

# **STORMWATER MAINTENANCE CHECKLISTS AND FORMS**

Inspection and Maintenance Action Checklists

Stormwater Facility Inspection/Maintenance Field Form

# STORMWATER INSPECTION AND MAINTENANCE ACTION CHECKLISTS

The following inspection and maintenance action checklists are provided primarily for maintenance field staff. The checklists indicate recommended inspection frequency and timing, conditions to look for, corrective actions, and estimated time to perform the work. They can assist management staff with maintenance planning, scheduling, staffing, and budgeting. The work time estimates given on the checklists should be compared to actual effort required to perform each task in the future and revised as necessary. Continual review, feedback, and revision of the checklists will make them more effective tools in the effort to manage stormwater.

**Inspection Timing:** Specific elements of the stormwater facilities are assigned to be inspected annually or seasonally. W = winter, Sp = Spring, Su = Summer and F = Fall. **At least one inspection per year should occur during a storm event.**

**Manufactured treatment structures** will have maintenance requirements from the manufacturer that are included in the back of this packet.

**Maintenance Records:** Maintenance records must be kept on all stormwater facilities, an example maintenance record is provided in this packet. Record the date and description of repairs and maintenance activities. Invoices and work orders for supplies and hiring contractors to complete work should be kept on file. The property owner/owners shall keep records of facility system inspections and maintenance for five years from the date of each inspection. Records shall be made available to jurisdictional authority upon request, at no cost.

**Herbicides and Pesticides:** Utilize integrated pest management and avoid the use of herbicides and pesticides as much as possible due to the potential to contaminate downstream waters. If pesticides or herbicides must be used, a licensed applicator should be hired.

**Fertilizers:** Avoid the use of fertilizers in stormwater treatment and detention facilities. Instead, mulch plants with shredded wood chips or coarse compost. Mulch shall be either shredded wood chips or coarse compost. Mulch must be dye, pesticide and weed free.

**Pollution Prevention:** Best Management Practices must be implemented on all sites to prevent stormwater contamination. Spills should be cleaned up following best management practices and should never be washed into a stormwater treatment facility. Report spills into the stormwater facility by calling the local jurisdiction.

Inspection and Maintenance Action Checklist		Pervious Pavement
Inspection Timing	Conditions to Check For	Suggested Action
Sp, F	Erosion from landscape areas	Implement erosion prevention and sediment control and replant per the approved landscape plan.
F, W, Sp	Trash and Leaves	Pick up trash, blow or sweep leaves. Remove and dispose of waste properly.
F, Sp	Weed and moss growth over 10% of area or more	Mechanically remove during the dry season. Avoid mossicides and herbicides.
Su, F	Sediment/debris accumulation	<ul style="list-style-type: none"> <li>• Dry sweep</li> <li>• Vacuum-sweep at least twice a year.</li> <li>• Or, pressure wash at a right angle to the pavement.</li> <li>• Sediment should be disposed of properly at a landfill or approved facility.</li> </ul>
Annual	Unraveling or settled pavement	Repair per manufacturer specification. Do not apply sealants to pervious pavement.
Annual	Aggregate loss	<b>Do not</b> seal coat. Replace with aggregate per original design. 50sf or less of damage may be patched with conventional asphalt, up to 10% of the entire porous surface.
W, Sp	Reduced infiltration	If storms are not infiltrating, contact the jurisdiction.
W, Sp, Su, F	Landscape Contractors stockpiles/ blown debris	Ensure landscape contractors understand that the surface is permeable. Inform them that they cannot stage material on the surface or blow grass/leaves/etc. onto the surface.
Annual	Settling of pavers or loss of paver filling.	Reset pavers and replace missing fill material per original design.
Annual	Signage describing Pervious Pavement in Place	Ensure sign is visible and legible
W	Snow Removal	Use salt-free deicers only. Do not apply to concrete <1 year old. Plow with the blade one inch above the surface.

Inspection and Maintenance Action Checklist		Vegetated Facilities*
Inspection Timing	Conditions to Check For	Suggested Action
W, Sp, Su, F	<b>Trash and debris.</b>	Remove and dispose of waste in regular trash.
Annual	<b>Sediment or debris accumulation in facility</b> exceeding 2 inches.	Remove with appropriate equipment to limit compaction or damage to plants and infiltration media. Record amount of sediment collected. Sediment should be disposed of properly at a landfill or approved facility.
Annual	<b>Clogged inlets, outlets, pipes</b>	Remove sediment and debris. Sediment should be disposed of properly at a landfill or approved facility.
Annual	<b>Damaged inlets or outlets, cracked pipe</b>	Repair or seal cracks, replace when needed.
Annual	<b>Scouring under Inlet to Facility</b>	Replace rock or gravel in energy dissipator according to design specifications. Remove blockage manually or with appropriate equipment.
Annual	<b>Perforated Liner.</b>	Repair or replace as necessary per manufacturer specification.
Annual	<b>Erosion within facility.</b> Check inlets, slopes, energy dissipators and facility bottom.	Determine cause of erosion and eliminate. Apply appropriate temporary erosion control best management practices. Evaluate options for permanent solution.
Annual	<b>Poorly draining facility.</b>	If facility does not drain in 48 hours after a storm, scrape 1 inch of soil out of the facility and scarify to 3 inches. If infiltration does not improve, contact the jurisdictional authority. Consider installation of sediment trap.
W, Sp, Su, F	<b>Odor, sludge, or color.</b> Presence of any chemical pollutants.	Notify appropriate jurisdiction to investigate and determine chemical type. Remove contaminant by appropriate methods and dispose of as directed by hazardous waste protocols. Provide sign or stencil as necessary.
Sp, F	<b>Hydraulic performance.</b> Flow has become channelized and does not spread over bottom of swale.	Recontour and replant vegetated facility bottom following approved landscape plan; consider installing a flow spreader device. Contact the stormwater jurisdiction for advice on flow spreader installation.
Sp	<b>Check Dams Functioning</b>	Maintain design number, spacing and elevation, of check dams.
Sp, F	<b>Vegetation covers &lt; 90% of facility bottom or is unhealthy looking.</b>	Determine cause of poor growth. Revegetate following approved landscape plan to achieve 95% coverage. Avoid use of fertilizers.
Sp, Su, F	<b>Vegetation is overgrown. Weeds.</b> <b>Vegetation poses potential health hazard</b> (poison oak, stinging nettles, tansy).	<ul style="list-style-type: none"> <li>• Prune vegetation that blocks sight lines, inlets, outlets, or is a health hazard and remove cuttings. Do not string trim grasses, sedges or rushes. Remove weeds mechanically, avoid pesticides and herbicides.</li> <li>• Facilities seeded with low-mow or no-mow seed mix, should be mown a</li> </ul>

Inspection and Maintenance Action Checklist		Vegetated Facilities*
Inspection Timing	Conditions to Check For	Suggested Action
		maximum of three to four times a year for aesthetics and to reduce fire risk. If possible, utilize a weed whacker rather than a mower to reduce compaction of the facilities soils.
Sp, Su	<b>Irrigation system functioning properly.</b>	Irrigation will be needed frequently during first 3 years, once plants mature frequency of watering can decrease unless >90F.

\* Vegetated Facilities include rain gardens, water quality swales, planters, and vegetated filter strips.

Inspection and Maintenance Action Checklist		Detention Ponds*
Inspection Timing	Conditions to Check For	Suggested Action
W, Sp, Su, F	<b>Trash and debris.</b>	Remove and dispose of waste properly.
Annual	<b>Sediment accumulations</b> exceeding 20 percent of the forebay depth or 4 inches, whichever is less.	Evaluate whether cleaning can be performed with an eductor, backhoe, or excavator. Perform work or contract out. Record amount of waste collected. Reshape and reseed as necessary. Sediment should be disposed of properly at a landfill or approved facility.
Annual	<b>Clogging of check dam</b> between forebay and detention area with sediment or debris.	Manually remove sediment or use mechanical equipment as described for sediment removal.
Annual	<b>Inspect facility geometry for erosion and settlement to ensure inlets and outlets are functioning as intended.</b>	Determine cause of erosion and eliminate it. Repair and revegetate as per the approved designs.
	<b>Odor, sludge, or unusual color.</b> Presence of any chemical pollutants.	Notify appropriate jurisdiction to investigate. Remove contaminant by appropriate methods and dispose of as directed by hazardous waste protocols.
Sp, Su, F	<b>Vegetation is overgrown.</b>	<ul style="list-style-type: none"> <li>• Prune vegetation that blocks inlets, outlets and remove cuttings. Do not string trim ornamental grasses, sedges or rushes. Remove weeds mechanically, avoid use of pesticides and herbicides.</li> <li>• Facilities seeded with low-mow or no-mow seed mix, should be mown a maximum of three to four times a year for aesthetics and to reduce fire risk. If possible, utilize a weed whacker rather than a mower to reduce compaction of the facilities soils.</li> </ul>
Sp, F	<b>Facility vegetated &lt; 90% of original plan.</b>	Determine cause of poor growth. Revegetate following approved landscape plan. Avoid use of fertilizers.

Inspection and Maintenance Action Checklist		Underground Detention Structures
Inspection Timing	Conditions to Check For	Action
Annual	<b>Sediment and debris</b> exceeding 15% of the structure height or 6" in depth, whichever is less.	Sediment should be disposed of properly at a landfill or approved facility.. Contract for cleaning if necessary.
Annual	<b>Plugged or blocked air vents.</b> Accumulations of debris or sediment exceed one-half of the vent end area.	Remove and dispose of waste in regular trash.
Every 5-yrs	<b>Cracks</b> in joints between tank or pipe sections that leak soil into the facility.	Manually seal all cracks with appropriate grout material.
Every 5-yrs	<b>Underground facility structurally deficient or restricting flow.</b>	Repair or replace structure to design.
W, Sp, F	<b>Clogged inlets, manholes, catch basins or silt traps</b>	Remove blockages.
W, SP, Su, F	<b>Missing or open manhole cover.</b> Locking mechanism difficult to open or lacking more than 1/2 inch of thread; cover difficult to remove.	Replace cover or repair and reinstall. Cover should operate properly and be removed easily by one maintenance person.
Su	<b>Cleanout shear gate damaged,</b> rusted, leaking* or missing. Gate cannot be adjusted by one person. Chain or rod missing or damaged	Repair or replace to meet design standards. Repair, lubricate, or replace gate as necessary. Repair or replace chain or rod as necessary.
W, SP, Su, F	<b>Odor, sludge, or unusual color.</b> Presence of any chemical pollutants.	Notify appropriate jurisdiction to investigate and determine chemical type. Remove contaminant by appropriate methods and dispose of as directed by hazardous waste protocols.

\*Leaking is permissible provided it is less than 2 gallons per hour.

Inspection and Maintenance Action Checklist		Catch Basins and Inlets
Inspection Timing	Conditions to Check For	Suggested Action
W, Sp, Su, F	<b>Trash, debris, and sediment on grating.</b> More than 1/2 cu ft in front of or on grating, blocking capacity by more than 10%	Remove and dispose of waste in regular trash. Sediment should be disposed of properly at a landfill or approved facility.
Annual	<b>Sediment or debris in sump.</b> Depth exceeds 1/2 the distance between the bottom of basin and the invert of lowest pipe into or out of the basin.	Evaluate whether cleaning can be performed manually or mechanically. Perform work or contract out. Record amount of sediment collected at each basin.

**Catch Basin/Area Drain:** A structure, typically concrete, into which stormwater flows to be conveyed downstream.

**Stormwater Inlet /Curb Inlet:** A pipe or opening in a curb that conveys runoff into a stormwater facility.



Inspection and Maintenance Action Checklist		Outlet Control Structures/Flow Restrictors
Inspection Timing	Conditions to Check For	Suggested Action
W, Sp, F	<b>Sediment, debris, or trash</b> is blocking or sump is less than 50% from restrictor/orifice plate	Remove and dispose of waste in regular trash. Sediment should be disposed of properly at a landfill or approved facility. Contract for cleaning if necessary.
Annual	<b>Structural integrity.</b> Tee-type flow restrictor is not securely attached to manhole wall and outlet pipe. Weir or baffle flow restrictor not securely attached to manhole. Flow restrictor is not plumb within 10% Connections to outlet pipe are leaking and show signs of rust Holes in plates, baffles, elbows, etc.	Determine best method for anchoring flow restrictor based on materials and severity of situation. Consult supervisor if necessary. Replumb and realign restrictor, securing as necessary. Repair or replace as necessary to eliminate leakage. Plug or patch holes if structural integrity is not affected. Replace part if possible, replace entire structure if severely failing.
Sp, F	<b>Trash, sediment, or debris</b> blocking overflow pipe.	Remove material manually or with mechanical equipment. Contract for cleaning if necessary.

**Outlet Control Structure:** Located at the downstream end of a stormwater facility, it controls the rate at which stormwater can flow out through the use of a flow restrictor or orifice.

**Flow Restrictor (Orifice):** A hole cut into the outlet control structure that is specifically sized to control stormwater outflow.

Inspection and Maintenance Action Checklist		Culverts/Pipes
Inspection Timing	Conditions to Check For	Suggested Action
W, Sp, F	<b>Trash, debris, or sediment</b> restricting pipe flow.	Evaluate whether cleaning can be performed manually or mechanically using an eductor, jet or bucket loader. Perform work or contract out. Record amount of waste collected at each culvert. Sediment should be disposed of properly at a landfill or approved facility.
Su	<b>Vegetation</b> that reduces free movement of water through culvert.	Cut vegetation to 6 inches minimum and remove. Take care to limit damage to embankment and side slopes. Prune back woody vegetation without killing and leaving roots in place if possible.
Su	<b>Damage to pipe</b> such as rusting throughwall of pipe , dents, bent or crushed ends that affects efficient flow.	Repair or replace pipe as necessary.
Annual	<b>Cracking or buckling of headwall.</b> Erosion or piping occurring at backside or around ends of headwall.	Determine extent of problem and monitor for changes. Contact appropriate city staff for evaluation. Repair or replace as necessary.
Annual	<b>Missing rock or riprap</b> within upstream or downstream apron areas or side slopes. Active erosion within area.	Repair eroded areas as necessary. Determine cause of rock movement and replace with similar size rock or larger as necessary.

Inspection and Maintenance Action Checklist		Energy Dissipators
Inspection Timing	Conditions to Check For	Suggested Action
<b>External Energy Dissipator</b>		
Su	<b>Missing layer of rock.</b> Exposed soil.	Replace rock of size and at depth specified. Evaluate need to replace with larger rock.
Su	<b>Broken wires</b> in gabion structure.	Replace rock as necessary and wire shut. Evaluate need to replace structure.
	<b>Bypassing beneath structure</b>	Backfill with smaller rock to fill the voids.
<b>Dispersing Trench</b>		
Sp, F	<b>Accumulated sediment</b> in pipe.	Vacuum or jet clean pipe, catching or collecting sediment for proper disposal. Sediment should be disposed of properly at a landfill or approved facility.
F, W	<b>Discharge flow is concentrated</b> , not dispersed, causing erosion.	Regrade trench lip to provide "sheet" flow. Evaluate need to redesign and rebuild.
Su	<b>Perforated pipe is plugged</b> for half of openings.	Jet clean, catching sediment for proper disposal. Evaluate need to replace pipe.
F, W	<b>Stormwater flows out</b> top of distribution manhole or catch basin.	Check outlet pipe for restrictions and clean if necessary. Confirm design storm parameters. Provide erosion control BMPs. Evaluate need to redesign and reconstruct.
F, W, Sp	<b>Oversaturated receiving area</b> , slope failure; potential for landslide.	Divert flow if possible, stabilize bank using appropriate BMPs.
<b>Manhole Chamber</b>		
Su	<b>Worn or damaged dissipating structure</b> or walls.	Replace structure to design standards. Evaluate need for alternative design.

**Energy Dissipators:** Typically located below an inlet to a stormwater facility and made of rip-rap, concrete, or a proprietary structure. They prevent scouring of the stormwater facility substrate.

Inspection and Maintenance Action Checklist		Constructed SW Wetlands, Wet Ponds
Inspection Timing	Conditions to Check For	Suggested Action
W, Sp, Su, F	<b>Yard waste, trash, and debris</b> of more than 1 cu ft (1 garbage can)	Remove and dispose of waste. Notify appropriate city staff for potential enforcement or public education.
Annual	<b>Trash rack or bar screen</b> missing or more than 25% covered	Remove debris and dispose of waste. Repair or replace rack as necessary.
Su	<b>Weedy, invasive or poisonous vegetation</b> such as blackberry, purple loosestrife, tansy ragwort, poison oak, stinging nettles, etc. <b>Sparse vegetation</b> , sickly or overgrown.	Ask if there is an O&M plan for the facility or if an evaluation by a wetland ecologist is recommended prior to maintenance. If not, remove manually or use mechanical equipment as necessary; minimize disturbance to other vegetation. Do not spray pesticides without consulting appropriate jurisdiction. Determine cause of poor plant growth; correct problem and replant as specified or directed by appropriate city staff. If vegetation is cut, remove all cuttings and dispose offsite.
W, Sp	<b>Inlet, outlet, or check dam clogged</b> with sediment or debris.	Remove blockage manually or with appropriate equipment. Minimize disturbance to surrounding vegetation. Evaluate need for facility modifications to eliminate problem. Sediment should be disposed of properly at a landfill or approved facility.
F, W, Sp	<b>Sediment accumulation</b> interfering with treatment function.	Remove sediment using appropriate equipment to restore design contours. Minimize disturbance to surrounding vegetation and replant as necessary using specified vegetation. Sediment should be disposed of properly at a landfill or approved facility.
Annual	<b>Settlement of structures</b> dikes, berms, pipes, by 4 inches.	Notify appropriate the stormwater jurisdiction and request an inspection. Stabilize slopes or structures as necessary until final evaluation and specific solution is determined.
W, Sp, Su, F	<b>Odor, sludge, or unusual color.</b> Presence of any chemical pollutants.	Notify appropriate jurisdiction to investigate. Remove contaminant by appropriate methods and dispose of as directed by hazardous waste protocols.
Annual	<b>Overflow berms or spillways exposed</b> and either actively eroding or vulnerable to erosion.	Replace armoring or replant as specified in design plans and specifications.
Annual	<b>Erosion</b> at inlet or on side slopes or scouring of pond bottom of > 6".	Consult appropriate city staff on cause of erosion. Stabilize eroded areas ASAP using proper erosion control methods.

Inspection and Maintenance Action Checklist		Access Roads & Easements
Inspection Timing	Conditions to Check For	Suggested Action
Annual	No access road for maintenance by motorized equipment.	Determine whether an easement to a drainage feature exists. If so, obtain permits and construct gravel (or equivalent) access road. If not, call lack of easement to jurisdiction's attention.
W, Sp, Su, F	Debris blocks access or could damage vehicle tires (glass or metal).	Remove debris and dispose of properly.
Annual	Obstructions reduce clearance above road surface to less than 14 feet.	Clear overhead area to 14 feet high.
Annual	Settlement, potholes, mush spots, or ruts . Surface defect hinders or prevents maintenance access.	Grade road uniformly smooth with no evidence of settlement, potholes, mush spots, or ruts. Apply additional gravel or pit-run rock as needed
Annual	Woody vegetation or excessive weed cover blocks vehicular access.	Remove woody growth; cut back weeds regularly or when they encroach on road surface.
Annual	Erosion damage is within 1 foot of the roadway and is more than 8 inches wide and 6 inches deep.	Place fill material or rock to match the surrounding slope; Revegetate as necessary.

Inspection and Maintenance Action Checklist		Vegetated Roofs
Inspection Timing	Conditions to Check For	Suggested Action
F	Leaks in roof	Identify leaks of structural problems and contact manufacturer for repair or replacement.
Wi, Sp	Clogged Drains	Remove sediment and debris.
Sp, F	Stressed or dead vegetation	Remove and replace per approved landscape plan. Irrigate, if planting in the summer.
Sp, F	Excessive weeds	Mechanically remove weeds.
Wi, Sp	Erosion	Fill eroded area with approved soil, plant to prevent erosion.
F	Excessive Vegetation	Prune and remove cut vegetation.
W, Sp	Standing Water	Check for leaks in irrigation, amend soils, clear drains.



<b>Conditions Checked</b>	<b>Observations</b>	<b>Actions Taken or Required</b>	<b>Date Action Taken</b>