mulch.
- Perform plant maintenance as needed, such as pruning branches.
- Remove dead vegetation and replace dead plants with same varieties.

Debris Barriers and Trash Racks:
A structural device with metal bars, to prevent debris from entering a pipe, spillway or hydraulic structure.

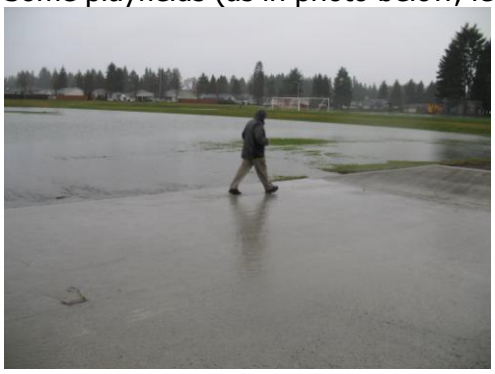



SAFETY: Do not clean trash rack when flowing! Check trash racks and culvert entrances regularly to prevent plugging during storm events.

Actions to keep Debris Barriers and Trash Racks functioning:

- Remove trash, debris, vegetation, and dirt from around the structure.
- Check inflow and outflow and remove any flow obstructions.
- Remove plants such as alder and willow that tend to grow near the pipe ends.
- Check for structural integrity; hire a professional to fix broken bars or racks.

Infiltration Basin ("Dry Pond"):
A shallow bowl-like depression in the land, with a broad, flat bottom area to collect, temporarily store and infiltrate stormwater. An infiltration basin is commonly found adjacent to a wet pond, to receive treated water and allow it to infiltrate into the soil. The infiltration basin is usually lined with grass and drains "dry" between rain events. Some playfields (as in photo below, left) double as infiltration basins by design.




Actions to keep Infiltration Basins functioning:

- Remove litter, yard debris and problem vegetation such as Scotch broom.
- Maintain a healthy grass cover to prevent erosion and weed growth.
- Repair erosion, and replace rock riprap at pipe ends.
- Avoid activities within the basin that could cause erosion or soil compaction.
- Avoid using herbicides or pesticides within the basin area.
- Aerate the soil in the bottom area as needed to preserve and enhance infiltration.

Stormwater Facility Maintenance Standards

The following pages contain facility-specific maintenance standards, which are intended to be observable conditions for determining whether maintenance actions are required.

		Check if on Subject Site
Group 1: Ponds and Swales		
1a	Detention Ponds & Infiltration Basins ("dry ponds")	☐
1b	Wet ponds and Constructed Wetlands	☐
1c	Biofiltration Swales (or Bio-Swales)	☐
1d	Wet Bio-Swales	☐
1e	Filter Strips	☐
1f	Open Sand Filters	☐
1g	Bioretention Cells (Rain Gardens)	☐
Group 2: Underground Tanks, Vaults and Trenches		
2a	Detention Tanks and Vaults	☐
2b	Wetvaults	☐
2c	Enclosed Sand Filters	☐
2d	Dispersion Trenches	☐
2e	Infiltration Trenches and Galleries	☐
Group 3: Structures and Pre-Treatment		
3a	Control Structures/Flow Restrictors	☐
3b	Catch Basins	☐
3c	Debris Barriers (Trash Racks)	☐
3d	Energy Dissipators	☐
3e	API (Baffle) Oil/Water Separators	☐
3f	Coalescing Plate Oil/Water Separators	☐
3g	Catch Basin Inserts	☐
Group 4: Miscellaneous Facilities and Features		
4a	Downspouts and Roof Drywells	☐
4b	Conveyance Pipes and Ditches	☐
4c	Access Roads	☐

Group 1

Ponds and Swales

1a Detention Ponds & Infiltration Basins ("dry ponds")

Detention ponds and infiltration basins are earthen excavations that are "dry" except during and after rains, when they contain stormwater temporarily. Detention ponds store water while releasing it gradually; infiltration basins percolate water into the ground.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Entire Facility	Quarterly	Trash & Debris	Dumping of yard wastes such as grass clippings and branches into pond. Presence of glass, plastic, metal, foam, or paper. There should be no visual evidence of dumping.		Remove and properly dispose all trash /debris.	
	Quarterly	Noxious or Poisonous Vegetation	Any invasive vegetation such as Scotch broom or blackberry vines, or any vegetation which may constitute a hazard to the public, such as poison oak, tansy ragwort, stinging nettles, or devil's club.		Completely remove invasive, noxious or non-native vegetation. Do not spray chemicals on vegetation without guidance or Town approval.	
	Quarterly	Pollution or Fire Hazard	Presence of chemicals such as natural gas, oil, and gasoline, obnoxious color, odor, or sludge.		First, try to locate the source of the pollution. Then, call the Town of Mooresville toreport the hazard.	
	Quarterly	Rodent Holes	Any evidence of rodent holes if facility is acting as a dam or berm. Water should not be able to flow through the rodent holes.		Destroy rodents and repair the dam or berm. Contact Town of Mooresville for advice.	
	Quarterly	Insects	Insects such as wasps and hornets interfering with maintenance activities, or mosquitoes becoming a nuisance.		Destroy or remove insects. For mosquito control, eliminate stagnant water.	
	Annually	Overgrown Vegetation around pond	Ensure trees/shrubs are not interfering with the facility function or maintenance (i.e. mowing, silt removal, or access).		Prune tree limbs to allow for maintenance. Trees should not be present within ponds.	
	Quarterly	Vegetation not growing or overgrown within pond	Sparse, weedy, or overgrown grass in grassy dry/infiltration ponds. Presence of invasive species or sparse/excessive growth of plants in wetland ponds.		For grassy ponds, selectively thatch, aerate, and re-seed ponds. Grass should be kept under 8" height. In wet ponds, control cattails and unwanted vegetation to less than 25% of pond surface area.	

1a Detention Ponds / Infiltration Basins (continued)

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Side Slopes	Annually	Erosion	Check around the inlets and outlets for signs of erosion. Check berms for signs of sliding or settling. Action is needed where eroded damage is over 2" deep and where there is potential for continued erosion.		Try to determine what has caused the erosion and fix it. Stabilize slopes by reinforcing the slope with rock, planting grass, or compacting the soil. Contact the Town of Mooresville for assistance.	
Pond Storage Area	Annually	Sediment Build-Up	Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified or affects inlets or outlets of the facility. (If a percolation test pit or test of Infiltration facility indicates facility is only working at 90% of its designed capabilities. If two inches or more sediment is present.		Clean out sediment and aerate and/or re-seed the pond if deemed necessary to improve infiltration and control erosion.	
	Quarterly	PVC Pond Liner	Check to see if liner is visible and has more than three 1/4-inch holes, exposed and or torn. An indicator of a torn liner could be the pond no longer holds water. (during long dry periods the water may evaporate)		Repair or replace liner as needed.	
	Quarterly	Clay Liner	Check to see if pond is holding water. (during long dry periods the water may evaporate)		Repair liner to designed state.	
Dikes or Berms	Annually	Settlement	Any part of the dike or berm which has settled more than 4 inches lower than designed.		Build the dike or berm back to the original elevation. If there is significant settling a licensed Civil Engineer should be consulted.	
	Quarterly	Seepage	Check for water flowing through the pond berm.		Repair berm to stop seepage. (Consult a Geotechnical Engineer)	
Emergency Overflow Spillway	Annually	Rocks Missing	Check to see that the rip rap protective area is intact. If any native soil is exposed, cover soil with rock rip rap.		Replace rocks so that all native soil is covered.	

1a Detention Ponds/ Infiltration Basins (continued)

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Side Slopes	Annually	Erosion	Check around the inlets and outlets for signs of erosion. Check berms for signs of sliding or settling. Action is needed where eroded damage is over 2" deep and where there is potential for continued erosion.		Try to determine what has caused the erosion and fix it. Stabilize slopes by reinforcing the slope with rock, planting grass, or compacting the soil. Contact the Town of Mooresville.	
Pond Storage Area	Annually	Sediment Build-Up	Accumulated sediment that exceeds 10% of the designed pond depth or affects inlets or outlets of the facility. (If a percolation test of infiltration facility indicates facility is only working at 90% of its designed capabilities, or if 2" or more sediment is present.		Clean out sediment and re-seed the pond if deemed necessary to improve infiltration and control erosion.	
	Quarterly	PVC Pond Liner	Check to see if liner is visible and has more than three 1/4-inch holes, exposed and or torn. An indicator of a torn liner could be the pond no longer holds water. (during long dry periods the water may evaporate)		Repair or replace liner as needed. Note: wetponds or detention ponds may have liners, but infiltration ponds do not have liners.	
	Quarterly	Clay Liner	Check to see if pond is holding water. (during long dry periods the water may evaporate)		Repair liner to designed state.	
Dikes or Berms	Annually	Settlement	Any part of the dike or berm which has settled more than 4 inches lower than designed.		Build the dike or berm back to the original elevation. If there is significant settling a licensed civil engineer should be consulted.	
	Quarterly	Seepage	Check for water flowing through the pond berm.		Repair berm to stop seepage. (Consult a Geotechnical Engineer)	
Emergency Overflow Spillway	Annually	Rocks Missing	Check to see that the rip rap protective area is intact. If any native soil is exposed, cover soil with rock rip rap.		Replace rocks so that all native soil is covered.	

1a Detention Ponds/ Infiltration Basins (continued)

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Emergency Overflow Spillway (cont.)	Annually	Erosion	Make sure the riprap under the inlet pipe is intact and no native soil is exposed. Check for accumulations of sediment deeper than half the height of the rocks.		Replace rocks and/or clean out sediment.	
	Quarterly	Screen clogged or missing	The bar screen over the outlet should be intact and clear of debris. Water should flow freely through the outlet pipe.		Replace screen if it is not attached. Remove any trash or debris and dispose of properly. Clean out the end pipe if necessary.	
Sediment Trapping Area	Quarterly	Sediment and Debris Buildup	Ensure sediment and debris do not obstruct water flow into the infiltration area.		Clean out the sump area.	
	Annually	Inadequate Sediment Settling Area	Stormwater should not enter the infiltration area without some method of settling-out solids.		Add a sediment trapping area by constructing a sump or berm for settling of solids. This area should be separatefrom the rest of the facility. Contact the Town of Mooresville for guidance.	

1b Wet ponds and Constructed Wetlands

Wet ponds and constructed wetlands are designed to improve water quality. They have a permanent pool of water, which slows incoming stormwater flows causing sediments and pollutants to settle-out. Constructed wetlands are designed with emergent aquatic plants to provide biological treatment and filtering of runoff water, while wet ponds are typically deeper and utilize the pool volume to reduce pollutant loads.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Entire Facility	Annually	Water Level	First cell is empty, doesn't hold water.		Line the first cell to maintain at least 4 feet of water. Second cell may drain, but the first cell must remain full to control turbulence of the incoming flow and reduce sediment resuspension.	
	Quarterly	Trash and Debris	Accumulation that exceeds 1 cu. ft. per 1000 sq. ft. of pond area.		Trash and debris removed from pond.	
	Quarterly	Inlet/Outlet Pipe	Inlet/Outlet pipe clogged with sediment and/or debris material.		No clogging or blockage in the inlet and outlet piping.	
	Annually	Sediment Accumulation on Pond Bottom	Accumulated sediment on pond bottom that exceeds the depth of sediment zone plus 6-inches, usually in the first cell of the pond.		Sediment removed from pond bottom.	
	Quarterly	Oil Sheen on Water	Visible and prevalent oil sheen.		Oil removed from water using oil-absorbent pads or vactor truck. Locate and correct oil source. If chronic low levels of oil persist, plant wetland plants such as Juncus effusus (soft rush) which can uptake small concentrations of oil.	
	Quarterly	Erosion	Erosion of the pond's side slopes and/or scouring of pond bottom that exceeds 6-inches, or where continued erosion is prevalent		Slopes stabilized using proper erosion control measures and repair methods.	

1b Wetponds and Constructed Wetlands (continued)

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Entire Facility	Annually	Settlement of Pond Dike/Berm	Any part of these components that has settled 4-inches or lower than the design elevation, or inspector determines dike/berm is unsound.		Dike/berm is repaired to specifications.	
	Annually	Internal Berm	Berm dividing cells should be level.		Berm surface is leveled so that water flows evenly over entire length of berm.	
	Annually	Overflow Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.		Rocks replaced to specifications.	
	Quarterly	PVC Pond Liner	Check to see if liner is visible and has more than three 1/4-inch holes, is exposed and/or torn. An indicator of a torn liner could be the pond no longer holds water (during long dry periods the water may evaporate)		Repair or replace liner as needed. Note: wetponds usually have liners	
	Quarterly	Clay Liner	Check to see if pond is holding water (during long dry periods the water may evaporate)		Repair liner to design state.	

1c Biofiltration Swale (Bio-Swale)

A gently-sloped channel with gentle side slopes, lined with grass (and sometimes other vegetation) to slow the flow and allow for water quality treatment and infiltration.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
General	Quarterly	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.		Remove sediment deposits on grass treatment area of the bio-swale. When finished, swale should be level from side to side and drain freely toward outlet. There should be no areas of standing water once inflow has ceased.	
	Quarterly	Standing Water	When water stands in the swale between storms and does not drain freely.		Any of the following may apply: remove sediment or trash blockages, improve grade from head to foot of swale, remove clogged check dams, add underdrains or convert to a wet biofiltration swale.	
	Quarterly	Flow spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed through entire swale		Level the spreader and clean so that flows are spread evenly over entire swale width.	
	Quarterly	Constant Base flow	Small quantities of water continually flow through the swale, even when it has been dry for weeks, and an eroded, muddy channel has formed in the swale bottom.		Add a low-flow pea-gravel drain the length of the swale or by-pass the base flow around the swale.	
	Quarterly	Poor Vegetation Coverage	Grass is sparse or bare or eroded patches occur in more than 10% of the swale bottom.		Determine why grass growth is poor and correct that condition. Re-plant with plugs of grass from the upper slope: plant in the swale bottom at 8-inch intervals. Or re-seed into loosened, fertile soil.	
	Quarterly	Vegetation	When the grass becomes excessively tall (greater than 10”); when nuisance weeds and other vegetation start to take over.		Mow vegetation or remove nuisance vegetation so that flow not impeded. Grass should be mowed to a height of 3 to 4 inches. Remove grass clippings.	
	Annually	Excessive Shading	Grass growth is poor because sunlight does not reach swale.		If possible, trim back over-hanging limbs and remove brushy vegetation on adjacent slopes.	

1c Biofiltration Swale (Bio-Swale) (continued)

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Swale	Quarterly	Inlet/Outlet	Inlet/outlet areas clogged with sediment and/or debris.		Remove material so that there is no clogging or blockage in the inlet and outlet area.	
	Quarterly	Trash and Debris Accumulation	Trash and debris accumulated in the bio-swale.		Remove trash and debris from bioswale.	
	Annually	Erosion/Scouring	Eroded or scoured swale bottom due to flow channelization, or higher flows.		For ruts or bare areas less than 12 inches wide, repair the damaged area by filling with crushed gravel. If bare areas are large, generally greater than 12 inches wide, the swale should be re-graded and re-seeded. For smaller bare areas, over seed when bare spots are evident, or take plugs of grass from the upper slope and plant in the swale bottom at 8-inch intervals.	

1d Wet Biofiltration Swale (Wet Bio-Swale)

Similar to a standard Bio-Swale (previous pages), but with modifications due to saturated soil conditions (such as, specific plants that can tolerate wet conditions).

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Swale	Quarterly	Sediment Accumulation	Sediment depth exceeds 2-inches in 10% of the swale treatment area.		Remove sediment deposits in treatment area.	
Swale	Quarterly	Water Depth	Water not retained to a depth of about 4 inches during the wet season.		Build up or repair outlet berm so that water is retained in the wet swale.	
Swale	Quarterly	Wetland Vegetation	Vegetation becomes sparse and does not provide adequate filtration, OR vegetation is crowded out by very dense clumps of cattail, which do not allow water to flow through the clumps.		Determine cause of lack of vigor of vegetation and correct. Replant as needed. For excessive cattail growth, cut cattail shoots back and compost off-site. Note: normally wetland vegetation does not need to be harvested unless die-back is causing oxygen depletion in downstream waters.	
Swale	Quarterly	Inlet/Outlet	Inlet/outlet area clogged with sediment and/or debris.		Remove clogging or blockage in the inlet and outlet areas.	
Swale	Quarterly	Trash and Debris Accumulation	Any plastic, paper or other waste or debris.		Remove trash and debris from wet swale.	
Swale	Quarterly	Erosion/Scouring	Swale has eroded or scoured due to flow channelization, or higher flows.		Check design flows to assure swale is large enough to handle flows. By-pass excess flows to enlarge swale. Replant eroded areas with fibrous- rooted plants such as Juncus effusus (soft rush) in wet areas or snowberry (Symphoricarpos albus) in dryer areas.	

1e Filter Strip

A basic filter strip is a flat grassy area that provides treatment of unconcentrated sheet flow runoff from adjacent pavement. Can provide enhanced treatment for metals in runoff water when soil is amended with organic compost and grass is sufficiently dense.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
General	Quarterly	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.		Remove sediment deposits, re-level so slope is even and flows pass evenly through strip.	
	Quarterly	Vegetation	When the grass becomes excessively tall (greater than 10-inches); when nuisance weeds and other vegetation starts to take over.		Mow grass, control nuisance vegetation, such that flow not impeded. Grass should be mowed to a height between 3-4 inches.	
	Quarterly	Trash and Debris Accumulation	Trash and debris accumulated on the filter strip.		Remove trash and Debris from filter.	
	Quarterly	Erosion/Scouring	Eroded or scoured areas due to flow channelization, or higher flows.		For ruts or bare areas less than 12 inches wide, repair the damaged area by filling with crushed gravel. The grass will creep in over the rock in time. If bare areas are large, generally greater than 12 inches wide, the filter strip should be re-graded and re-seeded. For smaller bare areas, over seed when bare spots are evident.	
	Quarterly	Flow spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed through entire filter width.		Level the spreader and clean so that flows are spread evenly over entire filter width.	

1f Sand Filter

A typical open sand filter consists of a pre-treatment system to remove sediments, a flow spreader, a sand bed, and underdrain piping. See also Sand Filter Vault.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Above Ground (open sand filter)	Quarterly	Sediment Accumulation on top layer	Sediment depth exceeds 1/2-inch.		No sediment on the sand filter that would impede permeability of the filter section.	
	Quarterly	Trash and Debris Accumulations	Trash and debris accumulated on sand filter bed.		Trash and debris removed from sand filter bed.	
	Quarterly	Sediment/ Debris in Clean-Outs	When the clean-outs become full or partially plugged with sediment and/or debris.		Sediment removed from clean-outs.	
	Quarterly	Sand Filter Media	Drawdown of water through the sand filter media takes longer than 24-hours, and/or flow through the overflow pipes occurs frequently.		Top several inches of sand are scraped. May require replacement of entire sand filter depth depending on extent of plugging (a sieve analysis is helpful to determine if the lower sand has too high a proportion of fine material).	
	Quarterly	Prolonged Flows	Sand is saturated for prolonged periods of time (several weeks) and does not dry out between storms due to continuous base flow or prolonged flows from detention facilities.		Low, continuous flows are limited to a small portion of the facility by using a low wooden divider or slightly depressed sand surface.	
	Quarterly	Short Circuiting	When flows become concentrated over one section of the sand filter rather than dispersed.		Flow and percolation of water through sand filter is uniform and dispersed across the entire filter area.	
	Quarterly	Erosion Damage to Slopes	Erosion over 2-inches deep where cause of damage is prevalent or potential for continued erosion is evident.		Slopes stabilized using proper erosion control measures.	

1f **Sand Filter** (continued)

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Above Ground (open sand filter)	Quarterly	Rock Pad Missing or Out of Place	Soil beneath the rock is visible.		Rock pad replaced or rebuilt to design specifications.	
	Quarterly	Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed across sand filter.		Spreader leveled and cleaned so that flows are spread evenly over sand filter.	
	Annually	Damaged Pipes	Any part of the piping that is crushed or deformed more than 20% or any other failure to the piping.		Pipe repaired or replaced.	

1g Bioretention Cells (Rain Gardens)

A bioretention cell is a shallow, garden-like landscaped depression backfilled with 12" or more of a designed soil mixture and specific plantings for varying moisture conditions. Bioretention areas require annual plant, soil, and mulch maintenance to ensure optimum infiltration and pollutant removal capabilities. Most routine maintenance procedures are typical landscape care activities, but other tasks are more typical of drainage facilities.

Table 1. Routine Maintenance

Activity	Schedule	Completed (Date/By)	Objective	What to do & Notes
Watering: Maintain irrigation system. Fix leaks & breaks, and clear blockages. Hand water as needed for specific plants.	Check system twice annually (such as, in May & July); water only as needed for plant health.		Establish vegetation with a minimum 80% survival rate.	Plants should be selected to be drought-tolerant and not require watering after establishment (2-3 years). Watering may be needed during prolonged dry periods after plants are established.
Weeding: Remove undesired vegetation by hand.	As needed, and especially prior to seed disbursement		Reduce competition for desired vegetation. Improve aesthetics. Exclude undesirable plants.	Periodic weeding is necessary until plants are established. Pull weeds by hand, if possible. Avoid using chemical weed controls.
Prune/control vegetation: Trim excessive growth of branches and remove dead plant material.	Once or twice annually		Maintain plant health and adequate plant coverage. Reduce shading of under-story if species require sun. Maintain soil health and infiltration capability. Maintain clearances from utilities and sight distances.	Depending on aesthetic requirements, occasional pruning and removing dead plant material may be necessary. Remove and dispose of properly. Avoid compacting soil in rain garden.
Clean the entry: Remove any accumulation of debris from flow entrance to garden	Check at least twice annually (such as, in October and January)		Maintain proper flow of stormwater from paved and/or impervious areas to bioretention facility.	Remove debris from curb drops and gutters in flow path to the bioretention area.
Mulching: Replace or add mulch with hand tools to a depth of 2-4 inches.	Once annually, or every two years if runoff pollutant load is low.		Replenish organic material in soil, reduce erosion, prolong good soil moisture level, filter pollutants.	Use compost mulch on the rain garden bottom area and lower side slopes, and wood chips on the upper side slopes and rim (above typical water levels).
Trash, Litter & Debris Removal	As needed, check at least monthly		Maintain aesthetics and prevent clogging of infrastructure.	Remove paper, plastic and other deleterious material from garden
Maintain access to infrastructure: Clear vegetation within one foot of inlets and outfalls, maintain access pathways.	Annually		Prevent clogging of grates and pipes; prevent encroachment on utilities or other infrastructure; maintain sight lines for traffic; maintain access for inspections.	

1g Bioretention Cells (Rain Gardens) - continued

Table 2. Non-routine Maintenance

Activity	Schedule	Completed (Date/By)	Objective	What to do & Notes
Erosion control: Prevent erosion and sediment movement. Replace soil, plant material, and/or mulch layer in areas where erosion has occurred.	Determined by inspection.		Reduce sediment transport and clogging of infrastructure. Maintain desired plant survival and appearance of facilities.	Properly designed facilities should not have erosion problems. If erosion problems persist, assess: (1) flow volumes vs. garden size, (2) flow velocities and gradients, (3) flow dissipation and erosion protection at the flow entrance.
Remove Sediment: Shovel or rake out sediment within vegetated areas. Vactor catch basins and sediment traps.	Determined by inspection.		Reduce sediment transport and clogging of infrastructure. Maintain plant survival and appearance of facilities. Maintain proper elevations and ponding depths.	If sediment is deposited in the bioretention area, determine the source within the contributing area and stabilize sediment source to prevent erosion.
Clean underdrains: Jet clean or rotary cut debris/roots from under-drains.	Determined by inspection of clean-outs.		Maintain proper subsurface drainage, ponding depths, and dewatering rates.	
Clear flow entry: Remove excess vegetation at garden edge with line trimmer, vacuum sweeper, rake and/or shovel.	Determined by inspection.		Prevent accumulation of vegetation at pavement edge and maintain proper sheet flow of stormwater from paved and/or impervious areas to rain garden.	Bioretention facilities should be designed with a proper elevation drop from pavement to vegetated area to prevent blockage of storm flows by vegetation into infiltration area.
Replace plants: Replant bare spots or poor-performing plants per original design or per Town.	Determined by inspection.		Maintain dense vegetation cover to prevent erosion, encourage infiltration and exclude weeds.	If specific plants have a high mortality rate, assess the cause and replace with suitable species.
Replace soil: Remove vegetation and excavate soil.	Determined by inspection (visual) or tests (infiltration, pollutant, or soil fertility).		Maintain infiltration, soil fertility and pollutant removal capability. Save as much plant material as possible for replanting.	Soil mixes for bioretention facilities are designed to maintain long-term fertility and pollutant processing capability. Replacing mulch helps prolong performance & reduce pollutant accumulation.
Rebuild or reinforce structures: Various activities to maintain walls, intake and outfall pads, weirs, other hardscape elements	Determined by inspection.		Maintain proper drainage and aesthetics, and prevent erosion.	
Regrade or recontour slopes: Maintain proper slopes and replant exposed areas.	Determined by inspection.		Prevent erosion where side slopes have been disturbed by foot or auto traffic intrusion.	

Group 2

Underground Tanks, Vaults and Trenches

2a Detention Tanks and Vaults

These types of storage structures are usually underground and accessed via a manhole. DO NOT ENTER ANY TANK OR VAULT without proper training, certification & equipment.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Storage Area	Quarterly	Plugged Air Vents	One-half of the cross section of a vent is blocked at any point, or the vent is damaged.		Vents open and functioning.	
	Quarterly	Debris and Sediment	Accumulated sediment depth exceeds 10% of the diameter of the storage area for 1/2 length of storage vault or any point depth exceeds 15% of diameter. (Example: 72-inch storage tank would require cleaning when sediment reaches depth of 7 inches for more than 1/2 length of tank.)		All sediment and debris removed from storage area.	
	Quarterly	Joints Between Tank/Pipe Section	Any openings or voids allowing material to be transported into facility. (Will require engineering analysis to determine structural stability).		All joint between tank/pipe sections are sealed.	
	Annually	Tank Pipe Bent Out of Shape	Any part of tank/pipe is bent out of shape more than 10% of its design shape. (Review required by engineer to determine structural stability).		Tank/pipe repaired or replaced to design.	
	Annually	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch and any evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determines that the vault is not structurally sound. Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or any evidence of soil particles entering the vault through the walls.		Vault replaced or repaired to design specifications and is structurally sound. No cracks more than 1/4-inch wide at the joint of the inlet/outlet pipe.	
Manhole	Quarterly	Cover Not in Place	Cover is missing or only partially in place. Any open manhole requires maintenance.		Manhole is closed.	
	Quarterly	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread (may not apply to self-locking lids)		Mechanism opens with proper tools.	

2a Detention Tanks and Vaults (continued)

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Manhole	Quarterly	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. Intent is to keep cover from sealing off access to maintenance.		Cover can be removed and reinstalled by one maintenance person.	
	Quarterly	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks.		Ladder meets design standards. Allows maintenance person safe access.	
Catch Basins		See "Catch Basins"	See "Catch Basins"		See "Catch Basins"	

2b Wet Vaults

These types of storage structures are usually underground and accessed via a manhole. DO NOT ENTER ANY TANK OR VAULT without proper training, certification & equipment.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Vault	Quarterly	Trash/Debris Accumulation	Trash and debris accumulated in vault, pipe or inlet/outlet (includes floatables and non-floatables).		Remove trash and debris from vault.	
	Quarterly	Sediment Accumulation in Vault	Sediment accumulation in vault bottom exceeds the depth of the sediment zone plus 6-inches.		Remove sediment from vault.	
	Quarterly	Damaged Pipes	Inlet/outlet piping damaged or broken and in need of repair.		Pipe repaired and/or replaced.	
	Quarterly	Access Cover Damaged/Not Working	Cover cannot be opened or removed, especially by one person.		Pipe repaired or replaced to proper working specifications.	
	Quarterly	Ventilation	Ventilation area blocked or plugged.		Blocking material removed or cleared from ventilation area. A specified % of the vault surface area must provide ventilation to the vault interior (see design specifications).	
	Annually	Vault Structure Damage - Includes Cracks in Walls Bottom, Damage to Frame and/or Top Slab	Maintenance/inspection personnel determine that the vault is not structurally sound.		Vault replaced or repairs made so that vault meets design specifications and is structurally sound.	
			Cracks wider than 1/2-inch at the joint of any inlet/ outlet pipe or evidence of soil particles entering through the cracks.		Vault repaired so no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.	
	Annually	Baffles	Baffles corroding, cracking warping and/or showing signs of failure as deemed by maintenance/ inspection staff.		Baffles repaired or replaced to specifications.	

2b **Wet Vaults** (continued)

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Vault	Annually	Access Ladder Damage	Ladder is corroded or deteriorated, not functioning properly, not attached to structure wall, missing rungs, has cracks and/or misaligned. Confined space warning sign missing.		Ladder replaced or repaired to specifications, and is safe to use as determined by inspection personnel. Replace sign warning of confined space entry requirements. Ladder and entry notification complies with OSHA standards.	

2c Enclosed Sand Filter

Similar to an open sand filter, but installed below grade within a vault.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Vault	Quarterly	Sediment Accumulation on Sand Media Section	Sediment depth exceeds 1/2-inch.		No sediment deposits on sand filter section that would impede permeability of the filter section.	
Vault	Quarterly	Sediment Accumulation in Pre-Settling Portion of Vault	Sediment accumulation in vault bottom exceeds the depth of sediment zone plus 6-inches.		No sediment deposits in first chamber of vault.	
Vault	Quarterly	Trash/Debris Accumulation	Trash and debris accumulated in vault, or pipe inlet/ outlet, floatables and non-floatables.		Trash and debris removed from vault and inlet/outlet piping.	
Vault	Quarterly	Sediment in Drain Pipes/Cleanouts	When drain pipes, cleanouts become full with sediment and/or debris.		Sediment and debris removed.	
Vault	Quarterly	Short Circuiting	When seepage/flow occurs along the vault walls and corners. Sand eroding near inflow area.		Sand filter media section re-laid and compacted along perimeter of vault to form a semi-seal. Erosion protection added to dissipate force of incoming flow and curtail erosion.	
Pipes	Annually	Damaged Pipes	Inlet or outlet piping damaged or broken, in need of repair.		Pipe repaired and/or replaced.	
Vault	Quarterly	Access Cover Damaged/Not Working	Cover cannot be opened, corrosion/ deformation of cover. Maintenance person cannot remove cover using normal lifting pressure.		Cover repaired to proper working specifications or replaced.	
Vault	Quarterly	Ventilation	Ventilation area blocked or plugged		Blocking material removed/cleared from ventilation area. A specified % of the vault surface area must provide venting to the vault interior (per design)	

2c **Enclosed Sand Filter** (continued)

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Vault	Annually	Vault Structure Damaged; Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab.	Cracks wider than 1/2-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound.		Vault replaced or repairs made so that vault meets design specifications and is structurally sound.	
Vault	Annually		Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.		Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.	
Vault	Annually	Baffles/Internal walls	Baffles or walls corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection person.		Baffles repaired or replaced to specifications.	
Vault	Quarterly	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.		Ladder replaced or repaired to specifications, and is safe to use as determined by inspection personnel.	

2d Dispersion Trenches

Dispersion trenches consist of an excavated trench backfilled with drain rock, containing a level perforated pipe, often with a catch basin on the pipe and a notched grade board. They are designed to spread out the flow of water over a broad surface area, to convert pipe flow to sheet flow and reduce the potential for erosion. These structures are typically found at the outlet areas of pipes, ponds or swales.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Dispersion Trench	Annually	Missing or Moved Rock	Trench should be full of rip rap.		Add large rocks (about 30 lb. each) so that rocks are visible above the edge of the trench.	
Dispersion Trench	Quarterly	Pipe Plugged	Accumulated sediment should not exceed 20% of the depth.		Clean and flush pipe. In severe cases, the rocks will have to be removed, cleaned, and then replaced.	
Dispersion Trench	Quarterly	Perforations Plugged	Ensure that at least half of the perforations in the pipe are not plugged with debris or sediment.		Clean or replace perforated pipe.	
Dispersion Trench	Semi-Annually & After Major Storms	Not Discharging Water Properly	The intent of the dispersion trench is to prevent erosion. Water should flow out of the trench in a uniform "sheet flow." Visually inspect the trench for evidence of water discharging at concentrated points and causing erosion.		If water is not being discharged correctly, the trench must be redesigned or rebuilt to standard. The elevation of the lip of the trench should be the same (level) at all points.	
Dispersion Trench	Semi-Annually & After Major Storms	Water flows out top of catch basin	Water should not flow out during storms smaller than the design storm. Also, ensure that it is not causing (and appears unlikely to cause) damage.		Facility must be rebuilt or redesigned to standards. Pipe is probably plugged or damaged and needs replacement.	
Dispersion Trench	Semi-Annually & After Major Storms	Receiving Area Over-Saturated	Ensure that the water in the receiving area is not causing, and does not have the potential to cause, a landslide.		Stabilize the slope with grass or other vegetation. You might need to use rock or other cover if the condition is severe.	

2e Infiltration Trenches and Galleries

Infiltration trenches and galleries are often used to treat runoff from impervious surfaces, such as roads, sidewalks and parking lots. Both utilize perforated pipes surrounded by gravel to keep the perforations from becoming clogged and to help disperse the water into the soil.

Typical maintenance schedule and activities for infiltration trenches:

- Replace pea gravel/topsoil/surface filter fabric as needed.
- Monthly:
    - Ensure the contributing area and inlets are clear of debris.
    - Ensure the contributing area is stabilized.
    - Remove sediment and oil/grease from pre-treatment devices.
    - Mow grass filter strips as necessary and remove grass clippings.
- Semi-Annual Inspection:
    - Repair undercut and eroded areas at inflow and outflow.
    - Inspect pre-treatment devices and diversion structures for sediment build up and structural damage.
- Every five years:
    - Disc or otherwise aerate the basin bottom. De-thatch the basin bottom.
    - Scrape basin bottom and remove sediment.
    - Restore original cross section and infiltration rate. Seed or sod to restore ground cover.

Group 3

Structures and Pre-Treatment

3a Control Structures and Flow Restrictors

Flow control devices are usually placed within manholes, which may be locked. They typically consist of two pipes, one placed above the other. The lower pipe will typically have a cover and a small hole drilled in it to allow for slow release of water. The upper pipe is usually larger to provide an outlet for higher flows and emergency overflows.

What to Check	How Often	Problem or Defect	Conditions to Check for	√ Check	What to do for Desired Condition	√ Done
Structure	Quarterly	Trash and Debris (includes Sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.		Control structure orifice is not blocked. All trash & debris removed	
	Quarterly	Structural Damage	Structure is not securely attached to manhole wall.		Securely attach structure to wall and outlet pipe.	
			Structure is not in upright position (more than 10% from plumb)		Restore structure to correct position.	
			Connections to outlet pipe are not watertight and show signs of rust.		Pipe connections are water tight; structure repaired or replaced and works as designed.	
			Any holes in structure (other than designed holes).		Structure has no holes other than designed holes.	
Cleanout Gate	Quarterly	Damaged or Missing	Cleanout gate is not watertight or is missing.		Gate is watertight and works as designed.	
			Gate cannot be moved up and down by one maintenance person.		Gate moves up and down easily and is watertight.	
			Chain/rod leading to gate is missing or damaged.		Chain is in place and works as designed.	
			Gate is rusted over 50% of its surface area.		Gate is repaired or replaced to meet design standards.	
Orifice Plate	Quarterly	Damaged or Missing	Control device is not working properly due to missing, displaced, or bent orifice plate.		Plate is in place and works as designed.	
		Obstructions	Trash, debris, sediment or vegetation blocking the plate.		Plate is free of all obstructions and works as designed.	
Overflow Pipe	Quarterly	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.		Pipe is free of all obstructions and works as designed.	
Manhole			See "Detention Tanks and Vaults"		See "Detention Tanks and Vaults"	
Catch Basin			See "Catch Basins"		See "Catch Basins"	

3b Catch Basins

These structures are typically located in the streets. Unless identified through recorded documents, the Town is responsible for routine maintenance of the pipes and structures in the public rights-of-way, while the property owner or homeowners association is responsible for maintenance of pipes and catch basins in private areas andfor keeping the grates clear of debris in all areas.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Catch Basin	Quarterly	Trash & Debris	Trash, leaves or debris which is located immediately in front of the catch basin (CB) opening or is blocking inflow capacity of the basin by more than 10%.		Remove trash, leaves & debris located directly in front of CB or on grate	
			Trash or debris (in basin) that exceeds 60 percent of the sump depth as measured from bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6" clearance from the debris surface to the invert of the lowest pipe.		Remove all trash and debris from the catch basin.	
			Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.		Inlet and outlet pipes free of trash or debris.	
			Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g. methane).		Remove dead animals, etc. present within the catch basin.	
	Quarterly	Sediment	Sediment (in basin) exceeds 60% of sump depth as measured from the bottom of basin to invert of lowest pipe into or out of basin, but in no case less than a minimum of 6" clearance from the sediment surface to the invert of lowest pipe.		No sediment in the catch basin	
	Annually	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch (Intent is to make sure no material is running into basin).		Top slab is free of holes and cracks.	
			Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached		Frame is sitting flush on the riser rings or top slab and firmly attached.	
	Annually	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person determines structure is unsound.		Basin replaced or repaired to design standard	
			Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe, or any evidence of soil entering basin.		Pipe regrouted and secure at basin wall.	

3b Catch Basins (continued)

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Catch Basin	Annually	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.		Replaced or repair to design standards.	
	Quarterly	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening.		Remove vegetation blocking opening to basin.	
			Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.		No vegetation or root growth present.	
		Contamination and Pollution	See "Detention Ponds"		No pollution present.	
	Quarterly	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.		Catch basin cover is closed	
	Quarterly	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.		Mechanism opens with proper tools.	
	Quarterly	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)		Cover can be removed by one maintenance person.	
Catch Basin Cover	Quarterly	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.		Catch basin cover is closed	
	Quarterly	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.		Mechanism opens with proper tools.	
	Quarterly	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)		Cover can be removed by one maintenance person.	

3b Catch Basins (continued)

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Ladder	Quarterly	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.		Ladder meets design standards and allows maintenance person safe access.	
Metal Grates (If Applicable)	Quarterly	Grate opening Unsafe	Grate with opening wider than 7/8 inch.		Grate opening meets design standards.	
	Quarterly	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.		Grate free of trash and debris.	
	Quarterly	Damaged or Missing	Grate missing or broken member(s) of the grate.		Grate is in place and meets design standards.	

3c Debris Barriers (Trash Racks)

A metallic screen or similar structural device used to prevent debris from entering a pipe, spillway or other hydraulic structure.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
General	Quarterly	Trash and Debris	Trash or debris that is plugging more than 20% of the openings in the barrier.		Barrier cleared to design flow capacity.	
Metal	Quarterly	Damaged/ Missing Bars	Bars are bent out of shape more than 3 inches.		Bars in place with no bends more than 3/4 inch.	
			Bars are missing or entire barrier missing.		Bars in place according to design.	
			Bars are loose and rust is causing 50% deterioration to any part of barrier.		Barrier replaced or repaired to design standards.	
	Quarterly	Inlet/Outlet Pipe	Debris barrier missing or not attached to pipe		Barrier firmly attached to pipe	

3d Energy Dissipators

Typically a rock splash pad at a pipe end or other discharge location, to reduce the velocity and energy of flowing water and prevent erosion. Other means of energy dissipation include drop manholes, stilling basins, and check dams.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Rock Pad	Quarterly	Missing or Moved Rock	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil.		Rock pad replaced to design standards.	
	Quarterly	Erosion	Soil erosion in or adjacent to rock pad.		Rock pad replaced to design standards.	
Dispersion Trench	Quarterly	Pipe Plugged with Sediment	Accumulated sediment that exceeds 20% of the design depth.		Pipe cleaned/ flushed so it matches design.	
	Quarterly	Not Discharging Water Properly	Visual evidence of water discharging at concentrated points along trench (normal condition is a "sheet flow" of water along trench). Intent is to prevent erosion damage.		Trench redesigned or rebuilt to standards.	
	Quarterly	Perforations Plugged.	Over half of perforations in pipe are plugged with debris and sediment.		Perforated pipe cleaned or replaced.	
	Quarterly	Water Flows Out Top of "Distributor" Catch Basin.	Maintenance person observes or receives credible report of water flowing out during any storm less than the design storm or its causing or appears likely to cause damage.		Facility rebuilt or redesigned to standards.	
	Quarterly	Receiving Area Over-Saturated	Water in receiving area is causing or has potential of causing landslide problems.		No danger of landslides.	
Manhole/Chamber	Annually	Worn or Damaged Post, Baffles, Side of Chamber	Structure dissipating flow deteriorates to 1/2 of original size or any concentrated worn spot exceeding one square foot which would make structure unsound.		Structure replaced to design standards.	
		Other Defects	See "Catch Basins"		See "Catch Basins"	

3e Baffle Oil/Water Separators (API Type)

An underground vault or tank designed to separate oil from runoff water via baffles.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
General	Quarterly	Dirty Discharge Water	Inspect discharge water for obvious signs of poor water quality.		Effluent discharge from vault should be clear without thick visible sheen.	
	Quarterly	Sediment Accumulation	Sediment depth in bottom of vault exceeds 6-inches in depth.		Remove sediment deposits that would impede flow through the vault and reduce separation efficiency.	
	Quarterly	Trash and Debris Accumulation	Trash and debris accumulation in vault, or pipe inlet/outlet, floatables and non-floatables.		Remove trash and debris from vault and inlet/outlet piping.	
	Quarterly	Oil Accumulation	Oil accumulations that exceed 1-inch, at the surface of the water.		Extract oil from vault by vactoring. Disposal must be in accordance with state and local rules and regulations.	
	Quarterly	Damaged Pipes	Inlet or outlet piping damaged or broken and in need of repair.		Pipe repaired or replaced.	
	Quarterly	Access Cover Damaged/Not Working	Cover cannot be opened, corrosion/deformation of cover.		Cover repaired to proper working specifications or replaced.	
	Annually	Vault Structure Damage - Cracks in Walls or Bottom, Damage to Frame and/or Top Slab	See "Catch Basins"		Vault replaced or repairs made so that vault meets design specifications and is structurally sound.	
	Annually	Baffles	Baffles corroding, cracking, warping and/or show signs of failure as determined during inspection.		Baffles repaired or replaced to specifications.	
	Annually	Access Ladder Damaged	Ladder is corroded or deteriorated, not securely attached to structure wall, missing rungs, cracks, or misaligned.		Ladder replaced or repaired and meets specifications, and is safe to use as determined by inspection.	

3f Coalescing Plate Oil/Water Separators

An underground vault or tank designed to separate oil from runoff water via gravity.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
General	Quarterly	Dirty Discharge Water	Inspect discharge water for obvious signs of poor water quality.		Effluent discharge from vault should be clear with no thick visible sheen	
	Quarterly	Sediment Accumulation	Sediment depth in bottom of vault exceeds 6-inches in depth and/or visible signs of sediment on plates.		No sediment on vault bottom and plate media, which would impede flow through the vault and reduce separation efficiency.	
	Quarterly	Trash and Debris	Trash and debris accumulated in vault, or pipe inlet/outlet, floatables.		Trash and debris removed from vault.	
	Quarterly	Oil Accumulation	Oil accumulation that exceeds 1-inch at the water surface.		Oil is extracted from vault. Coalescing plates are cleaned. There should be no visible oil depth on water.	
	Annually	Damaged Coalescing Plates	Plate media broken, deformed, cracked and/or showing signs of failure.		Repaired or replaced.	
	Annually	Damaged Pipes	Inlet or outlet piping damaged or broken or in need of repair.		Pipe repaired and or replaced.	
	Annually	Baffles	Baffles showing signs of failure as determined during maintenance/inspection.		Baffles repaired or replaced to specifications.	
	Annually	Vault Structure Damage - Includes Cracks. Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound.		Vault replaced or repairs made so that vault meets design specifications and is structurally sound.	
	Annually		Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or soil particles entering through the cracks.		Vault repaired to designed condition.	
	Annually	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.		Replace or repair ladder so it meets specifications and is safe to use as determined by inspection.	

3g Catch Basin Inserts

A structure within a catch basin, with a filter containing a pollutant-removal medium. Generally considered as an alternative to oil-water separators, these are not commonly used for permanent installations, as they tend to be maintenance-intensive.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
General	Quarterly	Sediment Accumulation	When sediment forms a cap over the insert media of the insert and/or unit.		No sediment cap on the insert media and its unit.	
	Quarterly	Trash and Debris Accumulation	Trash and debris accumulates on insert unit creating a blockage/restriction.		Trash and debris removed from insert unit. Runoff freely flows into catch basin.	
	Quarterly	Media Insert Not Removing Oil	Effluent water from media insert has a visible sheen.		Effluent water from media insert is free of oils and has no visible sheen.	
	Quarterly	Media Insert Water Saturated	Catch basin insert is saturated with water and no longer has the capacity to absorb.		Remove and replace media insert	
	Quarterly	Media Insert-Oil Saturated	Media oil saturated due to petroleum spill that drains into catch basin.		Remove and replace media insert.	
	Quarterly	Media Insert Use Beyond Normal Product Life	Media has been used beyond the typical average life of media insert product.		Remove and replace media at regular intervals, depending on insert product.	

Group 4

Miscellaneous Facilities and Features

4a Downspouts and Roof Drywells

These facilities dispose of stormwater from roofs and clean impervious surfaces.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Downspout	Annually	Overflow	Water overflows from the gutter or downspout during rain.		First try cleaning out the gutter and downspouts. If this doesn't solve the problem, a larger drywell may be needed.	
Roof	Annually	Moss	Moss and algae are taking over the shadier parts of the shingles.		Disconnect the flexible part of the downspout that leads to the drywell. Then perform moss removal as desired. Pressure wash or use fatty acid solutions instead of highly toxic pesticides or chlorine bleach. Install a zinc strip as a preventative.	

4b Conveyance Pipes, Ditches and Swales

These features contain and direct the flow of water from one location to another.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Pipes	Annually	Sediment, Debris, & Vegetation	Accumulated sediment should not exceed 20% of the diameter of the pipe. Vegetation should not reduce free movement of water through pipes. Ensure that the protective coating is not damaged or rusted. Dents should not significantly impede flow. Pipe should not have major cracks or flaws allowing water to leak out.		Clean out pipes of all sediment and debris. Remove all vegetation so that water flows freely through pipes. Repair or replace pipe.	
Open Ditches	Quarterly	Trash & Debris	There should not be any yard waste or litter in the ditch.		Remove trash and debris and dispose of them properly.	
	Annually	Sediment Buildup	Accumulated sediment should not exceed 20% of the depth of the ditch.		Clean out ditch of all sediment and debris.	
Open Ditches and Swales	Annually	Overgrowth of Vegetation	Check for vegetation (e.g., weedy shrubs or saplings) that reduces the free movement of water through ditches or swales.		Clear blocking vegetation so that water moves freely through the ditches. Grassy vegetation should be left alone.	
	Quarterly	Erosion	Check around inlets and outlets for signs of erosion. Check slopes for signs of sloughing or settling. Action is needed where eroded damage is over 2" deep and where there is potential for continued erosion.		Eliminate causes of erosion. Stabilize slopes by using the appropriate erosion control procedure (e.g. compact the soil, plant grass, reinforce with rock).	
	Annually	Missing Rocks	Native soil beneath the rock splash pad, check dam, or lining should not be visible.		Replace rocks to design standard.	

4b Conveyance Pipes, Ditches and Swales (continued)

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
Swales	Quarterly	Vegetation	Grass cover is sparse and weedy, or areas are overgrown with woody vegetation.		Aerate soils and re-seed and mulch bare areas. Keep grass less than 8" high. Remove woody growth, re-contour & re-seed as necessary.	
	Quarterly	Homeowner Conversion	Swale has been filled in or blocked by shed, woodpile, shrubbery, etc.		Speak with the homeowner and request that the swale area be restored. Contact the Town to report the problem ifnot rectified voluntarily.	
	Annually	Swale does not drain	Water stands in the swale, or flow velocity is very slow. Stagnation occurs.		A survey may be needed to check grades. Grades should be in 1-5% range if possible. If grade is less than 1%, under-drains may need to be installed.	

4c Access Roads & Easements

These features provide access to drainage facilities for inspection and/or maintenance.

What to Check	How Often	Problem or Defect	Conditions to Check For	√ Check	What to do for Desired Condition	√ Done
General	One Time	Access	Check to determine if there is adequate access to your stormwater facilities for maintenance vehicles.		If there is not adequate access, check with the Town to determine whether an easement exists. If so, a maintenance road may need to be constructed	
Access Road	Quarterly	Blocked Roadway	Debris that could damage vehicle tires (glass or metal).		Clear all potentially damaging material.	
	Annually	Blocked Roadway	Any obstructions which reduce clearance above and along the road to less than 14 feet.		Clear above and along roadway so there is enough clearance.	
Road Surface	Annually	Bad Road Conditions	Check for potholes, ruts, mushy spots, or woody debris that limits access by maintenance		Add gravel or remove wood as necessary.	
Shoulders and Ditches	Annually	Erosion	Check for erosion along roadway.		Repair erosion with additional soil or gravel.	