City of Tumwater
Drainage Design and Erosion Control Manual

Stormwater Facility Maintenance Guide

Revised July 2022

Prepared for
City of Tumwater

Stormwater Facility Maintenance Guide

Maintenance Standards

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

Table of Contents

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 homeowners' association, you are responsible for regularly maintaining your privately-owned drainage facilities such as ponds, infiltration systems, rain gardens, catch basins, and pipes. (The City of Tumwater maintains stormwater facilities located in the public right-of-way.)

Most large development sites (typically projects larger than one single-family property) will have developed a detailed Maintenance and Source Control Manual as part of the site development (refer to Drainage Control Plan Maintenance and Source Control Manual requirements in Volume 1, Chapter 3, Section 3.3.3 of the City of Tumwater Drainage Design and Erosion Control Manual). The city requires that the Maintenance and Source Control Manual is transferred with the property to the new owner(s) and responsible parties. The Maintenance and Source Control Manual will provide extensive information on the project, the stormwater facilities on the site, maintenance responsibilities, and maintenance activities that may include. Be sure to locate the Maintenance and Source Control Manual for your project and follow the information presented therein. Where you believe a Maintenance and Source Control Manual exists for your property but is not available, please contact the city to request a copy.

For sites that do not have a Maintenance and Source Control Manual (typically smaller, single-family sites), the following instructions and helpful tips for successful facility inspections and maintenance are provided.

Maintenance Checklists

The checklists in this guide are for you to use when inspecting and maintaining the stormwater facilities for which you are responsible. 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 the city.

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 the desired outcome after maintenance is performed. Log sheets are included to help you keep track of when you last surveyed the stormwater drainage system.

Although it is not intended for the inspection 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
- Measuring tool

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

Safety Warning:

For your safety and per 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 checklists that don't apply to your system). Let city staff know if there are any components of your drainage system you do not recognize or are missing from these pages.

Refer to the City of Tumwater Stormwater System Code, TMC 13.12 for additional stormwater maintenance requirements, including required maintenance frequency.

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.

You may call the City of Tumwater Water Resources and Sustainability Department at 360-754-4140 for technical guidance. Please do not hesitate to call, especially if you are unsure whether a situation you have discovered may be a problem.

Resource Listing

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

Tumwater Water Resources and Sustainability Department
360-754-4140 <https://www.ci.tumwater.wa.us/departments/water-resources-sustainability>.

Tumwater Utility Operations Department
360-754-4150 < https://www.ci.tumwater.wa.us/departments/water-resources-sustainability/utility-operations>.

City of Tumwater Spill Reporting Hotline
360-754-4150 <https://www.ci.tumwater.wa.us/departments/water-resources-sustainability/utility-operations/report-a-public-works-problem>.

City of Tumwater Transportation and Engineering Department
360-754-4140 < https://www.ci.tumwater.wa.us/departments/transportation-engineering>.

Thurston County Environmental Health
Hazardous Waste Disposal (oil, paint, pesticides, etc.)
360-754-4111 <http://www.co.thurston.wa.us/HEALTH/ehhw/index.html>.

Solid Waste Disposal (yard waste, construction waste, contaminated soils, etc.)
360-786-5136 <https://www.thurstoncountywa.gov/phss/Pages/eh-garbagedumping.aspx.>

WSU Thurston Co. Extension (Water Resource Ed. Programs, Envir. Stewardship info.)
360-786-5445 <http://thurston.wsu.edu/water/>.

Log Sheet

Use copies of this log sheet to keep track of when maintenance inspections occur and what items, if any, are repaired or replaced. The completed sheets will serve as a record of past maintenance activities and will provide valuable information on how your facilities are operating. Keep all log sheets in a designated area so others can easily access them.

Location: _____	**Date Checked:**
Checked By: _____	_____
Name: _____	
Address: _____	**Phone:**
City: _____ **Zip:** _____	_____

Facility	Component Checked	Observations

Stormwater Facility Inspection and Maintenance Procedure

Stormwater facilities play an important role in managing the 4 feet of rainfall we receive in Tumwater 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 City of Tumwater Codes to maintain their facilities to established standards for full functionality (City of Tumwater Stormwater System Code, TMC 13.12). Facility owners are responsible for performing 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. The inspection of stormwater facilities and any required maintenance work must be completed and reported annually to the City of Tumwater Water Resources and Sustainability Department by August 31each year.

Again, note that most large development sites will also have a Maintenance and Source Control Manual that was prepared as part of the site development, and should have been provided to the property owners. Look to your site's Maintenance and Source Control Manual for information on the project, the facilities on the site, maintenance responsibilities, and maintenance activities. Where a Maintenance and Source Control Manual is not available, the following steps are provided as general guidance:

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 rain gardens and infiltration trenches), 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 (e.g., 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. You may conduct the inspection yourself and/or with co-owners, or you may use a property

manager or vendor to perform the inspection. Refer to the following Stormwater Facility Maintenance Checklists, which describe the maintenance standards for each component, and also identify and describe defects and their remedies.

For each facility, note on the Inspection and 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 and Maintenance Checklist corresponding to the maintenance accomplished on each facility.

Step 4. Submit

Inspections should be completed once per year using the Private Stormwater Facility Inspection Form. The form can be filled out online or printed out and mailed to the City of Tumwater. Forms are due by August 31 each year. The forms can be accessed here:

https://www.ci.tumwater.wa.us/departments/water-resources-sustainability/water-resources/stormwater/stormwater-programs/private-system-maintenance.

Submit hardcopies of the completed inspection form to: Tumwater Water Resources, 555 Israel Road SW, Tumwater, WA 98501. The completed checklist may be mailed, e-mailed (if available), or delivered in person to Tumwater City Hall, Water Resources and Sustainability counter (basement).

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.

Detention Pond:

A shallow bowl-like depression in the land, with an area to collect and temporarily store stormwater. The pond is generally lined with grass and is intended to store stormwater to reduce runoff volumes during storms.

Actions to keep detention ponds functioning:

- Remove litter, sediment, 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.
- Inspect pond berms for any structural deficiencies.

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 designed 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.

Biofiltration Swale:

A longitudinally sloped, wide, shallow, vegetation-lined channel with gently sloping sides and a flat bottom designed to remove pollutants by means of sedimentation, filtration, soil sorption, and/or plant uptake. Some water also 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 avoid use of herbicides (remove manually).
- Do not fill-in the swale with rocks, bark, etc.
- Aerate the soil to preserve infiltration capacity.

Wet Pond:

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 detention pond") or surface discharge. A wet pond provides a basic level of treatment, and is common in many neighborhoods.

Actions to keep wet ponds 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 city for advice).

Stormwater 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 stormwater 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 city for advice).

Bioretention Cell:

A shallow stormwater system with a designed soil mix and plants. Bioretention is a "low-impact development" (LID) practice that is integrated into a site to retain stormwater near its source. Bioretention cells are designed to mimic a forested condition by controlling stormwater through detention, infiltration, and evapotranspiration. They also provide water quality treatment through sedimentation, filtration, adsorption, and phytoremediation. Bioretention cells function by storing stormwater as surface ponding before it filters through the underlying amended soil.

Actions to keep bioretention cells 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.

Rain Garden:

Non-engineered, shallow, landscaped depressions with compost amended native soils and adapted plants that collect, absorb, and filter stormwater runoff from roof tops, driveways, patios, and other hard surfaces. Rain gardens are sized to pond and temporarily store stormwater runoff and allow stormwater to pass through the amended soil profile.

Actions to keep 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.

Permeable Pavement:

Permeable pavement (also known as pervious and porous pavement) looks very much like ordinary pavement but includes additional "void" spaces where water can pass through. After water drains through permeable pavement wearing course, it is held in a storage reservoir bed (made up of aggregate rock, or drain rock), and then infiltrates into the native soils.

Actions to keep permeable pavement functioning:

- Clean surface to remove trash, sediment, vegetation, and other accumulated debris.
- Check inflow and outflow systems and underdrains, and remove any obstructions.
- Use vacuum to remove fine sediments.
- If pavers are used, check for damaged or missing pavers and replace as needed.
- If paving grids are used, check for loss of soil, grass, and/or gravel material and replace as needed.

Downspout, Sheet Flow, and Concentrated Flow Dispersion:

A gravel trench or splashblock followed by a vegetated flowpath (or dispersion area) used to disperse flow and reduce runoff from impervious surfaces. Dispersion attenuates peak runoff flows by slowing the runoff entering into the conveyance system, allowing some infiltration, and providing some water quality benefits.

Actions to keep downspout, sheet flow, and concentrated flow dispersion functioning:

- Ensure that vegetation is not blocking flow, and perform plant maintenance as needed.
- Remove and replace dead vegetation to ensure that runoff is received in a well-vegetated area.
- Avoid activity in dispersion area to avoid compaction.
- Check for erosion of the dispersion trench or dispersal area and replace and restore gravel and/or soil.

Downspout Infiltration:

Includes an infiltration trench or drywell intended only for use in infiltrating runoff from roof surfaces. Infiltration trenches and drywells are backfilled with washed drain rock, allowing for temporary storage of stormwater runoff in the voids of the drain rock material. Stored runoff gradually infiltrates into the surrounding soil.

Actions to keep downspout infiltration functioning:

- Remove litter, leaves, debris, and obstructions from the infiltration trench or drywell.
- Stabilize adjacent landscaped areas to avoid runoff from eroding and mobilizing soil into the surface inlet.

Detention Tank:

An underground storage facility typically constructed with large diameter corrugated metal or HDPE pipe.

Actions to keep detention tanks functioning:

- Remove litter, leaves, debris, and obstructions from inlet and outlet.
- Check tank for cracks or leaks.
- Clean out any sediment or debris accumulated inside the tank.

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:

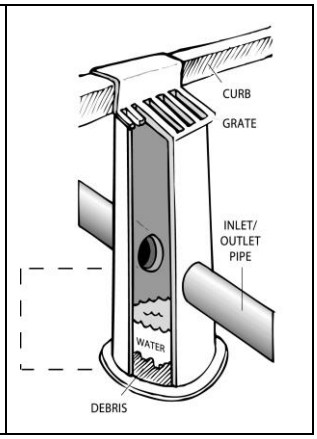
A pipe that continues conveyance flow from a ditch or swale under the ground surface, typically under driveways and cross-streets. Usually connects ("daylights") to another ditch, swale or pond. The end of a pipe or culvert is often surrounded by rock "riprap" (as in photo below, right) to prevent soil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

Debris Barriers and Trash Racks:

A structural device with metal bars, to prevent debris from entering a pipe, spillway, or hydraulic structure.

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.

Stormwater Facilities Maintenance Standards

Group 1 – Flow Control and Treatment Facilities

1a. Detention Ponds

Detention ponds are earthen excavations that are "dry" except during and after rains, when they contain stormwater temporarily. Detention ponds store water while releasing it gradually.

Detention Ponds					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Trash and Debris	Accumulated trash and debris. Dumping of yard wastes such as grass clippings and branches into pond. Presence of glass, plastic, metal, foam, or paper. In general, there should be no visual evidence of dumping.		No trash or debris present. Remove and properly dispose of all trash and debris.	
	Poisonous Vegetation and Noxious Weeds	Any poisonous or nuisance vegetation which may constitute a hazard to the public (such as Scotch broom or blackberry vines, poison oak, tansy ragwort, stinging nettles, or devil's club). Any evidence of noxious weeds as defined in the Thurston County Noxious Weed List: https://www.co.thurston.wa.us/tcweeds/weed-list.htm		Eliminate danger of poisonous vegetation where maintenance personnel or the public might normally be. Completely remove invasive, noxious, or nonnative vegetation according to applicable regulations. *(Coordinate with Thurston County Health Department.)* Do not spray chemicals on vegetation without guidance or city approval. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. (Apply requirements of adopted integrated pest management policies for the use of herbicides.) *Complete eradication of noxious weeds may not be possible.*	

Detention Ponds					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Contamination and Pollution	Presence of contaminants such as oil, gasoline, concrete slurries, paint, obnoxious color, odor, or sludge.		Locate the source of the pollution and remove contaminants or pollutants present. *Report and coordinate source control, removal, and/or cleanup with City of Tumwater Spill Reporting Hotline 360-754-4150, Moderate Risk Waste Program at Thurston County Environmental Health 360-754-4111 and/or Dept. of Ecology Spill Response 800-424-8802.*	
	Rodent Holes	If the facility is constructed with a dam or berm, look for rodent holes or any evidence of water piping through the dam or berm. Water should not be able to flow through the rodent holes.		Remove rodents and repair the dam or berm. *(Coordinate with the Thurston County Health Department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)*	
	Beaver Dam	Beaver dam results in an adverse change in the functioning of the facility		Return facility to design function. Contact City of Tumwater Water Resources and Sustainability Water Resources Specialist for beaver management consultation. (*Contact WDFW Region 6 to identify the appropriate Nuisance Wildlife Control Operator.)*	
	Insects	Insects such as wasps and hornets interfering with maintenance activities, or mosquitoes becoming a nuisance.		Remove insects. For mosquito control, eliminate stagnant water or apply larvicide that contains Bti. *Apply insecticides in compliance with adopted integrated pest management policies.*	

Detention Ponds					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Overgrown Vegetation Around Pond	Tree grown and dense vegetated impedes inspection, maintenance access or interferes with maintenance activity with the facility function or maintenance (i.e., slope mowing, silt removal, vactoring, or equipment movements). Cattails covering more than 25% of the pond surface.		Prune or maintain trees and vegetation so they do not to hinder inspection or maintenance activities. Dispose of clippings appropriately.	
	Hazard Trees	If dead, diseased, or dying trees are identified (Use a certified Arborist to determine health of tree or removal requirements).		Remove hazard trees.	
Side Slopes	Erosion	Maintenance is needed where eroded damage is over 2 inches deep and where there is potential for continued erosion or where any erosion is observed on a compacted berm embankment. Check all pond areas, particularly around inlets and outlets, as well as at berms for signs of sliding or settling.		Try to determine what has caused the erosion and fix it. Stabilize slopes by using appropriate erosion control measure(s); e.g., reinforcing the slope with rock, planting grass, or compacting the soil. Contact the City of Tumwater for assistance. *If erosion is occurring on compacted berms, a professional engineer should be consulted.*	
Pond Storage Area	Sediment Accumulation	Accumulated sediment that exceeds 10 percent of the designed pond depth unless otherwise specified or affects inlets or outlets of the facility.		Clean out sediment and aerate and/or re-seed the pond if deemed necessary to improve infiltration and control erosion. *Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper sediment disposal from street runoff.*	

Detention Ponds					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Pond Storage Area	PVC Pond Liner	An indicator of a torn liner could be the pond no longer holds water. Check to see if the pond holds water during dry periods (during long dry periods the water may evaporate), and the liner is not exposed. Maintenance is needed if liner is visible and has more than three 0.25-inch holes.		Repair or replace liner as needed. Ensure liner is fully covered.	
	Clay Liner	An indicator of a failing liner could be the pond no longer holds water. Check to see if the pond holds water during dry periods (during long dry periods the water may evaporate).		Repair or replace liner as needed.	
Dikes or Berms	Settlement	Any part of the dike or berm that has settled more than 4 inches lower than designed.		Build the dike or berm back to the design elevation. *If settlement is significant, a professional engineer should be consulted to determine the cause of the settlement.*	
	Seepage	Check for water flowing through the pond berm and ongoing erosion with potential for erosion to continue.		Repair berm to eliminate seepage and erosion. *Recommend a geotechnical engineer be called in to inspect and evaluate condition and recommend repair.*	
Emergency Overflow Spillway	Rocks Missing	Check to see that the riprap protective area is intact. Maintenance is need if only one layer of rock exists above native soil in area 5 square feet or larger, or any exposure of native soil at the top of outflow path of spillway.		Restore rocks and pad depth to design standards. (Riprap on inside slopes need not be replaced.) If any native soil is exposed, cover soil with rock riprap.	

Detention Ponds					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Emergency Overflow Spillway	Tree Growth	Check emergency spillways for tree growth that creates blockage problems and may cause failure of the berm due to uncontrolled overtopping.		Remove trees on emergency spillway. *If root system is small (base less than 4 inches) the root system may be left in place. Otherwise, the roots should be removed and the berm restored. A professional engineer should be consulted for proper berm/spillway restoration.*	
Emergency Overflow Spillway	Erosion	Maintenance is needed where eroded damage is over 2 inches deep and where there is potential for continued erosion. Maintenance is needed where any erosion is observed on a compacted berm embankment. Check all pond areas, particularly around inlets and outlets, as well as at berms for signs of sliding or settling.		Try to determine what has caused the erosion and fix it. Stabilize slopes by using appropriate erosion control measure(s); e.g., reinforcing the slope with rock, planting grass, or compacting the soil. Contact the City of Tumwater for technical assistance. *If erosion is occurring on compacted berms, a professional engineer should be consulted to resolve source of erosion.*	

1b. Infiltration Ponds, Trenches, and Galleries

Infiltration ponds, trenches, and galleries are earthen excavations or underground structures that are "dry" except during and after rains, when they contain stormwater temporarily. Infiltration ponds, trenches, and galleries store water while gradually percolating water into the ground.

Infiltration Ponds, Trenches, and Galleries					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Trash and Debris	Accumulated trash and debris. Dumping of yard wastes such as grass clippings and branches into pond. Presence of glass, plastic, metal, foam, or paper. In general, there should be no visual evidence of dumping.		Remove and properly dispose all trash and debris.	
	Poisonous Vegetation and Noxious Weeds	Any poisonous or nuisance vegetation which may constitute a hazard to the public (such as Scotch broom or blackberry vines, poison oak, tansy ragwort, stinging nettles, or devil's club). Any evidence of noxious weeds as defined in the Thurston County Noxious Weed List: https://www.co.thurston.wa.us/tcweeds/weed-list.htm		Eliminate danger of poisonous vegetation where maintenance personnel or the public might normally be. Completely remove invasive, noxious, or nonnative vegetation in accordance with applicable regulations. *(Coordinate with Thurston County Health Department.)* Do not spray chemicals on vegetation without guidance or city approval. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. (Apply requirements of adopted integrated pest management policies for the use of herbicides.) *Complete eradication of noxious weeds may not be possible.*	

Infiltration Ponds, Trenches, and Galleries					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Contamination and Pollution	Presence of contaminants such as oil, gasoline, concrete slurries, paint, obnoxious color, odor, or sludge.		Locate the source of the pollution and remove contaminants or pollutants present. *Report and coordinate source control, removal, and/or cleanup with City of Tumwater Spill Reporting Hotline 360-754-4150, Moderate Risk Waste Program at Thurston County Environmental Health 360-754–4111, and/or Dept. of Ecology Spill Response 800-424-8802.*	
	Rodent Holes	If the facility is constructed with a dam or berm, look for rodent holes or any evidence of water piping through the dam or berm. Water should not be able to flow through the rodent holes.		Remove rodents and repair the dam or berm. *(Coordinate with Thurston County Health Department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)*	
	Beaver Dam	Beaver dam results in an adverse change in the functioning of the facility.		Return facility to design function. Contact City of Tumwater Water Resources and Sustainability Water Resources Specialist for beaver management consultation. (*Contact WDFW Region 6 to identify the appropriate Nuisance Wildlife Control Operator.)*	
	Insects	Insects such as wasps and hornets interfering with maintenance activities, or mosquitoes becoming a nuisance.		Remove standing water if possible. For mosquito control, eliminate stagnant water or apply larvicide that contains Bti. *Apply insecticides in compliance with adopted integrated pest management policies.*	
	Hazard Trees	If dead, diseased, or dying trees are identified (Use a certified Arborist to determine health of tree or removal requirements).		Remove hazard trees.	

Infiltration Ponds, Trenches, and Galleries					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Tree Growth and Dense Vegetation	Tree growth and dense vegetation, which impedes inspection, maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). Cattails covering more than 25% of the pond surface.		Prune or maintain trees and vegetation so they do not to hinder inspection or maintenance activities. Dispose of clippings appropriately.	
Storage Area	Water Not Infiltrating	Check for water ponding in infiltration basin after rainfall ceases and appropriate time allowed for infiltration. Treatment basins should infiltrate Water Quality Design Storm Volume within 48 hours, and empty within 24 hours after cessation of most rain events. (Maintenance is required if a percolation test pit or test of facility indicates facility is only working at 90 percent of its designed capabilities, or if 2 inches or more sediment is present, remove).		Remove sediment and/or clean facility so that infiltration system works according to design. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment form street runoff.	
Filter Bags (if applicable)	Filled with Sediment and Debris	Maintenance is required if sediment and debris fill bag more than one-half full.		Replace filter bag or redesign system. Filter bag must be less than one-half full.	
Rock Filters	Sediment and Debris	By visual inspection, little or no water flows through filter during heavy rain storms.		Replace gravel in rock filter if needed. Water must flow through filter.	
Trenches	Observation Well (use surface of trench if well is not present)	Water ponds at surface during storm events. Less than 90 percent of design infiltration rate.		Remove and replace/clean rock and geomembrane.	

Infiltration Ponds, Trenches, and Galleries					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Galleries	Chambers	Check inlet and outlets and interior of chambers for deficiencies, cracks, debris, and sediment.		Remove any debris and sediment and replace or restore chambers as needed.	
Ponds	Vegetation	Exceeds 12 inches.		Mow grass or groundcover to a height no greater than 6 inches.	
		Bare spots.		Revegetate and stabilize immediately. No bare spots should be present.	
Side Slopes	Erosion	Maintenance is needed where eroded damage is over 2 inches deep and where there is potential for continued erosion or where any erosion is observed on a compacted berm embankment. Check all pond areas, particularly around inlets and outlets, as well as at berms for signs of sliding or settling.		Try to determine what has caused the erosion and fix it. Stabilize slopes by using appropriate erosion control measure(s); e.g., reinforcing the slope with rock, planting grass, or compacting the soil. Contact the City of Tumwater for technical assistance. *If erosion is occurring on compacted berms, a professional engineer should be consulted.*	
Dikes or Berms	Settlement	Any part of the dike or berm that has settled more than 4 inches lower than designed.		Build the dike or berm back to the design elevation. *If settlement is significant, a professional engineer should be consulted to determine the cause of the settlement.*	
	Seepage	Check for water flowing through the pond berm and ongoing erosion with potential for erosion to continue.		Repair berm to eliminate seepage and erosion. *A geotechnical engineer should be consulted to inspect and evaluate condition and recommend repair of condition.*	

Infiltration Ponds, Trenches, and Galleries					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Dikes or Berms	Tree Growth	Tree growth on berms over 4 feet in height may lead to piping through the berm, which could lead to failure of the berm.		Remove trees on berms. *If root system is small (base less than 4 inches) the root system may be left in place. Otherwise, the roots should be removed and the berm restored. A professional engineer should be consulted for proper berm/spillway restoration.*	
Emergency Overflow Spillway	Rocks Missing	Check to see that the riprap protective area is intact. Maintenance is need if only one layer of rock exists above native soil in area 5 square feet or larger, or any exposure of native soil at the top of outflow path of spillway.		Restore rocks and pad depth to design standards. (Riprap on inside slopes need not be replaced.) If any native soil is exposed, cover soil with rock riprap.	
	Tree Growth	Check emergency spillways for tree growth that creates blockage problems and may cause failure of the berm due to uncontrolled overtopping.		Remove trees on emergency spillway. *If root system is small (base less than 4 inches) the root system may be left in place. Otherwise, the roots should be removed and the berm restored. A professional engineer should be consulted for proper berm/spillway restoration.*	
	Erosion	Maintenance is needed where eroded damage is over 2 inches deep and where there is potential for continued erosion. Maintenance is needed where any erosion is observed on a compacted berm embankment. Check all pond areas, particularly around inlets and outlets, as well as at berms for signs of sliding or settling.		Try to determine what has caused the erosion and fix it. Stabilize slopes by using appropriate erosion control measure(s); e.g., reinforcing the slope with rock, planting grass, or compacting the soil. Contact the City of Tumwater for assistance. *If erosion is occurring on compacted berms, a professional engineer should be consulted.*	

Infiltration Ponds, Trenches, and Galleries					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Emergency Overflow Spillway	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.	
Presettling Ponds and Vaults	Facility or Sump Filled with Sediment and/or Debris	6 inches or designed sediment trap depth of sediment.		Remove sediment. No sediment should be present in presettling pond or vault.	
	Water Ponding	If water enters the facility from the surface, inspect to see if water is ponding at the surface during storm events. If buried drain rock, observe drawdown through observation port or cleanout.		Clear piping through facility when ponding occurs. Replace rock material/sand reservoirs as necessary. Tilling of subgrade below reservoir may be necessary (for trenches) prior to backfill. No water ponding should be present on surface during storm events.	
Drain Rock					

For manufactured infiltration galleries, designers must review and apply the most current manufacturer guidelines and recommendations for facility operation and maintenance.

1c. 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 and equipment.

Detention Tanks and Vaults					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Storage Area	Plugged Air Vents	One-half of the cross section of a vent is blocked at any point or the vent is damaged.		Remove blockage or replace air vent if damaged.	
	Debris and Sediment	Accumulated sediment depth exceeds 10 percent of the diameter of the storage area for 50 percent of the length of storage vault or any point depth exceeds 15 percent of diameter. (Example: 72-inch storage tank would require cleaning when sediment reaches depth of 7 inches for more than 50 percent of the length of tank.)		Remove all sediment and debris from storage area.	
	Joints Between Tank/Pipe Section	Any openings or voids allowing material to be transported into facility. (Will require engineering analysis to determine structural stability).		Seal all joint between tank/pipe sections.	
	Tank Pipe Bent Out of Shape	Any part of tank/pipe is bent out of shape more than 10 percent of its design shape. (Review required by engineer to determine structural stability).		Repair or replace tank/pipe to design standard.	

Detention Tanks and Vaults					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Storage Area	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 0.5 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.		Repair or replace to design specifications and ensure structural integrity.	
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 0.5 inch at the joint of any inlet/outlet pipe or any evidence of soil particles entering the vault through the walls.		Repair cracks more than 0.25-inch wide at the joint of the inlet/outlet pipe.	
Manhole	Cover Not in Place	Cover is missing or only partially in place. Any open manhole requires maintenance.		Position manhole access cover/lid in place and secure.	
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 0.5 inch of thread (may not apply to self-locking lids)		Repair or replace the locking mechanism.	
	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.		Use blunt force with a hammer or similar tool to loosen lid.	
	Ladder Rungs Unsafe	Maintenance person judges that ladder is unsafe due to missing rungs, misalignment, rust, or cracks. Ladder must be fixed or secured immediately.		Repair or replace the ladder so it meets design standards and allows maintenance persons safe access.	

Detention Tanks and Vaults					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Catch Basins	See “Catch Basins”	See “Catch Basins.”		See “Catch Basins.”	

1d. 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 and equipment.

Wet Vaults					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Vault	Trash and Debris	Accumulated trash and debris in vault, pipe or inlet/outlet (includes floatables and non-floatables).		Remove and properly dispose of all trash and debris.	
	Sediment Accumulation	Sediment accumulation in vault bottom exceeds the depth of the sediment zone plus 6 inches.		Remove sediment and/or clean facility so that the system works according to design. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment form street runoff.	
	Damaged Pipes	Inlet/outlet piping damaged or broken and in need of repair.		Repair/replace the defective pipe	
	Access Cover Damaged/ Not Working	Cover cannot be opened or removed, especially by one person.		Use blunt force with a hammer or similar tool to loosen lid.	
	Ventilation	Ventilation area blocked or plugged.		Remove blocking material from ventilation area. A specified percentage of the vault surface area must provide ventilation to the vault interior (see design specifications).	
	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.		Repair or replace vault so that vault meets design specifications and is structurally sound.	
		Cracks wider than 0.5 inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.		Repair vault so no cracks exist wider than 0.25 inch at the joint of the inlet/outlet pipe.	

Wet Vaults					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Vault	Baffles	Baffles corroding, cracking warping and/or showing signs of failure as deemed by maintenance/inspection staff.		Repair or replace baffles to specifications.	
	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.		Replace or repair ladder to specifications. Replace sign warning of confined space entry requirements. Ensure ladder and entry notification complies with OSHA standards.	

1e. Wet Ponds

Wet ponds 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. Wet ponds are typically deeper than other water quality BMPs, such as stormwater wetlands, and utilize the pool volume to reduce pollutant loads.

Wet Ponds					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	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.	
	Trash and Debris	Accumulated trash and debris. Dumping of yard wastes such as grass clippings and branches into pond. Presence of glass, plastic, metal, foam, or paper. In general, there should be no visual evidence of dumping.		Remove and properly dispose of all trash and debris.	
	Inlet/Outlet Pipe	Inlet/Outlet pipe clogged with sediment and/or debris material.		Remove sediment and/or debris and dispose of properly.	
	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.		Remove sediment and/or clean facility so that the system works according to design. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
	Oil Sheen on Water	Visible and prevalent oil sheen.		Remove oil 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.	

Wet Ponds					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Erosion	Erosion of the pond's side slopes and/or scouring of pond bottom that exceeds 6 inches, or where continued erosion is prevalent.		Stabilize slopes using proper erosion control measures and repair methods.	
	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.		Repair dike/berm to specifications.	
	Internal Berm	Berm dividing cells should be level.		Level the berm surface so that water flows evenly over entire length of berm.	
	Overflow Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.		Replace rocks to specifications.	
	PVC Pond Liner	Check to see if liner is visible and has more than three 0.25-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: wet ponds usually have liners.	
	Clay Liner	Check to see if pond is holding water (during long dry periods the water may evaporate).		Repair liner to design specifications.	

Wet Ponds					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Poisonous Vegetation and Noxious Weeds	Any poisonous or nuisance vegetation which may constitute a hazard to the public (such as Scotch broom or blackberry vines, poison oak, tansy ragwort, stinging nettles, or devil's club). Any evidence of noxious weeds as defined in the Thurston County Noxious Weed List: https://www.co.thurston.wa.us/tcweeds/weed-list.htm		Eliminate danger of poisonous vegetation where maintenance personnel or the public might normally be. Completely remove invasive, noxious, or nonnative vegetation in accordance with applicable regulations. *(Coordinate with Thurston County Health Department.)* Do not spray chemicals on vegetation without guidance or city approval. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. (Apply requirements of adopted integrated pest management policies for the use of herbicides.) *Complete eradication of noxious weeds may not be possible.*	
	Vegetation Not Growing or Overgrown Within Pond	Presence of invasive species or sparse/excessive growth of plants. Cattails covering more than 25% of the pond surface.		Remove invasive species and reestablish vegetation as designed. Remove tree saplings and cattails from the bottom of the pond. Maintain trees and vegetation around the edges of the pond so they do not hinder inspection or maintenance activities or affect functionality of the pond. Dispose of clippings appropriately.	

1f. Stormwater Wetlands

Stormwater wetlands are designed to improve water quality. They are designed with emergent aquatic plants to provide biological treatment and filtering of runoff water.

Stormwater Wetlands					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Trash and Debris	Accumulated trash and debris. Dumping of yard wastes such as grass clippings and branches into pond. Presence of glass, plastic, metal, foam, or paper.		Remove and properly dispose all trash and debris.	
	Poisonous Vegetation and Noxious Weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public (such as Scotch broom or blackberry vines, poison oak, tansy ragwort, stinging nettles, or devil's club). Any evidence of noxious weeds as defined in the Thurston County Noxious Weed List: https://www.co.thurston.wa.us/tcweeds/weed-list.htm		Eliminate danger of poisonous vegetation where maintenance personnel or the public might normally be. *(*Completely remove invasive, noxious, or nonnative vegetation in accordance with applicable regulations. (*Coordinate with Thurston County Health Department.)* Do not spray chemicals on vegetation without guidance or city approval. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. (Apply requirements of adopted integrated pest management policies for the use of herbicides.) *Complete eradication of noxious weeds may not be possible.*	
	Oil Sheen on Water	Prevalent and visible oil sheen.		Stop the oil discharge at the source if possible. Remove oil from water using oil absorbent pads or Vactor truck. *If chronic low levels of oil persist, plant emergent wetland plants such as Juncus effusus (soft rush) which can assist filtering small concentrations of oil.*	

Stormwater Wetlands					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Inlet/Outlet Pipe	Inlet/Outlet pipe clogged with sediment and/or debris material or damaged.		Remove sediment and/or debris and dispose of properly. Repair and/or replace piping as needed.	
	Rodent Holes	If the facility is constructed with a dam or berm, look for rodent holes or any evidence of water piping through the dam or berm. Water should not be able to flow through the rodent holes.		Remove rodents and repair the dam or berm. *(Coordinate with Thurston County Health Department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)*	
	Beaver Dams	Beaver dam results in an adverse change in the functioning of the facility.		Return facility to design function. Contact City of Tumwater Water Resources and Sustainability Water Resources Specialist for beaver management consultation. (*Contact WDFW Region 6 to identify the appropriate Nuisance Wildlife Control Operator.)*	
	Tree Growth and Hazard Trees	Tree growth that impedes maintenance access.		Remove hazard trees so they do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses.	
	Tree Growth and Hazard Trees	If dead, diseased, or dying trees are identified, use a certified Arborist to determine the health of tree and whether removal is required.		Consult City of Tumwater Community Development Department to determine if a tree cutting permit is required to remove trees in a wetland. Remove hazard trees only as required.	
	Liner	Check to see if liner is visible and has more than three 0.25-inch holes, or if it is exposed and or torn. An indicator of a torn liner could be the wetland no longer holds water (during long dry periods the water may evaporate).		Repair or replace liner as needed.	

Stormwater Wetlands					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Forebay	Sediment Accumulation	Sediment accumulation in forebay exceeds the design depth of the sediment zone plus 6 inches.		Remove accumulated sediment from forebay bottom to the design depth of the sediment zone. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment form street runoff.	
Side Slopes of Wetland	Erosion	Maintenance is needed where eroded damage is over 2 inches deep and where there is potential for continued erosion. Check all wetland areas, particularly around inlets and outlets, as well as at berms for signs of sliding or settling.		Try to determine what has caused the erosion and fix it. Stabilize slopes by using appropriate erosion control measure(s); e.g., reinforcing the slope with rock, planting grass, or compacting the soil. Contact the City of Tumwater for technical assistance.	
Side Slopes of Wetland	Erosion	Any erosion observed on a compacted berm embankment.		If erosion is occurring on compacted berms a professional engineer should be consulted.	
Wetland Cell	Wetland Vegetation	20 percent or more of the stormwater wetland area has dead or dying vegetation, as measured by stem counts relative to the design plant coverage.		Replace dead or dying vegetation with like species, unless recommended otherwise by a Wetlands Consultant and approved by the city. *(Watering, physical support, mulching, and weed removal may be required on a regular basis especially during the first 3 years.)*	
Wetland Cell	Wetland Vegetation	Percent vegetated cover of stormwater wetland bottom area, excluding exotic and invasive species, is less than 50 percent after 2 years.		Remove exotic/invasive species. Additional plantings may be required.	
	Wetland Vegetation	Decaying vegetation produces foul odors.		Remove decaying vegetation, preferably in late summer.	
	Wetland Vegetation	Wetland vegetation is blocking flow paths causing flow back-up and flooding.		Cut back areas of blocking vegetation sufficiently to allow design flows and prevent flooding.	

Stormwater Wetlands					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Wetland Cell	Wetland Vegetation	Water quality monitoring indicates that wetland vegetation is contributing phosphorus and metals to downstream waters rather than sequestering them.		To maximize removal of wetland pollutants, wetland vegetation must be periodically harvested, particularly with respect to phosphorus and metals removal. Harvesting should occur by mid-summer before plants begin to transfer phosphorus from the aboveground foliage to subsurface roots, or begin to lose metals that desorb during plant die off. Every 3 to 5 years the entire plant mass including roots should be harvested because the belowground biomass constitutes a significant reservoir (as much as half) of the nutrients and metals that are removed from stormwater by plants.	
	Sediment Accumulation	Sediment accumulation inhibits growth of wetland plants or reduces wetland volume (greater than 1 foot of sediment accumulation).		Dredge wetland to remove sediment accumulation. Consult with Water Resources and Sustainability and Community Development for applicable permits.	
Wetland Berms (dikes)	Settlements	Any part of berm that has settled 4 inches lower than the design elevation. If settlement is apparent, measure berm to determine amount of settlement. Settling can be an indication of more severe problems with the berm or outlet works.		Restore dike to the design elevation. *A professional engineer should be consulted to determine the source of the settlement.*	
	Seepage	Check for water flowing through the pond berm and ongoing erosion with potential for erosion to continue.		Repair berm to eliminate seepage and erosion. *A geotechnical engineer should be consulted to inspect and evaluate condition and recommend repair of condition.*	

Stormwater Wetlands					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Wetland Berms Over 4 Feet in Height (dikes)	Tree Growth	Tree growth on berms over 4 feet in height may lead to piping through the berm, which could lead to failure of the berm.		Remove trees on berms. *If root system is small (base less than 4 inches) the root system may be left in place. Otherwise, the roots should be removed and the berm restored. A professional engineer should be consulted for proper berm/spillway restoration.*	
Emergency Overflow/ Spillway	Obstruction	Tree growth or other blockage on emergency spillways may cause failure of the berm due to uncontrolled overtopping.		Remove obstruction on emergency spillway. *A professional engineer should be consulted for proper berm/spillway restoration.*	
	Rock Missing	Check to see that the riprap protective area is intact. Only one layer of rock exists above native soil in an area 5 square feet or larger, or any exposure of native soil at the top of out flow path of spillway.		Restore rocks and pad depth to design standards. (Riprap on inside slopes need not be replaced.)	
	Erosion	Maintenance is needed where eroded damage is over 2 inches deep and where there is potential for continued erosion. Maintenance is needed where any erosion is observed on a compacted berm embankment. Check all wetland areas, particularly around inlets and outlets, as well as at berms for signs of sliding or settling.		Try to determine what has caused the erosion and fix it. Stabilize slopes by using appropriate erosion control measure(s); e.g., reinforcing the slope with rock, planting grass, or compacting the soil. Contact the City of Tumwater for assistance. *If erosion is occurring on compacted berms a professional engineer should be consulted.*	

1g. Basic and Compost-Amended Biofiltration 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.

Basic and Compost-Amended Biofiltration Swale					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches or inhibits vegetation growth in 10 percent or more of swale.		Remove sediment deposits on grass treatment area of the biofiltration swale. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff. 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.	
	Standing Water	When water stands in the swale between storms and does not drain freely.		Swale must drain freely and not contain standing water between storms. 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.	
	Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed through entire swale width.		Level the spreader and clean so that flows are spread evenly over entire swale width.	
	Constant Baseflow	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.		Remove base flow from swale. Add a low-flow pea-gravel drain the length of the swale or by-pass the baseflow around the swale.	

Basic and Compost-Amended Biofiltration Swale					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Poor Vegetation Coverage	Grass is sparse or bare or eroded patches occur in more than 10 percent 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. Re-seed into loosened, fertile soil.	
	Vegetation	When the grass becomes excessively tall (higher than 12 inches); 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.	
	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.	
Swale	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.	
	Trash and Debris Accumulation	Trash and debris accumulated in the biofiltration swale.		Remove trash and debris from biofiltration swale.	
	Erosion/ Scouring	Eroded or scoured swale bottom due to flow channelization, or higher flows.		Address cause of erosion or scour. 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, overseed when bare spots are evident, or take plugs of grass from the upper slope and plant in the swale bottom at 8-inch intervals.	

Basic and Compost-Amended Biofiltration Swale					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Swale	Poisonous Vegetation and Noxious Weeds	Any poisonous or nuisance vegetation which may constitute a hazard to the public. Any evidence of noxious weeds as defined in the Thurston County Noxious Weed List: https://www.co.thurston.wa.us/tcweeds/weed-list.htm		Eliminate danger of poisonous vegetation where maintenance personnel or the public might normally be. Completely remove invasive, noxious, or nonnative vegetation in accordance with applicable regulations. (*Coordinate with Thurston County Health Department.)* Do not spray chemicals on vegetation without guidance or city approval. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. (Apply requirements of adopted integrated pest management policies for the use of herbicides.) *Complete eradication of noxious weeds may not be possible.*	

1h. Wet and Continuous Inflow Biofiltration Swales

Similar to a basic biofiltration swale (previous pages), but with modifications due to saturated soil conditions (such as, specific plants that can tolerate wet conditions).

Wet and Continuous Inflow Biofiltration Swales					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Swale	Sediment Accumulation	Sediment depth exceeds 2 inches in 10 percent of the swale treatment area.		Remove sediment deposits in treatment area. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
	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.	
	Wetland Vegetation	Vegetation becomes sparse and does not provide adequate filtration, OR vegetation is crowded out so it does not allow water to flow through. Cattails covering more than 25% of the swale.		Wetland vegetation fully covers bottom of swale. Cause of lack of vigor of vegetation addressed. Replant as needed. Determine cause of lack of vigor of vegetation and correct. Replant as needed. Remove cattails and compost off site. Note: normally wetland vegetation does not need to be harvested unless die-back is causing oxygen depletion in downstream waters.	
	Inlet/Outlet	Inlet/outlet area clogged with sediment and/or debris.		Remove clogging or blockage in the inlet and outlet areas.	
	Trash and Debris Accumulation	Any plastic, paper or other waste or debris.		Remove trash and debris from wet biofiltration swale.	

Wet and Continuous Inflow Biofiltration Swales					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Swale	Erosion/ Scouring	Swale has eroded or scoured due to flow channelization, or higher flows.		Check design flows to ensure swale is large enough to handle flows. By-pass excess flows or 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.	
	Poisonous Vegetation and Noxious Weeds	Any poisonous or nuisance vegetation which may constitute a hazard to the public. Any evidence of noxious weeds as defined in the Thurston County Noxious Weed List: https://www.co.thurston.wa.us/tcweeds/weed-list.htm		Eliminate danger of poisonous vegetation where maintenance personnel or the public might normally be. Completely remove invasive, noxious, or nonnative vegetation in accordance with applicable regulations. *(Coordinate with Thurston County Health Department.)* Do not spray chemicals on vegetation without guidance or city approval. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. (Apply requirements of adopted integrated pest management policies for the use of herbicides.) *Complete eradication of noxious weeds may not be possible.*	

1i. Filter Strip (Basic and CAVFS)

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.

Filter Strip (basic and CAVFS)					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.		Remove sediment deposits, re-level so slope is even and flows pass evenly through strip.	
	Vegetation	When the grass becomes excessively tall (greater than 12 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 to 4 inches.	
	Trash and Debris Accumulation	Trash and debris accumulated on the filter strip.		Remove trash and debris from filter.	
	Erosion/ Scouring	Eroded or scoured areas due to flow channelization, or higher flows.		Address cause of erosion or scour. 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, overseed when bare spots are evident.	
	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.	

1j. Sand Filter (aboveground/open)

A typical open sand filter consists of a pretreatment system to remove sediments, a flow spreader, a sand bed, and underdrain piping. See also Sand Filter (belowground/closed).

Sand Filter (aboveground/open)					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Aboveground (open sand filter)	Sediment and Silt Accumulation on top layer	Sediment and silt depth exceeds 0.5 inch over 10 percent of surface area of sand filter.		Remove sediment deposit on grass layer of sand filter that would impede permeability of the filter section. Scrape silt off during dry periods using steel rakes or other devices. Ensure surface layer of the media is striated.	
	Trash and Debris Accumulations	Trash and debris accumulated on sand filter bed.		Remove trash and debris from sand filter bed.	
	Sediment/ Debris in Clean-Outs	When the clean-outs become full or partially plugged with sediment and/or debris.		Remove sediment from cleanouts and/or drainpipes.	
	Sand Filter Media	Drawdown of water through the sand filter media takes longer than 24-hours, flow through the overflow pipes occurs frequently, or hydraulic conductivity is less than 1 inch per hour.		Scrape top several inches of sand are scraped. Entire replacement of the sand filter may be required depending on extent of plugging (a sieve analysis is helpful to determine if the lower sand has too high a proportion of fine material).	
	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. (Consider 4- to 8-hour drawdown tests).		Limit low, continuous flows to a small portion of the facility by using a low wooden divider or slightly depressed sand surface.	
	Short Circuiting	Drawdown greater than 12 inches per hour. When flows become concentrated over one section of the sand filter rather than dispersed.		Ensure flow and percolation of water through sand filter is uniform and dispersed across the entire filter area. No leaks in the cleanouts or underdrains.	

Sand Filter (aboveground/open)					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Aboveground (open sand filter)	Erosion Damage to Slopes	Erosion over 2 inches deep where cause of damage is prevalent or potential for continued erosion is evident.		Stabilize slopes using proper erosion control measures.	
	Rock Pad Missing or Out of Place	Soil beneath the rock is visible.		Replace or rebuild rock pad to design specifications.	
	Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed across sand filter. Rills and gullies on the surface of the filter can indicate improper function of the inlet flow spreader.		Level the spreader and clean so that flows are spread evenly over sand filter.	
	Damaged Pipes	Any part of the piping that is crushed or deformed more than 20 percent or any other failure to the piping.		Repair or replace pipe as needed.	

1k. Sand Filter (belowground/closed)

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

Sand Filter (belowground/closed)					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Vault	Sediment Accumulation on Sand Media Section	Sediment depth exceeds 0.5 inch.		Remove sediment deposits on sand filter section that would impede permeability of the filter section. Scrape silt off during dry periods using steel rakes or other devices. Ensure the surface layer of the media is striated.	
	Sediment Accumulation in Presettling Portion of Vault	Sediment accumulation in vault bottom exceeds the depth of sediment zone plus 6 inches.		Remove sediment deposits in first chamber of vault.	
	Trash and Debris	Trash and debris accumulated in vault, or pipe inlet/outlet, floatables and non-floatables.		Remove trash and debris from vault and inlet/outlet piping.	
	Sediment in Drain Pipes/ Cleanouts	When drain pipes, cleanouts become full with sediment and/or debris.		Remove any sediment and debris from cleanouts and/or drainpipes.	
	Clogged 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, and/or hydraulic conductivity is less than 1 inch per hour.		Ensure sand filter infiltrates as designed. Scrape top several inches of sand. . Entire replacement of the sand filter may be required depending on extent of plugging and influent suspended solids loads (a sieve analysis is helpful to determine if the lower sand has too high a proportion of fine material). *Other options include removal of thatch, aerating the filter surface, tilling the filter surface, replacing the top 4 inches of filter media, and inspecting geotextiles for clogging.*	

Sand Filter (belowground/closed)					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Vault	Short Circuiting	Drawdown greater than 12 inches per hour. When seepage/flow occurs along the vault walls and corners. Sand eroding near inflow area. (Consider 4- to 8-hour drawdown tests.)		Re-lay and compact the sand filter media section along perimeter of vault to form a semi-seal. Add erosion protection to dissipate force of incoming flow and curtail erosion. Ensure there are no leaks in the cleanouts or underdrains.	
	Access Cover Damaged/ Not Working	Cover cannot be opened, corrosion/deformation of cover. Maintenance person cannot remove cover using normal lifting pressure.		Repair cover to proper working specifications or replaced.	
	Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed across sand filter.		Level the spreader and clean so that flows are spread evenly over sand filter.	
	Ventilation	Ventilation area blocked or plugged.		Remove blocking material from ventilation area. A specified percentage of the vault surface area must provide venting to the vault interior (per design specifications).	
	Vault Structure Damaged; Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 0.5 inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound.		Replace or repair vault to meet design specifications.	

Sand Filter (belowground/closed)					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Vault)	Vault Structure Damaged; Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 0.5 inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.		Repair vault so that no cracks exist wider than 0.25 inch at the joint of the inlet/outlet pipe.	
	Baffles/ Internal walls	Baffles or walls corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection person.		Repair or replace baffles to specifications.	
	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.		Repair or replace ladder to specifications, ensure it is safe to use as determined by inspection personnel.	
Pipes	Damaged Pipes	Inlet or outlet piping damaged or broken, in need of repair.		Repair and/or replace pipe.	

1l. Media Filter Drains

A filter treatment device that is typically sited along highway side slopes (conventional design) and medians (dual media filter drains), borrow ditches, or other linear depressions. Media filter drains have basic components: a gravel no-vegetation zone, a grass strip, the MFD mix bed, and a conveyance system for flows leaving the media filter drain mix.

Media Filter Drains					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
No Vegetation Zone Adjacent to Pavement	Erosion, Scour, or Vehicular Damage	No vegetation zone uneven or clogged so that flows are not uniformly distributed.		Level area and clean so that flows are spread evenly.	
	Sediment Accumulation on Edge of Pavement	Flows no longer sheet flowing off of roadway. Sediment accumulation on pavement edge exceeds top of pavement elevation.		Remove sediment deposits such that flows can sheet flow off of roadway. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
Vegetated Filter	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.		Remove sediment deposits, re-level slope so that flows pass evenly through media filter drain. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
	Excessive Vegetation or Undesirable Species	When the grass becomes excessively tall (greater than 12 inches); when nuisance weeds and other vegetation starts to take over or shades out desirable vegetation growth characteristics. See also the Thurston County Noxious Weed List: https://www.co.thurston.wa.us/tcweeds/weed-list.htm		Grass mowed and nuisance vegetation controlled such that flow not impeded. *Grass should be mowed to a height that encourages dense even herbaceous growth.*	

Media Filter Drains					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Vegetated Filter	Erosion, Scour, or Vehicular Damage	Eroded or scoured areas due to flow channelization, high flows or vehicular damage.		For ruts or bare areas less than 12 inches wide, repair the damaged area by filling with suitable topsoil. 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, overseed when bare spots are evident.	
Media Bed	Erosion, Scour, or Vehicular Damage	Eroded or scoured areas due to flow channelization, high flows or vehicular damage.		For ruts or areas less than 12 inches wide, repair the damaged area by filling with suitable media. If bare areas are large, generally greater than 12 inches wide, the media bed should be re-graded.	
	Sediment Accumulation on Media Bed	Sediment depth inhibits free infiltration of water.		Remove sediment deposits and re-level slope so that flows pass freely through media bed.	
Underdrains	Sediment	Depth of sediment within perforated pipe exceeds 0.5 inch.		Flush underdrains through access ports and collect flushed sediment. Refer to “Volume IV Appendix IV-C: Recommendations for Management of Street Wastes” for proper disposal of sediment from street runoff.	
General	Trash and Debris Accumulation	Accumulated trash and debris. If there is less than the threshold, remove all trash and debris as part of the next scheduled maintenance.		Remove trash and debris from media filter.	
	Flows are Bypassing Media Filter Drain	Evidence of significant flows downslope (rills, sediment, vegetation damage, etc.) of media filter drain.		Remove sediment deposits and re-level slope so that flows pass evenly through media filter drain. If media filter drain is completely clogged, it may require a more extensive repair or replacement.	

Media Filter Drains					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Media Filter Drain Mix Replacement	Water is seen on surface of the media filter drain mix from storms that are less than the 91st percentile 24-hour rain event (approximately 1.25 inches in 24 hours). Maintenance also needed on a 10-year cycle and during a preservation project.		Excavate and replace all of the media filter drain mix contained within the media filter drain.	

1m. Bioretention Cells, Swales, and Planter Boxes

Bioretention areas are shallow stormwater systems with a designed soil mix and plants adapted to the local climate and soil moisture conditions. They are designed to mimic a forested condition by controlling stormwater through detention, infiltration, and evapotranspiration. Most routine maintenance procedures are typical landscape care activities.

Bioretention Cells, Swales, and Planter Boxes					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Trash	Trash and debris present.		Remove and properly dispose of all trash and debris.	
Concrete Sidewalls	Cracks or Failure in Concrete Planter Reservoir	Cracks wider than 0.5 inch or maintenance/inspection personnel determine that the planter is not structurally sound.		Repair or replace concrete.	
Rockery Sidewalls	Unstable Rockery	Rock walls are insecure.		Stabilize rockery sidewalls (may require consultation with professional engineer, particularly for walls 4 feet or greater in height).	
Earthen Side Slopes and Berms	Failure in Earthen Reservoir (embankments, dikes, berms, and side slopes)	Erosion (gullies/rills) greater than 2 inches around inlets, outlet, and alongside slopes.		Eliminate the source of erosion and stabilize damaged area (regrade, rock, vegetation, erosion control blanket). For deep channels or cuts (over 3 inches in ponding depth), deploy temporary erosion control measures until permanent repairs can be made.	
		Erosion of sides causes slope to become a hazard.		Eliminate the hazard and stabilize the slopes.	
		Settlement greater than 3 inches (relative to undisturbed sections of berm).		Restore the design height with additional mulch.	

Bioretention Cells, Swales, and Planter Boxes					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Earthen Side Slopes and Berms	Failure in Earthen Reservoir (embankments, dikes, berms, and side slopes) (continued)	Downstream face of berm or embankment wet, seeps or leaks evident.		Plug holes are compact berm. May require consultation with professional engineer, particularly for larger berms.	
		Any evidence of rodent holes or water piping around holes if facility acts as dam or berm.		Remove rodents (see "Pests: Insects/Rodents") and repair/compact berm.	
Ponding Area	Sediment or Debris Accumulation	Accumulation of sediment or debris to extent that infiltration rate is reduced (see "Ponded water") or surface storage capacity significantly impacted.		Clean sediment out to restore facility shape and depth. Replace damaged vegetation and mulched. Identify and control the source of sediment (if feasible).	
	Leaf Accumulation	Accumulated leaves in facility.		Remove leaves clogging outlet structure that impede water flow.	
	Basin Inlet via Surface Flow	Soil is exposed or signs of erosion are visible.		Control and repair sources of erosion.	
Curb Cut Inlet	Sediment or Debris Accumulation	Sediment, vegetation, or debris partially or fully blocking inlet structure.		Clear curb cut of debris. Identify source of the blockage and take action to prevent future blockages.	
Splashblock Inlet	Water Not Properly Directed to Facility	Water is not being directed properly to the facility and away from the inlet structure.		Reconfigure blocks to direct water to facility and away from structure.	
	Erosion	Water disrupts soil media.		Reconfigure/repair splashblock.	
Inlet/ Outlet Pipe	Damaged Pipe	Pipe is damaged.		Repair/replace pipe. Ensure no cracks more than 0.25 inch wide at the joint of inlet/outlet pipes exist.	
	Clogged Pipe	Pipe is clogged.		Clear pipe of roots or debris. Identify source of the blockage and take action to prevent future blockages.	
Inlets/ Outlet and Access Pathways	Blocked Access	Maintain access for inspections.		Clear vegetation within 1 foot of inlets and outlets. Maintain access pathways.	

Bioretention Cells, Swales, and Planter Boxes					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Ponding Area	Erosion	Water disrupts soil media.		Address cause of erosion or scour. Maintain a cover of rock or cobbles or other erosion protection measure (e.g., matting) to protect the ground where concentrated water enters or exits the facility (e.g., a pipe, curb cut, or swale).	
Trash Rack	Trash or Debris Accumulation	Trash or debris present on trash rack.		Clean and dispose trash.	
	Damaged Trash Rack	Bar screen damaged or missing.		Repair or replace barrier to design standards.	
Check Dams and Weirs	Sediment or Debris Accumulation	Sediment, vegetation, or debris accumulated at or blocking (or having the potential to block) check dam, weir, or orifice.		Clear blockage. Identify the source of the blockage and take actions to prevent future blockages.	
	Erosion	Erosion and/or undercutting is present.		Address the cause of erosion or undercutting. Repair check dam or weir.	
	Unlevel Top of Weir	Grade board or top of weir damaged or not level.		Restore weir to level position.	
Flow Spreader	Sediment Accumulation	Sediment blocks 35 percent or more of ports/notches or, sediment fills 35 percent or more of sediment trap.		Remove and dispose of sediment.	
	Damaged or Unlevel Grade Board/Baffle	Grade board/baffle damaged or not level.		Remove and reinstall board/baffle to level position.	
Overflow/ Emergency Spillway	Sediment or Debris Accumulation	Overflow spillway is partially or fully plugged with sediment or debris.		Remove sediment or debris in overflow.	
	Erosion	Native soil is exposed or other signs of erosion damage are present.		Repair erosion and stabilize surface of spillway.	
	Missing Spillway Armament	Spillway armament is missing.		Replace armament.	

Bioretention Cells, Swales, and Planter Boxes					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Underdrain	Blocked Underdrain	Plant roots, sediment or debris reducing capacity of underdrain. Prolonged surface ponding (see "Bioretention Soil").		Remove sediment and debris from underdrains and orifices.	
Bioretention Soil	Ponded Water	Excessive ponding water: Water overflows during storms smaller than the design event or ponded water remains in the basin 48 hours or longer after the end of a storm.		Identify and address the cause of ponded water: 1. Remove leaf or debris buildup 2. Clear underdrain 3. Investigate other water inputs (e.g., groundwater, illicit connections) 4. Verify contributing area If steps #1–4 do not solve the problem, repair and replant imported bioretention soil.	
	Protection of Soil	Maintenance requiring entrance into the facility footprint.		Perform maintenance without compacting bioretention soil media.	
Vegetation	Bottom Swale and Upland Slope Vegetation	Less than 75 percent of swale bottom is covered with healthy/surviving vegetation.		Address cause of poor vegetation growth. Replant bioretention area as necessary to obtain 75 percent survival rate or greater. Ensure plant selection is appropriate for site growing conditions.	
Trees and Shrubs	Causing Problems for Operation of Facility	Large trees and shrubs interfere with operation of the basin or access for maintenance.		Trees and shrubs Prune or remove large trees and shrubs so they do not hinder facility performance or maintenance activities.	
	Dead Trees and Shrubs	Standing dead vegetation is present.		Ensure trees and shrubs do not hinder facility performance or maintenance activities. Remove dead vegetation and address cause of dead vegetation. Ensure specific plants with high mortality rate are replaced with more appropriate species.	

Bioretention Cells, Swales, and Planter Boxes					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Trees and Shrubs Adjacent to Vehicle Travel Areas (or areas where visibility needs to be maintained)	Safety Issues	Vegetation causes some visibility (line of sight) or driver safety issues.		Maintain appropriate height for sight clearance. Ensure regular pruning maintains visual sight lines for safety or clearance along a walk or drive. Remove or transplant tree or shrub if presenting a continual safety hazard.	
Emergent Vegetation	Conveyance Blocked	Vegetation compromises conveyance. Cattails cover more than 25% of the facility surface.		Clear conveyance of emergent plants. Consider replanting with plants that allow conveyance.	
Mulch	Lack of Mulch	Bare spots (without much cover) are present or mulch covers less than 2 inches.		Ensure facility has a maximum 3-inch layer of an appropriate type of mulch and mulch is kept away from woody stems.	
Vegetation	Accumulation of Clippings	Any grass or other vegetation clippings left in the facility.		Remove and properly dispose of clippings.	
	Weeds	Weeds are present (unless on edge and providing erosion control).		Ensure weed material is removed and disposed of. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality.	

Bioretention Cells, Swales, and Planter Boxes					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Noxious Weeds	Poisonous Vegetation and Noxious Weeds	Any poisonous or nuisance vegetation which may constitute a hazard to the public. Any evidence of noxious weeds as defined in the Thurston County Noxious Weed List: https://www.co.thurston.wa.us/tcweeds/weed-list.htm		Eliminate danger of poisonous vegetation where maintenance personnel or the public might normally be. Completely remove invasive, noxious, or nonnative vegetation in accordance with applicable regulations. *(Coordinate with Thurston County Health Department.)* Do not spray chemicals on vegetation without guidance or city approval. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. (Apply requirements of adopted integrated pest management policies for the use of herbicides.) *Complete eradication of noxious weeds may not be possible.*	
Excessive Vegetation	Adjacent Facilities Compromised	Low-lying vegetation growing beyond facility edge onto sidewalks, paths, or street edge poses pedestrian safety hazard or may clog adjacent permeable pavement surfaces due to associated leaf litter, mulch, and soil.		Trim groundcovers and shrubs at facility edge. Ensure excessive leaf litter is removed.	
	Causes Facility to Not Function Properly	Excessive vegetation density inhibits stormwater flow beyond design ponding or becomes a hazard for pedestrian and vehicular circulation and safety.		Ensure pruning and/or thinning vegetation maintains proper plant density and aesthetics. Remove or replace plants that are weak, broken, or not true to form in-kind. Ensure appropriate plants are present.	
Irrigation (if any)	Routine maintenance	Irrigation system present.		Refer to manufacturer's instructions for O&M.	

Bioretention Cells, Swales, and Planter Boxes					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Plant Watering	Plant Establishment	Plant establishment period (1–3 years).		Water plants as necessary during periods of no rain to ensure plant establishment.	
Summer Watering (after establishment)	Drought Period	Longer term period (3+ years).		Water plants as necessary during drought conditions and water trees up to 5 years after planting.	
Spill Prevention and Response	Spill Prevention	Storage or use of potential contaminants in the vicinity of facility.		Implement spill prevention measures whenever handling or storing potential contaminants.	
	Spill Response	Any evidence of contaminants such as oil, gasoline, concrete slurries, paint, etc.		Clean spills up as soon as possible to prevent contamination of stormwater. *(Coordinate source control, removal, and/or cleanup with City of Tumwater Spill Reporting Hotline 360-754-4150, Moderate Risk Waste Program at Thurston County Environmental Health 360-754–4111, and/or Dept. of Ecology Spill Response 800-424-8802.)*	
Safety	Safety (slopes)	Erosion of sides causes slope to exceed 1:3 or otherwise becomes a hazard.		Take actions to eliminate the hazard such as regrade the slope or vegetate to reduce erosion.	
	Safety (hydraulic structures)	Hydraulic structures (pipes, culverts, vaults, etc.) become a hazard to children playing in and around the facility.		Take actions to eliminate the hazard (such as cover and secure any openings).	
Aesthetics	Aesthetics	Damage/vandalism/debris accumulation.		Restore facility to original aesthetic conditions.	
	Edging	Grass is starting to encroach on swale.		Repair edging.	
Pest Control	Pests: Insects/ Rodents	Pest of concern is present and impacting facility function.		Remove pests and return facility to original functionality. *Manage pests in compliance with adopted integrated pest management policies.*	

Bioretention Cells, Swales, and Planter Boxes					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Pest Control	Mosquitoes	Standing water remains in the basin for more than three days following storms.		Remove standing water if possible. For mosquito control, eliminate stagnant water or apply larvicide that contains Bti. *Apply insecticides in compliance with adopted integrated pest management policies.*	

1n. Rain Gardens

Rain gardens are shallow stormwater systems with compost amended soil or imported rain garden or bioretention soil and plants adapted to the local climate and soil moisture conditions. They are similar in function to bioretention cells, but have less onerous design requirements and are generally applicable to smaller sites.

Rain Gardens					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Facility – General Requirements	Mosquitoes	Standing water remains for more than three days following storms.		Ensure rain garden drains freely and there is no standing water between storms. Remove standing water if possible. For mosquito control, eliminate stagnant water or apply larvicide that contains Bti. *Apply insecticides in compliance with adopted integrated pest management policies.*	
Footprint Area	Trash	Trash and debris present.		Remove and properly dispose of all trash and debris.	
	Debris Accumulation	Accumulated leaves in facility.		Remove leaves clogging outlet structure or impeding water flow.	
Earthen Side Slopes and Berms	Erosion	Persistent soil erosion on slopes.		Address cause of erosion or scour and repair as needed.	
Rockery Sidewalls	Unstable Rockery	Rockery side walls are insecure.		Stabilize rockery sidewalls (may require consultation with engineer, particularly for walls 4 feet or greater in height).	
Rain Garden Bottom Area	Sediment Accumulation	Visible sediment deposition in the rain garden that reduces drawdown time of water in the rain garden.		, Address source of sediment. Remove and dispose of sediment appropriately.	
Mulch	Lack of Mulch	Bare spots (without mulch cover) are present or mulch depth less than 2 inches.		Ensure facility has a minimum 2- to 3-inch layer of an appropriate type of mulch.	

Rain Gardens					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Splashblock Inlet	Water Not Properly Directed to Rain Garden	Water is not being directed properly to the rain garden and away from the inlet structure. Water splashes adjacent buildings.		Reconfigure blocks to direct water to rain garden and away from structure.	
Pipe Inlet/ Outlet	Erosion	Rock or cobble is removed or missing and concentrated flows are contacting soil.		. Address cause of erosion or scour. Cover of rock or cobbles protects the ground where concentrated water flows into the rain garden from a pipe or swale.	
	Accumulated Debris	Accumulated leaves, sediment, debris or vegetation at curb cuts, inlet or outlet pipe.		Clear blockages.	
	Damaged Pipe	Pipe is damaged		Repair/replace pipe as needed.	
	Clogged Pipe	Pipe is clogged.		Clear pipe of roots and debris.	
Access	Blocked Access	Maintain access for inspections.		Maintain vegetation to allow access for personnel and equipment.	
Ponded Water	Ponded Water	Excessive ponding water: Ponded water remains in the rain garden more than 48 hours after the end of a storm.		Remove leaf litter, debris and sediment as needed to maintain infiltration capacity.	
Overflow	Blocked Overflow	Capacity reduced by sediment or debris.		Remove sediment and debris to provide overflow functionality.	
Vegetation	Blocking Site Distances and Sidewalks	Vegetation inhibits sight distances and sidewalks.		Maintain vegetation to allow for adequate site distance and side walk clearances.	
	Vegetation Blocking Pipes	Vegetation is crowding inlets and outlets.		Maintain vegetation at inlets and outlets.	
Vegetation	Unhealthy Vegetation	Dead and dying vegetation		Remove and replace affected vegetation.	
	Weeds	Presence of weeds.		Remove weeds (manual methods preferred) and apply mulch.	

Rain Gardens					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Summer Watering (years 1–3)	Plant Establishment	Tree, shrubs and groundcover health in first 3 years of establishment period.		Water plants as needed during plant establishment period (years 1–3).	
Summer Watering (after establishment)	Drought Conditions	Vegetation requires supplemental water.		Water plants during drought conditions or more often if necessary during post-establishment period (after 3 years).	

1o. Trees

When designed in accordance with this Manual, trees can provide flow control via interception, transpiration, and increased infiltration. Most routine maintenance procedures are typical landscape care activities.

Trees					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Tree	Excess or Unhealthy Growth	Health of tree at risk, or tree in conflict with other infrastructure.		Prune tree according to industry standards to promote tree health and longevity.	
	Plant Establish-ment	Young tree (i.e., within first 3 years).		Provide tree with supplemental irrigation and fertilization (as needed) during first three growing seasons.	
	Plant Establish-ment	Evidence of pest activity affecting tree health.		Implement pest management activities to reduce or eliminate pest activity, and to restore tree health. Refer to Volume IV, BMP A3.6 for an Integrated Pest Management Plan	
	Dead or Declining	Dead, damaged or declining.		Replace tree per planting plan or acceptable substitute.	

1p. Permeable Pavement

Permeable pavement is a stormwater infiltration facility that is designed to accommodate pedestrian, bicycle, and auto traffic while allowing infiltration and storage of stormwater. Permeable pavement includes porous asphalt; pervious concrete; permeable pavers and aggregate pavers; and grid systems.

Permeable Pavement					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
All Pavement Types	Leaf and Debris Accumulation	Fallen leaves or debris.		Remove/dispose of leaf litter and debris.	
	All Pavement Types	Sediment or debris accumulation between paver blocks, on surface of pavement, or in grid voids.		Conduct routine sweeping to maintain permeable surfaces. If infiltration capacity has diminished, use low pressure spraying and vacuum immediately to remove sediment and debris.	
Facility – General Requirements	Unstable Adjacent Area	Runoff from adjacent pervious areas deposits soil, mulch, or sediment on paving.		Stabilize all exposed soils that may erode to pavement surface. Install temporary erosion control BMPs to protect pavement surface until soils have been permanently stabilized. Refer to Volume II, Chapter 3 for temporary erosion control BMPs.	
	Wearing Course Covered by Adjacent Vegetation	Vegetation growing beyond facility edge onto sidewalks, paths, and street edge.		Maintain vegetation so it does not impede function of adjacent facilities or pose as safety hazard. Trim groundcovers and shrubs to avoid overreaching the sidewalks, paths and street edge.	
Porous Asphalt or Pervious Cement Concrete	Routine Maintenance	Maintenance to prevent clogging with fine sediment.		Use conventional street sweepers equipped with vacuums, water, and brushes or pressure washer to restore permeability. Vacuum or sweep the pavement two to three times annually.	

Permeable Pavement					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Porous Asphalt or Pervious Cement Concrete	Facility Protection	Temporary erosion and sediment control BMPs		Use of sand and sealant application prohibited. Protect from construction runoff. Refer to Volume II, Chapter 3 for temporary erosion and sediment control BMPs.	
	Cracks	Major cracks or trip hazards.		Fill potholes or small cracks with patching mix. Address large cracks and settlement by cutting and replacing the pavement section with porous concrete or asphalt.	
	Construction	Utility cuts.		Replace any damage or change due to utility cuts with like porous material.	
Interlocking Concrete Paver Blocks	Missing or Damaged Paver Block	Interlocking paver block missing or damaged.		Remove and replace individual damaged paver blocks or repair per manufacturer's recommendations.	
	Settlement	Settlement of surface. When deviation from original grade impedes function.		Re-establish original grade. May require resetting paver blocks.	
	Void Material is Missing or Low	Loss of aggregate material between paver blocks.		Refill per manufacturer's recommendations.	
Open-Celled Paving Grid with Gravel	Loss of Aggregate Material in Paving Grid	Loss of aggregate material in grid.		Maintain aggregate gravel level at the same level as the plastic rings or no more than 0.25 inch above the top of rings. Refill per manufacturer's recommendations.	
Open-Celled Paving Grid with Grass	Lack of Grass Coverage	Loss of soil and/or grass material in grid.		Refill and/or replant per manufacturer's recommendations. Restore growing medium, aerate facility, and reseed or plant. Amend vegetated area as needed.	
Inlet/Outlet Pipe	Pipe is Damaged	Pipe is damaged.		Repair/replace pipe.	
	Pipe is Clogged	Pipe is clogged.		Remove roots or debris.	

Permeable Pavement					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Inlet/Outlet Pipe	Erosion	Native soil exposed or other signs of erosion damage present.		Address cause of erosion or scour.	
Underdrain Pipe	Blocked Underdrain	Plant roots, sediment or debris reducing capacity of underdrain (may cause prolonged drawdown period).		Jet clean or rotary cut debris/roots from underdrain(s). If underdrains are equipped with a flow restrictor (e.g., orifice) to attenuate flows, the orifice must be cleaned regularly.	
Spill Prevention and Response	Source Control	Storage or use of potential contaminants in the vicinity of facility.		Exercise spill prevention measures whenever handling or storing potential contaminants. Refer to Volume IV for Source Control BMPs.	
	Release of Pollutants	Any evidence of contaminants such as oil, gasoline, concrete slurries, paint, etc.		Clean spills as soon as possible to prevent contamination of stormwater. Use absorbent material or pads and dispose of properly. *(Coordinate source control, removal, and/or cleanup with City of Tumwater Spill Reporting Hotline 360-754-4150, Moderate Risk Waste Program at Thurston County Environmental Health 360-754–4111, and/or Dept. of Ecology Spill Response 800-424-8802.)*	

1q. Vegetated Roofs

Vegetated roofs are areas of living vegetation installed on top of buildings, or other above-grade impervious surfaces. Design components vary depending on the vegetated roof type and site constraints, but may include a waterproofing material, a root barrier, a drainage layer, a separation fabric, a growth medium (soil), and vegetation.

Vegetated Roofs					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Soil/ Growth Medium	Water is Not Infiltrating Properly	Water does not permeate growth media (runs off soil surface).		Aerate or replace media until stormwater infiltrates freely through growth media.	
	Water is Not Infiltrating Properly	Growth medium thickness is less than design thickness (due to erosion and plant uptake).		Supplement growth medium to design thickness.	
	Water is Not Infiltrating Properly	Fallen leaves or debris are present.		Remove leaves or debris.	
	Erosion/ Scouring	Areas of potential erosion are visible.		Address causes of erosion. Take steps to repair or prevent erosion. Fill, hand tamp, or lightly compact, and stabilize with additional soil substrate/growth medium and additional plants.	
Erosion Control Measures	Erosion/ Scouring	Mat or other erosion control is damaged or depleted during plant establishment period.		Repair/replace erosion control measures until 90 percent vegetation coverage is attained. Avoid application of mulch on extensively vegetated roofs.	
System Structural Components	Deteriorating Flashing, Gravel Stops, Utilities, or Other Structures on Roof	Flashing, utilities or other structures on roof are deteriorating (can serve as source of metal pollution in vegetated roof runoff).		Inspect and repair/replace structural components as necessary.	
Roof Drain	Sediment, Vegetation, or Debris Accumulation	Sediment, vegetation, or debris blocks 20 percent or more of inlet structure.		Identify and correct problems that led to the blockages. Clear blockages.	

Vegetated Roofs					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Roof Drain	Damaged Inlet Pipe	Inlet pipe is in poor condition.		Repair/replace pipe as needed.	
	Clogged Inlet Pipe	Pipe is clogged.		Remove roots or debris.	
Vegetation	Plant Coverage	Healthy vegetative coverage falls below 90 percent (unless design specifications stipulate less than 90 percent coverage).		Plant bare areas with vegetation. If necessary, install erosion control measures until percent coverage goal is attained.	
Vegetation (sedums)	Routine Maintenance	Extensive roof with low density sedum population.		Mulch mow sedums, creating cuttings from existing plants to encourage colonization.	
Vegetation	Poisonous Vegetation and Noxious Weeds	Any poisonous or nuisance vegetation which may constitute a hazard to the public. Any evidence of noxious weeds as defined in the Thurston County Noxious Weed List: https://www.co.thurston.wa.us/tcweeds/weed-list.htm		Eliminate danger of poisonous vegetation where maintenance personnel or the public might normally be. Completely remove invasive, noxious, or nonnative vegetation in accordance with applicable regulations. *(Coordinate with Thurston County Health Department.)*. Do not spray chemicals on vegetation without guidance or city approval. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. *Complete eradication of noxious weeds may not be possible.*	
	Presence of Weeds	Weeds are present.		Remove and properly dispose of weed material using manual methods. It is strongly recommended that herbicides and pesticides not be used in order to protect water quality.	

Vegetated Roofs					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Vegetation (extensive vegetated roof)	Under Fertilization	Poor plant establishment and possible nutrient deficiency in growth medium.		Allow organic debris to replenish and maintain long-term nutrient balance and growth medium structure. Conduct annual soil test 2 to 3 weeks prior to the spring growth flush to assess need for fertilizer. Utilize test results to adjust fertilizer type and quantity appropriately. Use the minimum amount of slow-release fertilizer necessary to achieve successful plant health. Apply fertilizer only after acquiring required approval from facility owner and operator. Note that extensive vegetated roofs are designed to require zero to minimal fertilization after establishment (excess fertilization can contribute to nutrient export).	
Vegetation (intensive vegetated roof)	Under Fertilization	Fertilization may be necessary during establishment period or for plant health and survivability after establishment.		Conduct annual soil test 2 to 3 weeks prior to the spring growth flush to assess need for fertilizer. Utilize test results to adjust fertilizer type and quantity appropriately. Apply the minimum amount of slow-release fertilizer necessary to achieve successful plant establishment. Apply fertilizer only after acquiring required approval from facility owner and operator. Intensive vegetated roofs may require more fertilization than extensive vegetated roofs.	

Vegetated Roofs					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Vegetation (trees and shrubs on an intensive vegetated roof)	Routine Maintenance	Pruning as needed.		All pruning of mature trees shall be performed by or under the direct guidance of an ISA certified arborist.	
Irrigation system (if any)	Routine Maintenance	Irrigation system is not working or routine maintenance is needed.		Refer to manufacturer's instructions for O&M.	
Vegetation (extensive vegetated roof)	Plant Establish-ment	Summer watering – Plant establishment period (1 to 2 years).		Water weekly during periods of no rain to ensure plant establishment (30 to 50 gallons per 100 square feet).	
	Drought Conditions	Summer watering – Longer term period (2+ years).		Water during drought conditions or more often if necessary to maintain plant cover (30 to 50 gallons per 100 square feet).	
	Plant Establish-ment	Plant establishment period (1 to 2 years).		Water deeply, but infrequently, so that the top 6 to 12 inches of the root zone is moist. Use soaker hoses or spot water with a shower type wand when irrigation system not present.	
Vegetation (intensive vegetated roof)	Drought Conditions	Longer term period (2+ years).		Water during drought conditions or more often if necessary to maintain plant cover.	
Spill Prevention and Response	Source Control	Storage or use of potential contaminants in the vicinity of facility.		Exercise spill prevention measures whenever handling or storing potential contaminants.	

Vegetated Roofs					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Spill Prevention and Response	Release of Pollutants	Any evidence of contaminants such as oil, gasoline, concrete slurries, paint, etc.		Clean spills as soon as possible to prevent contamination of stormwater. (Coordinate source control, removal, and/or cleanup with City of Tumwater Spill Reporting Hotline 360-754-4150, Moderate Risk Waste Program at Thurston County Environmental Health 360-754–4111, and/or Dept. of Ecology Spill Response 800-424-8802.)	
Training and Documentation	Training	Training/written guidance is required for proper O&M.		Provide property owners and tenants with proper training and a copy of the Maintenance and Source Control Manual.	
Safety	Access	Insufficient egress/ingress routes and fall protection.		Maintain egress and ingress routes to design standards and fire codes. Ensure appropriate fall protection is in place.	
Aesthetics	Poor Aesthetics	Damage/vandalism/debris accumulation.		Restore facility to original aesthetic conditions.	
Pest Control	Mosquitoes	Standing water remains for more than three days following storms.		Remove standing water if possible. For mosquito control, eliminate stagnant water or apply larvicide that contains Bti. *Apply insecticides in compliance with adopted integrated pest management policies.*	

1r. Downspout, Sheet Flow, Concentrated Flow Dispersion

Dispersion BMP components vary depending on the type of BMP used, but can consistent of a gravel filled trench, splashblock, transition zone, vegetated flow path, berms, and/or slotted drains. Dispersion BMPs reduce peak flows by slowing stormwater runoff entering into the conveyance system, allowing for some infiltration, and providing some water quality benefits.

Downspout, Sheet Flow, Concentrated Flow Dispersion					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Splashblock	Water Directed Toward Building	Water is being directed towards building structure.		Direct water away from building structure.	
	Water Causing Erosion	Water disrupts soil media.		Reconfigure/repair blocks and restore media.	
Transition Zone	Erosion	Adjacent soil erosion; uneven surface creating concentrated flow discharge; or less than 2 feet of width.		Address cause of erosion or scour.	
Dispersion Trench	Concentrated Flow	Visual evidence of water discharging at concentrated points along trench (normal condition is a “sheet flow” from edge of trench; intent is to prevent erosion damage).		Notch grade board or other distributor type and align to prevent erosion. Rebuild trench to standards, if necessary.	
Surface of Trench	Accumulated Debris	Accumulated trash, debris, or sediment on drain rock surface impedes sheet flow from facility.		Remove and properly dispose of all trash and debris.	
	Vegetation Impeding Flow	Vegetation/moss present on drain rock surface impedes sheet flow from facility.		Maintain vegetation and treat moss with an all-natural, eco-friendly moss treatment.	
Pipe(s) to Trench	Accumulated Debris in Drains	Accumulation of trash, debris, or sediment in roof drains, gutters, driveway drains, area drains, etc.		Remove trash or debris in roof drains, gutters, driveway drains, or area drains.	

Downspout, Sheet Flow, Concentrated Flow Dispersion					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Pipe(s) to Trench	Accumulated Debris in Inlet Pipe	Pipe from sump to trench or drywell has accumulated sediment or is plugged.		Remove trash or debris in inlet/outlet pipe screen or inlet/outlet pipe.	
	Damaged Pipes	Cracked, collapsed, broken, or misaligned drain pipes.		Repair cracks more than 0.25-inch wide at the joint of the inlet/outlet pipe.	
Sump	Accumulated Sediment	Sediment in the sump.		Remove sediment and dispose of properly. A contractor with vactor capabilities maybe needed.	
Access Lid	Hard to Open	Cannot be easily opened.		Clear lid of soil and debris. Use a blunt force object, such as a hammer, to loosen lid. Repair or replace access lid as needed.	
	Buried	Access lid is buried or unable to locate.		Use a metal detector in necessary to locate lid. Clear lid of soil and debris and ensure lid functions as designed (refer to record drawings for design intent).	
	Missing Cover	Cover missing.		Replace cover.	
Rock Pad	Inadequate Rock Cover	Only one layer of rock exists above native soil in area 6 square feet or larger, or any exposure of native soil.		Repair/replace rock pad to meet design standards.	
	Erosion	Soil erosion in or adjacent to rock pad.		Repair/replace rock pad to meet design standards.	
Dispersal Area	Erosion	Erosion (gullies/rills) greater than 2 inches deep in dispersal area.		Address cause of erosion or scour. Replace eroded media.	
	Accumulated Sediment	Accumulated sediment or debris to extent that blocks or channelizes flow path.		Remove and dispose of sediment or debris in dispersal area. Address sediment source (if feasible).	
Ponded Water	Ponded Water	Standing surface water in dispersion area remains for more than 3 days after the end of a storm event.		Address the cause of the standing water (e.g., grade depressions, compacted soil).	

Downspout, Sheet Flow, Concentrated Flow Dispersion					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Vegetation	Plant Survival	Dispersal area vegetation in establishment period (1 to 2 years, or additional 3rd year) during extreme dry weather).		Ensure vegetation is healthy and watered weekly during periods of no rain to ensure plant establishment.	
	Lack of Vegetation Allowing Erosion	Poor vegetation cover such that erosion is occurring.		Ensure vegetation is healthy and watered. Address cause of erosion or scour. Ensure plant species are appropriate for the soil and moisture conditions.	
	Vegetation Blocking Flow	Vegetation inhibits dispersed flow along flow path.		Ensure vegetation is trimmed, weeded, or replanted to restore dispersed flow path.	
	Presence of Poisonous and Noxious Weeds	Any poisonous or nuisance vegetation which may constitute a hazard to county personnel or the public (such as Scotch broom or blackberry vines, poison oak, tansy ragwort, stinging nettles, or devil's club). Any evidence of noxious weeds as defined in the Thurston County Noxious Weed List: https://www.co.thurston.wa.us/tcweeds/weed-list.htm		Eliminate danger of poisonous vegetation where maintenance personnel or the public might normally be. Completely remove invasive, noxious, or nonnative vegetation in accordance with applicable regulations. Do not spray chemicals on vegetation without guidance or city approval. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. *Complete eradication of noxious weeds may not be possible.*	
Pest Control	Mosquito Infestation	Standing water remains for more than three days following storms.		Remove standing water if possible. For mosquito control, eliminate stagnant water or apply larvicide that contains Bti. *Apply insecticides in compliance with adopted integrated pest management policies.*	
Rodents	Presence of Rodents	Rodent holes or mounds disturb dispersion flow paths.		Remove pests and return facility to original functionality. *Manage pests in compliance with adopted integrated pest management policies.* Repair dispersion flow path.	

1s. Downspout Infiltration

Downspout infiltration systems are trench or drywell designs intended only for use in infiltrating runoff from roof downspout drains.

Downspout Infiltration					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Rock Trench/Well	Inflow Disruption	Accumulated trash, debris, or sediment on drain rock surface impeding sheet flow into facility.		Sheet flow re-established. Remove and dispose of material in accordance with applicable solid waste requirements.	
	Inflow Disruption	Vegetation/moss present on drain rock surface impeding sheet flow into facility.		Maintain vegetation and treat moss. Use natural moss treatment, such as baking soda or vinegar mixtures as solutions instead of highly toxic pesticides or chlorine bleach. Install a zinc strip as a preventive treatment.	
	Inflow Disruption	Water ponding at surface, or standing water in subgrade observation port.		Ensure inflow to facility is clear and/or rock or sand reservoirs have been replaced as needed.	
Inlet/Outlet Pipe Conveyance	Conveyance Blockage	Accumulation of trash, debris, or sediment in roof drains, gutters, driveways drains, area drains, etc.		Clear conveyance systems of debris.	
	Conveyance Blockage	Pipes to or from sump, trench, or drywell have accumulated sediment or is plugged.		Clear pipe systems of debris.	
	Conveyance Damage	Pipes to or from sump, trench, or drywell is cracked, broken, or misaligned.		Repair/replace pipes as needed.	
Roof Downspout	Splash Pad not functioning	Splash pad missing or damaged.		Repair/replace splash pad	
	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. Contact the city before changing the design or upgrading to a larger drywell.	

Downspout Infiltration					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Storage Sump	Sediment in Sump	Excess sediment accumulate in sump.		Remove and properly dispose of material.	
	Access Lid Problems	Access lid cannot be opened or is missing.		Refer to record drawings to confirm type, function, and required components. Repair or replace access lid as needed.	
Roof	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. Use natural moss treatment, such as baking soda or vinegar mixtures as solutions instead of highly toxic pesticides or chlorine bleach. Install a zinc strip as a preventive treatment.	

1t. Cisterns

Cisterns are designed to collect stormwater runoff from non-polluting surfaces (typically roofs), and to make use of the collected water. Reuse of the runoff can be for irrigation, potable, and non-potable uses, but requires different levels of storage and water quality treatment depending on the intended use.

Cisterns					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Roof/Gutter	Debris Accumulation in Cistern	Debris has accumulated.		Remove and properly dispose of all debris.	
	Debris Accumulation in Gutter	Debris has accumulated.		Remove and properly dispose of all debris.	
Screens at the Top of Downspout and Cistern Inlet	Debris Accumulation in Cistern	Screen has deteriorated.		Repair/replace screen as needed.	
	Routine Maintenance	Debris is accumulating on screen.		Remove and properly dispose of all debris.	
Low Flow Orifice	Cistern Overflows are too Frequent	Debris or other obstruction of orifice.		Clean low flow orifice.	
Overflow Pipe	Overflow Pipe	Pipe is damaged.		Repair/replace overflow pipe as needed.	
	Overflow Pipe	Pipe is clogged.		Remove debris. Ensure overflow pipe can convey overflow to point of discharge.	
Cistern	Accumulated Debris And/or Sediment	More than 6 inches of accumulation in bottom of cistern.		Remove accumulated debris and/or sediment.	
Training and Documentation	Training	Training/written guidance is required for proper O&M.		Ensure property owners and tenants are provided with proper training and a copy of the Maintenance and Source Control Manual.	

Cisterns					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Access and Safety	Hazardous conditions	Safe access to cistern is required for maintenance or cleaning.		Confined space training may be required if entering a confined space.	
Pest Control	Mosquitos	Standing water remains for more than 3 days following storms.		Remove standing water if possible. For mosquito control, eliminate stagnant water or apply larvicide that contains Bti. *Apply insecticides in compliance with adopted integrated pest management policies.*	

1u. Fencing/Shrubbery Screen/Other Landscaping

Fencing, shrubbery screening, and landscaping provide flow control via interception, transpiration, and increased infiltration as well as slope protection. Most routine maintenance procedures are typical landscape care activities.

Fencing/Shrubbery Screen/Other Landscaping					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Missing or Broken Parts/Dead Shrubbery	Any defect in the fence or screen that permits easy entry to a facility.		Mend fence or replace shrubs to form a solid barrier to entry.	
	Erosion	Erosion has resulted in an opening under a fence that allows entry by people or pets.		Replace soil under the fence so that no opening exceeds 4 inches in height.	
	Unruly Vegetation	Shrubbery is growing out of control or is infested with weeds. See also Thurston County Noxious Weed List: https://www.co.thurston.wa.us/tcweeds/weed-list.htm		Maintain shrubbery and remove weeds with manual methods. Do not spray chemicals on vegetation without guidance or city approval. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality.	
Fences	Damaged Parts	Posts out of plumb more than 6 inches.		Repair/replace posts so they are plumb to within 1.5 inches of plumb.	
		Top rails bent more than 6 inches.		Repair top rail so it is free of bends greater than 1 inch.	
		Missing or loose tension wire.		Ensure tension wire in place and holding fabric.	
		Missing or loose barbed wire that is sagging more than 2.5 inches between posts.		Stretch barbed wire in place with less than 0.75-inch sag between posts.	
		Extension arm missing, broken, or bent out of shape more than 1.5 inches.		Repair extension arm in place with no bends larger than 0.75 inch.	
		Part or parts that have a rusting or scaling condition that has affected structural adequacy.		Replace with structurally adequate posts or parts with a uniform protective coating.	

Fencing/Shrubbery Screen/Other Landscaping					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Fences	Openings in Fabric	Openings in fabric greater than 8-inch-diameter.		Repair fabric as needed.	

1v. Manufactured Media Filters

Manufactured media filters are installed below grade and usually consist of a two-chambered vault that include a presettling basin and a filter bed with sand or filter media. This filter is accessed through a manhole. DO NOT ENTER ANY TANK OR VAULT without proper training, certification, and equipment.

Manufactured Media Filters					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Media Filter Vault	Sediment Accumulation on Top of Filter Cartridges	Sediment accumulation exceeds 0.25 inches on top of cartridges.		Sediment on cartridges likely indicates that cartridges are plugged and require maintenance or replacement.	
	Sediment Accumulation	Sediment accumulation in vault exceeds 6 inches. Look for other indicators of clogged cartridges or overflow.		Sediment in vault likely indicates that cartridges are plugged and require maintenance or replacement. Remove sediment in vault.	
	Trash and Floatable Debris Accumulation	Trash and floatable debris accumulation in vault.		Remove trash or other floatable debris in filter vault.	
	Filter Cartridges Submerged	Filter vault does not drain within 24 hours following storm. Look for evidence of submergence due to backwater or excessive hydrocarbon loading.		Check filter media and replaced if needed. If cartridges are plugged with oil additional treatment or source control BMP may be needed (such as oil/water separator).	
Forebay	Sediment Accumulation	Sediment accumulation exceeds 6 inches or 33 percent (one third) of the available sump.		Remove and properly dispose of sediment. Refer to “Volume IV Appendix IV-C: Recommendations for Management of Street Wastes” for proper disposal of sediment from street runoff.	
	Trash and Floatable Debris Accumulation	Trash and/or floatable debris accumulation.		Remove trash or other floatable debris accumulation in forebay. Significant oil accumulation may indicate the need for additional treatment or source control (such as oil/water separator).	

Manufactured Media Filters					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Drain Pipes/ Cleanouts	Sediment in Drain Pipes/ Cleanouts	Accumulated sediment that exceeds 20 percent of the diameter.		Remove sediment and debris. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
Belowground Vault	Access Cover Damaged/ Not working	One maintenance person cannot remove lid after applying 80 pounds of lift, corrosion or deformation of cover.		Repair/replace cover to proper working specifications. Use blunt force with a hammer or similar tool to loosen lid.	
	Damaged Pipes	Any part of the pipes are crushed or damaged due to corrosion and/or settlement.		Repair/replace pipe as needed.	
	Vault Structure has Cracks in Wall, Bottom, and Damage to Frame and/or Top Slab	Cracks wider than 0.5 inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound.		Repair/replace vault so that vaults meets design specifications and is structurally sound.	
		Cracks wider than 0.5 inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.		Repair vault so that no cracks exist wider than 0.25 inch at the joint of inlet/outlet pipe.	
	Baffles	Baffles corroding, cracking, warping, and/or showing signs of failure as determined by maintenance/inspection person.		Repair/replace baffles to design specifications.	
	Ladder Rungs Unsafe	Maintenance person judges that ladder is unsafe due to missing rungs, misalignment, rust, or cracks. Ladder must be fixed or secured immediately.		Repair or replace ladder to specifications, ensure it is safe to use as determined by inspection personnel.	

Manufactured Media Filters					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Belowground Cartridge Type	Media	Drawdown of water through the media takes longer than 1 hour, and/or overflow occurs frequently.		Replace media cartridges.	
	Short Circuiting	Flows do not properly enter filter cartridges.		Replace filter cartridges.	

Designers must also review the most current manufacturer guidelines for any updates or additions to the following operation and maintenance requirements.

1w. Proprietary or Manufactured Products

- As with other stormwater BMPs in this guide, proper maintenance of proprietary products such as media filters or vegetation-based treatment technologies is critical to proper facility performance. Regular maintenance ensures proper functioning and keeps the facility aesthetically appealing. Many of the same inspection and maintenance procedures outlined for the facilities described in this guide also apply to proprietary technologies.

- Designers must review and apply the most current manufacturer guidelines and recommendations for facility operation and maintenance.

- The City of Tumwater will inspect proprietary products in accordance with the applicable inspection standards to ensure that maintenance is performed properly.

Group 2 – Structures and Pretreatment

2a. 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.

Control Structures and Flow Restrictors					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Structure	Trash and Debris (includes sediment)	Material exceeds 25 percent of sump depth or 1 foot below orifice plate.		Ensure control structure orifice is not blocked. Remove and properly dispose of all trash and debris.	
	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 percent from plumb)		Restore structure to correct position.	
		Connections to outlet pipe are not watertight and show signs of rust.		Pipe connections are water tight; Repair/replace structure components to design standards.	
		Any holes in structure (other than designed holes).		Repair holes as necessary so structure functions as designed.	
Cleanout Gate	Damaged or Missing	Cleanout gate is not watertight or is missing.		Repair/replace cleanout gate and ensure it is watertight.	
		Gate cannot be moved up and down by one maintenance person.		Provide maintenance to gate so it moves up and down easily and is watertight.	
		Chain/rod leading to gate is missing or damaged.		Repair/replace chain as needed.	
		Gate is rusted over 50 percent of its surface area.		Replace gate as needed to meet design standards.	
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, displaced, or bent orifice plate.		Repair/replace orifice plate as needed.	
	Obstructions	Trash, debris, sediment or vegetation blocking the plate.		Remove and dispose of debris and sediment.	

Control Structures and Flow Restrictors					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.		Remove and dispose of trash and debris.	
Manhole	Cover Not in Place	Cover is missing or only partially in place. Any open manhole requires maintenance.		Ensure manhole access cover/lid is in place and secure.	
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 0.5 inch of thread (may not apply to self-locking lids)		Repair/replace locking mechanism as needed.	
	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.		Use blunt force with a hammer or similar tool to loosen lid.	
	Ladder Rungs Unsafe	Maintenance person judges that ladder is unsafe due to missing rungs, misalignment, rust, or cracks. Ladder must be fixed or secured immediately.		Repair or replace ladder to specifications, ensure it is safe to use as determined by inspection personnel.	
Catch Basin	See “Catch Basins”	See “Catch Basins.”		See “Catch Basins.”	

2b. Catch Basins

These structures are typically located in the streets. The City of Tumwater 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 and for keeping the grates clear of debris in all areas.

Catch Basins					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Trash and Debris	Trash, leaves, or debris which is located immediately in front of the catch basin opening or is blocking inflow capacity of the basin by more than 10 percent.		Remove trash, leaves and debris located directly in front of catch basin or on grate.	
		Trash or debris (in basin) that exceeds 33 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 inches of clearance from the debris surface to the invert of the lowest pipe.		Remove and properly dispose of all trash and debris. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
		Trash or debris in any inlet or outlet pipe blocking more than 33 percent (one-third) of its height.		Remove and properly dispose of all trash and 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.	
	Sediment	Sediment (in basin) exceeds 33 percent 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 inches of clearance from the sediment surface to the invert of lowest pipe.		Remove and properly dispose of sediment in the catch basin. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	

Catch Basins					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 0.25 inch (intent is to make sure no material is running into basin).		Patch or seal top slab as needed. Re-set grate frame as needed.	
	Structure Damage to Frame and/or Top Slab	Frame not sitting flush on top slab, i.e., separation of more than 0.75 inch of the frame from the top slab. Frame not securely attached.		Repair or re-set frame as needed.	
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person determines structure is unsound.		Replace or repair basin to design standard.	
		Grout fillet has separated or cracked wider than 0.5 inch and longer than 1 foot at the joint of any inlet/outlet pipe, or any evidence of soil entering basin.		Re-grout pipe and secure at basin wall.	
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.		Replace or repair basin to design standards.	
	Vegetation	Vegetation growing across and blocking more than 10 percent of the basin opening.		Remove vegetation blocking opening to basin.	
		Vegetation growing in inlet/outlet pipe joints that is more than 6 inches tall and less than 6 inches apart.		Remove vegetation or root growth.	
	Contamination and Pollution	Presence of contaminants such as oil, gasoline, concrete slurries, paint, obnoxious color, odor, or sludge.		Locate the source of the pollution and remove contaminants or pollutants present. *Report and coordinate source control, removal, and/or cleanup with City of Tumwater Spill Reporting Hotline 360-754-4150, Moderate Risk Waste Program at Thurston County Environmental Health 360-754–4111, and/or Dept. of Ecology Spill Response 800-424-8802.*	

Catch Basins					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.		Ensure catch basin cover is in place and secured.	
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 0.5 inch of thread.		Repair/replace locking mechanism as needed.	
	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.)		Use blunt force with a hammer or similar tool to loosen lid.	
Ladder	Ladder Rungs Unsafe	Maintenance person judges that ladder is unsafe due to missing rungs, misalignment, rust, or cracks. Ladder must be fixed or secured immediately.		Repair or replace ladder to specifications. Ensure it is safe to use as determined by inspection personnel.	
Metal Grates	Grate Opening Unsafe	Grate with opening wider than 0.875 (7/8) inch.		Ensure grate opening meets design standards. Repair or replace grate as needed.	
	Trash and Debris	Trash and debris that is blocking more than 20 percent of grate surface inlet capacity.		Remove and properly dispose of all trash and debris.	
	Damaged or Missing	Grate missing or broken member(s) of the grate.		Repair or replace grate as needed. Ensure grate is in place and meets design standards.	

2c. Debris Barriers (trash racks)

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

Debris Barriers (trash racks)					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Trash and Debris	Trash or debris that is plugging more than 20 percent of the openings in the barrier.		Remove and properly dispose of all trash and debris.	
Metal Bars on Debris Barrier	Damaged/ Missing Bars	Bars are bent out of shape more than 3 inches.		Repair or replace bars in place with no bends more than 0.75 inch.	
		Bars are missing or entire barrier missing.		Replace bars as needed according to design.	
		Bars are loose and rust is causing 50 percent deterioration to any part of barrier.		Repair or replace barrier to design standards.	
	Inlet/Outlet Pipe	Debris barrier missing or not attached to pipe.		Replace barrier if missing. Firmly attach barrier to pipe.	

2d. 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.

Energy Dissipators					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
External:					
Rock Pad	Missing or Moved Rock	Only one layer of rock exists above native soil in area 5 square feet or larger, or any exposure of native soil.		Repair/replace rock pad to design standards.	
	Erosion	Soil erosion in or adjacent to rock pad.		Repair/replace rock pad to design standards. Repair eroded area.	
Dispersion Trench	Pipe Plugged with Sediment	Accumulated sediment that exceeds 20 percent of the design depth.		Remove and properly dispose of sediment. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
	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.		Re-level or repair dispersion trench so water discharges from feature by sheet flow.	
	Perforations Plugged	Over half of perforations in pipe are plugged with debris and sediment.		Clean or replace perforated pipe. Perforations freely discharge flow.	
	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.		Remove sediment from distributor catch basin including inlets and outlets. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	

Energy Dissipators					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Dispersion Trench	Receiving Area Over-Saturated	Water in receiving area is causing or has potential of causing landslide problems.		Investigate lack of infiltration causes. Consider facility redesign or methods to convey water to another location.	
Internal:					
Manhole/ Chamber	Worn or Damaged Post, Baffles, Side of Chamber	Structure dissipating flow deteriorates to 50 percent of original size or any concentrated worn spot exceeding 1 square foot, which would make structure unsound.		Repair/replace structure components to design standards.	
	Trash and Debris	Trash or debris (in basin) that exceeds 33 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-inch clearance from the debris surface to the invert of the lowest pipe.		Remove and properly dispose of all trash and debris. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
		Trash or debris in any inlet or outlet pipe blocking more than 33 percent of its height.		Remove and properly dispose of all trash and debris. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
		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.	
	Sediment	Sediment (in basin) exceeds 33 percent 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-inch clearance from the sediment surface to the invert of lowest pipe.		Remove and properly dispose of all sediment. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	

Energy Dissipators					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Manhole/ Chamber	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 0.25 inch (Intent is to make sure no material is running into basin).		Patch or seal top slab as needed. Re-set frame as needed.	
	Structure Damage to Frame and/or Top Slab (continued)	Frame not sitting flush on top slab, i.e., separation of more than 0.75 inch of the frame from the top slab. Frame not securely attached.		Repair or re-set frame as needed.	
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person determines structure is unsound.		Repair/replace basin to design standard.	
		Grout fillet has separated or cracked wider than 0.5 inch and longer than 1 foot at the joint of any inlet/outlet pipe, or any evidence of soil entering basin.		Re-grouted and secure pipe at basin wall.	
	Settlement/ Misalignment	Failure of basin has created a safety, function, or design problem.		Replace or repair basin to design standards.	
	Contamination and Pollution	Presence of contaminants such as oil, gasoline, concrete slurries, paint, obnoxious color, odor, or sludge.		Locate the source of the pollution and remove contaminants or pollutants present. *Report and coordinate source control, removal, and/or cleanup with City of Tumwater Spill Reporting Hotline 360-754-4150, Moderate Risk Waste Program at Thurston County Environmental Health 360-754–4111, and/or Dept. of Ecology Spill Response 800-424-8802.*	
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.		Replace missing cover and secure firmly in place.	

Energy Dissipators					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Catch Basin Cover	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 0.5 inch of thread.		Repair/replace locking mechanism as needed.	
	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.)		Use blunt force with a hammer or similar tool to loosen lid.	

2e. Baffle Oil/Water Separators (API type)

An underground vault or tank designed to separate oil from runoff water via baffles. An oil/water separator vault is a confined space. Visual inspections should be performed aboveground. If entry is required, it should be performed by qualified personnel.

Baffle Oil/Water Separators (API type)					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Dirty Discharge Water	Inspect discharge water for obvious signs of poor water quality.		Clean oil water separator by washing baffles with low pressure water and vactoring while washing.	
	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. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
	Trash and Debris Accumulation	Trash and debris accumulation in vault, or pipe inlet/outlet, floatables and non-floatables.		Remove and properly dispose of all trash and debris from vault and inlet/outlet piping.	
	Oil Accumulation	Oil accumulations at the surface of the water or 6 inches of sludge in the sump.		Extract oil from vault by vactoring. Disposal must be in accordance with state and local rules and regulations. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
Structure	Damaged Pipes	Inlet or outlet piping damaged or broken and in need of repair.		Repair/replace pipe as needed.	
	Access Cover Damaged/ Not Working	Cover cannot be opened, corrosion/deformation of cover.		Repair/replace cover to proper working specifications.	
	Vault Structure Damage – Cracks in	Maintenance person determines structure is unsound.		Repair/replace vault components so that vault meets design specifications and is structurally sound.	

Baffle Oil/Water Separators (API type)					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Structure	Walls or Bottom, Damage to Frame and/or Top Slab	Grout fillet has separated or cracked wider than 0.5 inch at the joint of any inlet/outlet pipe, or any evidence of soil entering basin.		Repair top slab using patch or grout material.	
	Baffles	Baffles corroding, cracking, warping and/or show signs of failure as determined by maintenance/inspection person.		Repair/replace baffles to manufacturer's specifications.	
	Access Ladder Damaged	Ladder is corroded or deteriorated, not securely attached to structure wall, missing rungs, cracks, or misaligned.		Repair/replace ladder to meet specifications, and ensure it is safe to use as determined by inspection.	

2f. Coalescing Plate Oil/Water Separators

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

Coalescing Plate Oil/Water Separators					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Dirty Discharge Water	Inspect discharge water for obvious signs of poor water quality.		Clean oil water separator by washing plates with low pressure water and vactoring while washing.	
	Sediment Accumulation	Sediment depth in bottom of vault exceeds 6 inches in depth and/or visible signs of sediment on plates.		Remove sediment deposits on vault bottom and plate media that would impede flow through the vault and reduce separation efficiency. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
	Trash and Debris	Trash and debris accumulated in vault, or pipe inlet/outlet, floatables and non-floatables.		Remove and properly dispose of all trash and debris from vault and inlet/outlet piping.	
	Oil Accumulation	Oil accumulation at the water surface.		Oil is extracted from vault using vactoring methods. Dispose of in accordance with state and local rules and regulations. Coalescing plates are cleaned by thoroughly rinsing and flushing. Direct wash-down effluent to the sanitary sewer system where permitted. There should be no visible oil depth on water. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
Structure	Damaged Coalescing Plates	Plate media broken, deformed, cracked and/or showing signs of failure.		A portion of the media pack or the entire plate pack is replaced depending on severity of failure.	

Coalescing Plate Oil/Water Separators					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Structure	Damaged Pipes	Inlet or outlet piping damaged or broken or in need of repair.		Repair/replace pipe.	
	Baffles	Baffles corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection person.		Repair/replace to specifications.	
	Vault Structure Damage – Includes Cracks. Damage to Frame and/or Top Slab	Cracks wider than 0.5 inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound.		Repair/replace vault components so that vault meets design specifications and is structurally sound.	
	Vault Structure Damage – Includes Cracks. Damage to Frame and/or Top Slab	Cracks wider than 0.5 inch at the joint of any inlet/outlet pipe or soil particles entering through the cracks.		Repair top slab using patch or grout material. Re-set frame if needed.	
	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 ensure it is safe to use as determined by inspection.	

2g. 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.

Catch Basin Inserts					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Sediment Accumulation	When sediment forms a cap over the insert media of the insert and/or unit.		Remove and properly dispose of sediment. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
	Trash and Debris Accumulation	Trash and debris accumulates on insert unit creating a blockage/restriction.		Remove and properly dispose of all trash and debris.	
	Media Insert Not Removing Oil	Effluent water from media insert has a visible sheen.		Remove and replace media insert as needed so no sheen is visible.	
	Media Insert Water Saturated	Catch basin insert is saturated with water and no longer has the capacity to absorb.		Remove and replace media insert.	
	Media Insert-Oil Saturated	Media oil saturated due to petroleum spill that drains into catch basin.		Remove and replace media insert.	
	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.	

2h. Sumps

Sumps are typically located within other structures, such as a catch basin or vault. Sumps collect sediment and debris in a location convenient for cleaning. The City of Tumwater is responsible for routine maintenance of structures and sumps in the public rights-of-way, while the property owner or homeowners' association is responsible for maintenance of structures and sumps in private areas.

Sumps					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Trash and Debris	Trash or debris (in sump) that exceeds 33 percent of the sump depth as measured from bottom of sump to invert of the lowest pipe into or out of the sump, but in no case less than a minimum of 6 inches of clearance from the debris surface to the invert of the lowest pipe.		Remove and properly dispose of all trash and debris. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
		Trash or debris in any inlet or outlet pipe blocking more than 33 percent (one-third) of its height.		Remove and properly dispose of all trash and debris. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
		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 sump.	
	Sediment	Sediment (in sump) exceeds 33 percent 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 inches of clearance from the sediment surface to the invert of lowest pipe.		Remove and properly dispose of all sediment. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	

Sumps					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Structure Damage to Frame and/or Top Slab (if applicable)	Top slab has holes larger than 2 square inches or cracks wider than 0.25 inch.		Patch or seal top slab as needed. Re-set frame as needed.	
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person determines structure is unsound.		Repair/replace basin to design standard.	
		Grout fillet has separated or cracked wider than 0.5 inch and longer than 1 foot at the joint of any inlet/outlet pipe, or any evidence of soil entering sump.		Re-grout pipe and secure at sump wall.	
	Settlement/ Misalignment	If failure of sump has created a safety, function, or design problem.		Replace/repair to design standards.	
	Vegetation	Vegetation growing in inlet/outlet pipe joints that is more than 6 inches tall and less than 6 inches apart.		Remove and properly dispose of vegetation.	
	Contamination and Pollution	Presence of contaminants such as oil, gasoline, concrete slurries, paint, obnoxious color, odor, or sludge.		Locate the source of the pollution and remove contaminants or pollutants present. *Report and coordinate source control, removal, and/or cleanup with City of Tumwater Spill Reporting Hotline 360-754-4150, Moderate Risk Waste Program at Thurston County Environmental Health 360-754–4111, and/or Dept. of Ecology Spill Response 800-424-8802.*	
Sump Cover (if applicable)	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.		Replace missing cover and ensure it is securely in place.	
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 0.5 inch of thread.		Repair/replace locking mechanism so it opens with proper tools.	

Sumps					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Sump Cover (if applicable)	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.)		Use blunt force with a hammer or similar tool to loosen lid.	
Ladder (if applicable)	Ladder Rungs Unsafe	Maintenance person judges that ladder is unsafe due to missing rungs, misalignment, rust, or cracks. Ladder must be fixed or secured immediately.		Replace or repair ladder so it meets specifications and ensure it is safe to use as determined by inspection.	
Metal Grates (if applicable)	Grate Opening Unsafe	Grate with opening wider than 0.875 (7/8) inch.		Repair/replace grate so it meets design standards.	
	Trash and Debris	Trash and debris that is blocking more than 20 percent of grate surface inlet capacity.		Remove and properly dispose of all trash and debris.	
	Damaged or Missing	Grate missing or broken member(s) of the grate.		Replace missing grate. Repair grate openings so it meets design standards.	

Group 3 – Miscellaneous Facilities and Features

3a. Conveyance Pipes, Culverts, Ditches, and Swales

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

Conveyance Pipes, Culverts, Ditches, and Swales					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Pipes	Sediment, Debris, and Vegetation	Accumulated sediment should not exceed 20 percent 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 as needed.	
Open Ditches	Trash and Debris	There should not be any yard waste or litter in the ditch.		Remove and properly dispose of all trash and debris.	
	Sediment Buildup	Accumulated sediment should not exceed 20 percent of the depth of the ditch.		Clean out ditch of all sediment and debris. Refer to “Volume IV Appendix IV-C: Recommendations for Management of Street Wastes” for proper disposal of sediment from street runoff.	
Open Ditches and Swales	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 maintained so it remains less than 12 inches high.	
	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 inches 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).	

Conveyance Pipes, Culverts, Ditches, and Swales					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Open Ditches and Swales	Missing Rocks	Native soil beneath the rock splash pad, check dam, or lining should not be visible.		Replace rocks to design standard.	
Swales	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 12 inches high. Remove woody growth, re-contour and re-seed as necessary.	
	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 city to report the problem if not rectified voluntarily.	
	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 to 5 percent range if possible. If grade is less than 1 percent, underdrains may need to be installed.	

3b. Access Roads and Easements

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

Access Roads and Easements					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Access	Ensure access is maintained to a standard that limits track out.		Re-gravel or install quarry spalls if needed.	
Access Road	Blocked Roadway	Debris that could damage vehicle tires (glass or metal).		Clear all potentially damaging material.	
	Blocked Roadway	Any obstructions that reduce clearance above and along the road to less than the required width (minimum of 15 feet).		Clear above and along roadway so there is enough clearance.	
Road Surface	Bad Road Conditions	Check for potholes, ruts, mushy spots, or woody debris that limits access by maintenance vehicles.		Add gravel or remove wood as necessary.	
Shoulders and Ditches	Erosion	Check for erosion along roadway.		Repair erosion with additional soil or gravel.	