



City of Camas



## Storm Sewer Systems

## Operation & Maintenance Manual

Public &  
Private Systems

September 2009

City of Camas



# Storm Sewer Systems

## Operation & Maintenance Manual

### Public & Private Systems

September 2009

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# Operation & Maintenance Manual

## Introduction

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## **Background**

Everything, whether it be public or privately owned, roads, parking lots, residential developments, commercial or industrial developments, or school facilities have various components that make up a storm sewer system. These components consist of conveyance pipes, catch basins, manholes, roadside ditches, stormwater facilities (such as drywells, bioswales, detention ponds, wet ponds, oil/water separators), landscaping (both hardscape and softscape), and any other structure that collects, conveys, controls, and/or treats stormwater. Regardless of the component, all storm sewer systems eventually discharge into 'waters of the state' which are our streams, rivers, lakes, wetlands, and groundwater.

Under the Federal Clean Water Act (FCWA) and in compliance with the Department of Ecology's NPDES Phase II Permit 'waters of the state' are to be protected from contamination. This in turn protects threatened and endangered species under the Federal Endangered Species Act (FESA).

One way to protect 'waters of the state' is to provide the proper maintenance of all storm sewer system components. It is the responsibility of the City of Camas to ensure that all components of the storm sewer system are properly maintained and operated. The City is responsible for those components that are located within the City's right-of-way, such as the conveyance pipes, manholes, catch basins, and roadside ditches. There are also a few specific stormwater ponds that are the responsibility of the City. However, the majority of the storm facilities are owned and maintained by the property owners as private facilities. These property owners include, but are not limited to, Homeowners Associations (HOA's), property manager companies, school districts, and commercial/industrial site owners.

## **Purpose of the Manual**

This manual is intended to help, both public and private operators, meet the requirements for proper maintenance and operation of the various storm sewer system components. Proper maintenance will help to assure that:

- Storm sewer facilities operate as they were designed;
- Storm sewer systems are cleaned of the pollutants that they trap, such as sediment and oils, so that storm sewer systems are not overwhelmed and in so doing become pollutant sources;
- Pollutant sources are removed, or minimized, prior to entering the storm sewer system.

Along with keeping a site from flooding, properly maintained storm sewers can help reduce surface water and groundwater pollution. Most sites have some type of stormwater control component designed to limit the environmental and flooding damage caused by stormwater runoff. These components require more labor intensive maintenance than a system of pipes and catch basins.

It is the intent of the City to conduct yearly inspections of storm sewer facilities, preferably late spring/early summer to allow maintenance to occur late summer, prior to the fall rainy season. See Appendix A for an example of a *Storm Sewer System Maintenance Notification* form.



## Manual Layout

The manual breaks out the various storm sewer system components and the general maintenance activities required for said component. For each component or activity this manual will:

- Briefly describe the component type, e.g. facility or activity.
- List the water quality and non-water quality result of each facility or activity.
- List the *Best Management Practices (BMP's)* needed to meet the water quality and general maintenance requirements.

Additional information may be found in other manuals, such as the Washington Department of Ecology's *2005 Stormwater Management Manual for Western Washington, Vols. IV and V*, or site specific Operation and Maintenance (O&M) Manuals.

Maintenance is performed as a means to obtain specific results. The maintenance results, as listed below, are specified for each drainage feature or activity. They include maintaining performance and appearance of the facility, and the need to prevent maintenance work itself from becoming a pollutant source or damaging habitat.

### **Maintenance Results (R1-R10)**

#### Water Quality Results:

- R1 Avoid or minimize sediment and pollutant discharges from the work area.
- R2 Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R3 Avoid or minimize vegetation removal.
- R4 Preserve native vegetation.

#### Infrastructure Maintenance Results:

- R5 Protect public safety and health.
- R6 Prevent catastrophic infrastructure failures.
- R7 Maintain and/or restore the intended infrastructure function.
- R8 Prevent and/or reduce flooding.
- R9 Protect infrastructure.
- R10 Meet public expectations for aesthetics.

Storm sewer facility refers to specific drainage features, such as catch basins, pipes, ditches, ponds, biofiltration swales, and infiltration systems. Activities refer to maintenance tasks associated with operating and maintaining stormwater facilities such as vegetation management and small repair projects. Depending on the extent of the maintenance, some property owners may be able to handle storm sewer maintenance themselves. Often, however, depending on the type of maintenance, the property owners will contract out the work. Landscapers are often employed to maintain vegetated facilities, such as swales and pond areas.

Heavier work, like cleaning catch basins, ditch inlets, outlet structures, or drywells often requires special equipment, such as trucks that can vacuum out sediment. When located within the city right-of-way, maintenance is typically the responsibility of the City. For those located on private

property a contractor would need to be contacted to perform this work. Check phone book listings, such as sewer and cleaning contractors, tank cleaning, and environmental and ecological services. Check with the contractor to ensure that all materials are disposed of according to solid waste and hazardous materials regulations. *Ultimately, the generator of the waste or hazardous material is responsible for proper disposal.*

**Special Facilities:**

Manufactured storm sewer facilities, such as leaf compost filters and oil/water separators often have maintenance requirements and manuals specified or written by the manufacturer. Also, larger or more complex storm sewer facilities may include specifications for maintenance and vegetation management that provide specific detail above and beyond this manual. Where the *Public Works Director* determines that these manuals or plans provide an equal or greater level of maintenance and water quality protection, then these procedures shall be followed by the owner. The Public Works Director must approve these individual maintenance plans, specifications, or manuals.

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# Operation & Maintenance Procedures

## Vegetated Facilities

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## Biofiltration Swales

Biofiltration swales use grass or other dense vegetation to filter sediment and oily materials out of stormwater. Usually they look like flat-bottomed channels with grass growing in them. Swales are stormwater treatment devices that must be properly maintained to sustain pollutant removal capacity.

### Maintenance Results

- R1 Avoid or minimize sediment and pollutant discharges from the surrounding area.
- R2 Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R7 Maintain or restore the intended infrastructure function.
- R10 Meet public expectations for aesthetics.

### Procedures

#### Inspection

Swales are easy to inspect and need to be well maintained to treat stormwater. Make frequent visual inspections, at least once every 6 months and after storm events of >0.50 inch rainfall/24 hours, for problems such as channeling flow, rills, bare ground, sediment accumulation, oily material, and debris. Maintain adequate grass growth and eliminate bare spots.

Identify and remove pollutant sources that are discharging to the swale.

Maintain access to inlet and outlet structures for pollutant removal, and to grass swale for mowing and noxious weed removal.

#### Cleaning

Remove leaves, litter, sediment, oily materials, and grass cuttings when mowing or at any time that it is observed in the swale as this can cause blockage of inlets and outlets.

Clear inlets, outlets, curb cuts, and level spreaders of debris to prevent blockage of stormwater flow.

Use a rake and shovel to remove, by hand, sediment accumulations greater than 2-inches thick that cover grass areas; avoid vegetation removal. Reseed bare areas.

#### Vegetation Management

Mow to keep grass at the maximum height (9-inches). Mow to no less than 4-inches in height and a minimum of four cuttings per year. Remove clippings from the swale.

If a swale has an underdrain system, vehicular traffic (other than grass mowing equipment) on the swale bottom is to be avoided to prevent damage to the underdrain pipes.

Preserve healthy vegetation or reestablish vegetation where needed. Seed bare spots.

Blackberry removal is required and should be done 2-3 times a year. Pesticide use is **not** allowed. After cutting down of blackberries, vines are to be bagged and removed from the area.

Use appropriate BMP's to cover bare soils. BMP's include hydroseeding or mulches.

Trees and shrubbery are not allowed to grow within the biofiltration swale as they interfere with the facility's function and maintenance activities. Any cut trees should be salvaged for habitat enhancement or converted to mulch or firewood.

Storm sewer facilities are, in effect, water body buffers where pesticides and fertilizers are not to be used. See Vegetation Management in Storm Sewer Systems for more information.

### Repairs

Often swales have problems due to flooding or erosion. Where possible, correct the underlying problem before trying to repair the symptom.

Level spreaders must be in proper working order for swales to function properly. Where level spreaders are damaged, sunken, or bypassed by erosion, repair them to design standards.

If there is a problem with grass dying due to the swale being flooded during the wet season, there are two options: convert the swale vegetation to a plant variety that can stand being flooded or find a way to fix the swale so it drains better.

Call the Public Works Department at 817-7231 for information on approved plants. **Design modifications to any storm sewer facility cannot be made without prior approval from the City of Camas.**

## Filter Strips

Filter strips are linear strips of grass that remove sediment and oils from stormwater by filtering it. Stormwater is treated as it runs across the filter. Usually, filter strips are placed along the edge of linear paved areas, such as parking lots and roads. Where designed filter strips are installed; road shoulders should only be graded to maintain level flow off the road.

### Maintenance Results

- R1 Avoid or minimize sediment and pollutant discharges from the area.
- R2 Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R7 Maintain or restore the intended infrastructure function.
- R10 Meet public expectations for aesthetics.

### Procedures

#### Inspection

Filter strips are easy to inspect and need to be well maintained to treat stormwater. Make frequent visual inspections for problems such as channeling flow, rills, bare ground, oily material, and debris.

Identify and remove pollutant sources.

#### Cleaning

Clear inlets and outlets to prevent blockage.

Remove litter when mowing or litter accumulates.

Use a rake and/or shovel to remove sediment and debris accumulations greater than 2-inches thick that cover grass areas; avoid vegetation removal. Remove sediment and re-level the slope to an even surface so that water spreads and does not form channels. Reseed bare areas.

#### Vegetation Management

Mow to keep grass at the optimum height (6-inches). Mow to no less than 4-inches in height and a minimum of four cutting per year.

Remove clippings from the treatment area. They may be spread elsewhere on site where they will not reenter the stormwater facility.

Preserve healthy vegetation or reestablish vegetation where needed. Seed bare spots.

Use appropriate BMP's to cover bare soils. BMP's include hydroseeding or mulches.

Storm sewer facilities are, in effect, water body buffers where pesticides and fertilizers are not to be used. See Vegetation Management in Storm Sewer Systems for more information.



### Repairs

Where possible, correct the underlying problem before trying to repair the symptom.

The flow spreader must be level and spread flow evenly across the filter strip. Immediately repair any defects in the flow spreader.

If ruts develop, fill them with coarse soil, level the surface and reseed.

## **Detention Ponds/Facility**

Detention pond facilities are designed to hold and slowly release stormwater by use of a pond and a specially designed control structure. Styles vary greatly from well manicured to natural appearing. Generally, native vegetation is preferred for reduced maintenance and enhance wildlife habitat. Some facilities are designed to appear as natural water bodies or are in a park-like setting.

### **Maintenance Results**

- R1 Avoid or minimize sediment and pollutant discharges from the work area.
- R2 Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R3 Avoid or minimize vegetation removal.
- R7 Maintain or restore the intended infrastructure function.
- R8 Prevent or reduce flooding.
- R10 Meet public expectations for aesthetics.

### **Procedures**

#### Inspection

Facilities should be inspected, at a minimum, once a year. Inspect the facility for litter, dead vegetation, invasion of trees and noxious weeds, accumulated sediment, oil and other pollutants. Identify pollutant sources to the facility.

#### Cleaning

Remove litter when litter accumulates.

Remove any pollutants greater in volume than a surface sheen.

Remove trees and noxious weeds that are growing within the pond, on side slopes/berms, or within the emergency overflow area.

Remove sediment when it accumulates to 10 percent of the designed pond depth (plans can be obtained for Public Works Department). Sediment removal should be undertaken during the summer months (drier time of the year). Ponds are not to be altered from the original approved design without prior permission from the City of Camas.

#### Material Handling

Disposal of waste, e.g. sediment or standing water, from the maintenance of these facilities shall be conducted in accordance with federal, state, and local regulations, including the Minimum Functional Standards for Solid Waste handling Chapter 173-304 WAC; guidelines for disposal of waste materials; and where appropriate, Dangerous Waste Regulations, Chapter 173-303 WAC.

#### Vegetation Management

Where a facility has a natural area (open space/buffer/wetlands), vegetation management should be timed to avoid or minimize impacts on wildlife. An example is a facility used by breeding birds such as red-winged black birds.

Mow, or rotary weed trim, vegetation to match surrounding area or sustain any other intended use of the facility, such as wildlife habitat or recreation area.

Use mechanical methods to control weeds. Pesticides, herbicides and fertilizers are not to be used in stormwater control facilities. See Vegetation Management in Storm Sewer Systems for more information.

If plants need replacing, please contact the City for a list of native plants.

Trees are not allowed to grow in the pond, on emergency overflows, or on berms. Trees can block flows and roots can lead to berm failure.

Trees and shrubbery may be allowed to grow around the perimeter of the pond unless growth interferes with the facility function or maintenance activities.

Blackberry removal is required and should be done 2-3 times a year. Pesticide use is **not** allowed around water. After cutting down of blackberries, vines are to be bagged and removed from the area.

### Repairs

Repair and seed bare areas. Repair eroded slopes when rills form. Use cover BMP's on exposed soils.

Rodent holes in a dam or berm can serve as a means of piping water out of the pond. Remove the rodents, preferably by trapping, and repair the dam or berm. Check with the Washington Department of Fish and Wildlife before removing a game animal or fur-bearer, for example muskrat, beaver, and nutria.

Where applicable, repair the pond liner if it is visible and repair or replace where there are more than three holes greater than 1/4-inch diameter.

If berms or dams show signs of settlement or sinkholes, serious problems may be occurring. Consult a licensed professional engineer to determine the cause of the settlement or sinkhole. Spillway areas should be completely covered by minimum of 12-inches of rock. **Design modifications to any storm sewer facility cannot be made without prior approval from the City of Camas.**

## **Infiltration Facilities (Basins/Ponds/Trenches)**

Infiltration facilities dispose of water by holding it in an area where it can soak into the ground. These are open facilities that may either drain rapidly and have grass bases, or have perpetual ponds where water levels rise and fall with stormwater flows. Infiltration facilities may be designed to handle all of the runoff from an area or they may overflow and bypass larger storms.

Since the facility is designed to pass water into the ground, generally after passing through a sediment trap/manhole, anything that can cause the base to clog will reduce the performance and is a large concern. Generally, infiltration basins are managed like detention ponds, but with greater emphasis on maintaining the capacity to infiltrate stormwater.

### **Maintenance Results**

- R1     Avoid or minimize sediment and pollutant discharges from the area.
- R2     Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R3     Avoid or minimize vegetation removal.
- R7     Maintain or restore the intended infrastructure function.
- R8     Prevent or reduce flooding.
- R10    Meet public expectations for aesthetics.

### **Procedures**

#### Inspection

During the first year after construction, the sediment trap shall be monitored after every large storm (>1-inch per 24 hours) and monthly from October 1 through May 31 to ensure the facility is draining as intended.

Check once per year after a rainstorm to see if the facility is draining as intended. Inspect all features of the facility annually.

A thorough inspection of the observation points should be made if there is a decrease in retention basin capacity. Inspection points can include monitoring ports built into the base of the facility and water table depth monitoring wells. Water levels in these inspection points can provide information about the performance of the facility. It will probably require a licensed professional engineer or other professional trained in hydraulics to interpret the information.

Identify and remove pollutant sources to the facility. Inspect the facility for oil and other pollutants and remove any pollutants greater in volume than a surface sheen.

#### Cleaning

Trash is to be removed as it accumulates.

Remove sediment when it accumulates to 2-inches or if the facility does not drain between storms or meet 90 percent of design capabilities.

If the facility has a sediment trap/manhole, clean out the sediment when one-half foot accumulates.

### Materials Handling

Disposal of waste from maintenance of drainage facilities shall be conducted in accordance with federal, state, and local regulations, including the Minimum Functional Standards for Solid Waste handling Chapter 173-304 WAC; guidelines for disposal of waste materials; and where appropriate, Dangerous Waste Regulations, Chapter 173-303 WAC.

### Vegetation Management

Where a facility has a natural area (open space/buffer/wetlands), vegetation management should be timed to avoid or minimize impacts on wildlife. An example is a facility used by breeding birds such as red-winged black birds.

Mow, or rotary weed trim, vegetation to match surrounding area or sustain any other intended use of the facility, such as wildlife habitat or recreation area.

Use mechanical methods to control weeds. Pesticides, herbicides and fertilizers are not to be used in stormwater control facilities. See Vegetation Management in Storm Sewer Systems for more information.

If plants need replacing, please contact the City for a list of native plants.

Trees should not be allowed to grow in the pond, over the trench, on emergency overflows, or on berms that are greater than 4-feet in height. Trees can block flows and roots can lead to berm failure. Remove any trees growing on emergency overflows, berms greater than 4-feet in height, or within the pond.

Trees and shrubbery should be allowed to grow around the perimeter of the facility unless growth interferes with the facility function or maintenance activities. Any cut trees should be salvaged for habitat enhancement or converted to mulch or firewood.

### Repairs

If the facility is overflowing for a storm that it was designed to infiltrate, it needs to be repaired. This may require removing accumulated sediment and cleaning or rebuilding the system so that it works according to design.

Repair and seed bare areas. Repair eroded slopes when rills form. Use cover BMP's on exposed soils.

Rodent holes on a dam or berm can serve as a means of piping water out of the pond. Remove the rodents, preferably by trapping, and repair the dam or berm. Check with the Washington Department of Fish and Wildlife before removing a game animal or fur-bearer, for example muskrat, beaver, and nutria.

Spillway areas should be completely covered with more a minimum of 12-inches of rock.

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## **Wet Biofiltration Ponds, Swales, and Treatment Wetlands**

Wet biofiltration swales and treatment wetlands use dense wetland vegetation and settling to filter sediment and oily materials out of stormwater. These stormwater treatment devices must be properly maintained to sustain pollutant removal capacity. In some cases, biofiltration swales that were designed to drain between storms remain wet and need to be rebuilt or converted to wetland swales. A designed wet biofiltration swale uses wetland plants instead of grass.

### **Maintenance Results**

- R1     Avoid or minimize sediment and pollutant discharges from the area.
- R2     Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R7     Maintain or restore the intended infrastructure function.
- R10    Meet public expectations for aesthetics.

### **Procedures**

#### Inspection

Swales are easy to inspect and need to be well maintained to treat stormwater. Make frequent visual inspections for problems such as bare ground, sediment and oily material.

Identify and remove sources of pollutants to the swale.

#### Cleaning

Clear inlets and outlets of debris in order to prevent blockage.

Remove litter and trash when it collects.

Where possible, use a rake and/or shovel to remove sediment accumulations greater than 2-inches thick in 10 percent of the treatment area.

#### Vegetation Management

Sparse vegetation or dense clumps of cattail do not properly treat stormwater. Try to find the cause of the problem and fix it to ensure dense vegetation. Cut back excessive cattail shoots. Normally, wetland vegetation does not need to be harvested unless there is an excessive die back that causes water quality problems.

If there is a problem with grass dying due to the swale being flooded during the wet season, there are two options: plant varieties that can stand being flooded or find a way to fix the swale so it drains better. Call the Public Works Department at 817-7231 for information on plants and possible swale modifications.

Outside of the treatment area, preserve healthy vegetation or reestablish vegetation where needed. Seed bare spots. Use cover BMP's on bare soils.

Trees and shrubbery should be allowed to grow unless they interfere with facility function or maintenance activities. Any cut trees should be salvaged for habitat enhancement or converted to mulch or firewood.

Stormwater control facilities are, in effect, water body buffers in which pesticides and fertilizer are not used. See Vegetation Management in Stormwater Control Facilities for more information.

### Repairs

Often swales have problems due to flooding or erosion. Where possible, correct the underlying problem before trying to repair the symptom.

Repair any defect that causes the wet swale to dry out during the wet season.

Replace stormwater facility signs that are broken, damaged, or stolen.



## Drainage Ditches

Ditches are often manmade open-channels that carry only stormwater. These ditches are maintained to prevent localized flooding by draining stormwater. Maintenance includes removing sediment, debris, litter, and overgrown vegetation.

Many manmade drainage ditches carry water when it is not raining. This water comes from groundwater seepage and wetlands. These ditches can be recognized by the presence of wetland plants, such as cattails. Any work that disturbs these channels is probably subject to a variety of environmental regulations and may require an HPA permit from the Washington Department of Fish and Wildlife. Contact the Washington Department of Fish and Wildlife and the City of Camas Public Works Department before beginning any work.

### Maintenance Results

- R1 Avoid or minimize sediment and pollutant discharges from the area.
- R2 Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R3 Avoid or minimize vegetation removal.
- R4 Preserve natives plants.
- R7 Maintain or restore the intended infrastructure function.
- R8 Prevent or reduce flooding.
- R9 Protect infrastructure.

### Procedures

#### Inspection

Inspect ditches during routine site maintenance or at least once per year.

#### Cleaning

Land disturbing activities that remove vegetation or disturb soil are subject to erosion/sediment control requirements per CMC 15.32. A good time to clean drainage ditches is during the growing season, when it's easiest to reestablish vegetation.

Cleaning or excavating within seasonally dry or ditched watercourses may require an HPA from WDFW. Consult the official state DNR water type maps or contact the City of Camas for assistance in determining whether watercourses are typed streams (e.g. type 1, 2, 3, 4 or 5) that are regulated by WDFW. *Contact VTDFW Region Five office for additional information on whether specific watercourses are regulated under the State Hydraulic Code, or if unmapped streams are encountered.*

If feasible, remove small amounts of sediment by hand when performing routine site maintenance.

Vegetation should only be removed when it reduces free movement of water through the ditch. Never remove more vegetation than is absolutely needed.

Only remove sediment when it reaches 20 percent of the ditch depth or affects the historic or designed hydraulic capacity.

Alternate cleaning areas with undisturbed areas, leaving undisturbed sections to act as sediment trapping filters between worked areas.

Trap sediment that is generated by ditch maintenance to keep it from entering water bodies. Use sediment-trapping BMP's such as bio-filter bags at the lower end of each excavated area.

Prevent sediment from eroding when ditch work is performed. Perform work during dry weather unless there is an emergency, such as property or road flooding.

Vegetate bare soils by hydroseeding or cover bare soils with an approved BMP. Hand seed for smaller areas.

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# Operation & Maintenance Procedures

## Stormwater Structures

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## **Catch Basins and Curb Inlets**

Catch basins and curb inlets trap sediment and some oils that are washed off the road surface during a storm event. This sediment and the oils if not removed from the basins and inlets have the potential to pollute water bodies. They need to be inspected and cleaned at a minimum annually, more often if necessary; to remove accumulated sediment, fluids, and trash.

### **Maintenance Results**

- R1 Avoid or minimize sediment and pollutant discharges from the work area.
- R2 Prevent parking areas, roads, drainage systems, facilities, and property from becoming pollutant sources.
- R7 Maintain or restore the intended infrastructure function
- R8 Prevent or reduce flooding.
- R9 Protect infrastructure.

### **Procedures**

#### Inspection

Inspect catch basins and curb inlets at least once per year, more often if necessary.

Periodically inspect the catch basin or curb inlets and surrounding areas for pollutants, such as leaks from dumpsters, minor spills, and oil dumping. Act to have the pollutant source removed. Ensure that grass clippings and leave debris is not being blown into the streets.

#### Cleaning

Clean catch basins and curb inlets when they become one third full in order to maintain sediment-trapping capacity. Catch basin, curb inlet, and manhole cleaning should be performed in a manner that keeps removed sediment and contaminated water from being discharged back into the storm sewer.

Clean putrid materials from the catch basins and curb inlets when discovered or reported.

Keep the inlet grates cleared of debris and litter.

#### Safety

Work inside underground structures (e.g. manholes) requires special OSHA-required confined space equipment and procedures. The most practical option may be to contract with a sewer-cleaning contractor for this work.

#### Materials Handling

Disposal of waste from maintenance of drainage facilities shall be conducted in accordance with federal, state, and local regulations, including the Minimum Functional Standards for Solid Waste handling Chapter 173-304 WAC; guidelines for disposal of waste materials; and where appropriate, Dangerous Waste Regulations, Chapter 173-303 WAC.

Removed sediment must be disposed of in the garbage as solid waste. Contaminated water should be disposed of in a sanitary sewer after oils are removed using oil absorbent materials or other mechanical means. Used oil absorbents should be recycled or disposed according to the manufacture's instructions.

### Repairs

Repair any damages that prevent the catch basin or curb inlet from functioning as designed. An example is a broken or missing outlet elbow.

Follow the Procedures described under the Activity: Installation, Repair and Replacement of Enclosed Drainage Systems.

## **Debris Barriers/Trash Racks**

Debris barriers and trash racks are barred covers to pipe openings. They prevent large objects from entering pipes and keeps pets and people out of the pipes as well. In cases where there is fish migration, maintaining unblocked trash racks allows fish passage.

### **Maintenance Results**

- R1 Avoid or minimize sediment and pollutant discharges from the work area.
- R2 Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R5 Protect public safety and health.
- R6 Prevent catastrophic infrastructure failures.
- R7 Maintain or restore the intended infrastructure function.
- R8 Prevent or reduce flooding.
- R9 Protect infrastructure.

### **Procedures**

#### Inspection

Inspect debris barriers and trash racks at least once per year in the fall.

#### Cleaning

Clean debris barriers and trash racks when debris is plugging more than 20 percent of the openings or when obstruction to fish passages are created. Consult the Washington Department of Wildlife is in a fish-bearing waterway.

#### Repairs

Immediately replace missing racks and bars.

Replace bars that are deteriorated to the point where they may be easily removed.

Straighten bent bars back into position.

Follow the Procedures described in the Activity: Installation, Repair and Replacement of Enclosed Drainage Systems.



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## Energy Dissipaters

Energy dissipaters are critical for preventing erosion at storm drain outfalls. There are a variety of designs, including wire gabion baskets, rock splash pads, trenches, and specially designed pools or manholes.

### Maintenance Results

- R1 Avoid or minimize sediment and pollutant discharges from the work area.
- R2 Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R7 Maintain or restore the intended infrastructure function.
- R8 Prevent or reduce flooding.
- R9 Protect infrastructure.

### Procedures

#### Inspection

Inspect at least once per year.

#### Cleaning

Remove any accumulated litter.

Dispersion trenches: remove sediment from pipe when it reaches 20 percent of the pipe diameter.

#### Repairs

Rock splash pads: replace missing or moved rocks to cover exposed soil and meet design standards.

Dispersion trenches: repair conditions that cause concentrated flow along the trench. Clean pipe perforations when one-half of them are plugged or if flows bypass or overflow the trench.

Manhole/Chamber: when the structure deteriorates to one-half its original size or it becomes structurally unsound, replace it to the design standards.

Follow the practice described under the Activity: Installation, Repair and Replacement of Enclosed Drainage Systems.

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## Manholes

Manholes are large cylindrical vaults usually set at storm sewer pipe connections. Unless you have OSHA approved training and equipment, never enter a manhole. There is a considerable risk of poisonous gas and injury.

### Maintenance Results

- R1 Avoid or minimize sediment and pollutant discharges from the work area.
- R2 Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R7 Maintain or restore the intended infrastructure function.
- R8 Prevent or reduce flooding.
- R9 Protect infrastructure.

### Procedures

#### Inspection

Inspect the manhole once per year. Check frame and lid for cracks and wear, such as rocking lids or lids move by traffic.

Periodically inspect the manhole and surrounding areas for pollutants such as leaks from dumpsters, minor spills, and oil dumping. Take action to have the pollutant source removed.

#### Cleaning

Clean manholes when there is a blockage of the stormwater channel. Cleaning should be performed in a way that ensures removed sediment and water is not discharged back into the storm sewer.

#### Safety

**Never** enter a confined space without proper training and safety gear. Work inside underground structures requires special OSHA-required confined space equipment and procedures. The most practical option may be to contract with a sewer-cleaning contractor.

#### Materials Handling

Disposal of waste from maintenance of drainage facilities shall be conducted in accordance with federal, state, and local regulations, including the Minimum Functional Standards for Solid Waste handling Chapter 173-304 WAC; guidelines for disposal of waste materials; and where appropriate, Dangerous Waste Regulations, Chapter 173-303 WAC.

Removed sediment must be disposed of in the garbage as solid waste. Contaminated water should be disposed of in a sanitary sewer after oils are removed using oil absorbent materials or other mechanical means. Used oil absorbents should be recycled or disposed according to the manufacture's instructions.

#### Repairs

Repair all security and access features so they are fully functional. This includes locking lids, cover, and ladder rungs.

Replace broken parts or lids that rock or are moved by traffic.

Follow the practice described under the Activity: Installation, Repair and Replacement of Enclosed Drainage Systems.

## Oil/Water Separators and Buried Wet Vaults

An oil/water separator is an underground vault that treats stormwater by mechanically separating oil from water. The oil rises to the surface and floats on the water and sediment settles to the bottom. Buried wet vaults are similar to oil/water separators in that they are sub-surface vaults that separate sediment and floating materials from stormwater.

These facilities have special problems for maintenance and should be serviced by contractors. The main issues are working in confined spaces and properly handling any sludge and oil cleaned from vaults or oil/water separators. Manufacturer's recommendations for maintenance should be followed at a minimum.

### Maintenance Results

- R1 Avoid or minimize sediment and pollutant discharges from the work area.
- R2 Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R7 Maintain or restore the intended infrastructure function.
- R9 Protect infrastructure.

### Procedures

#### Inspection

Periodically check stormwater flow out of the facility. It should be clear and not have a thick visible oil sheen.

Annually check for cracks large enough to let soil enter the vault, broken or defective plates and baffles, and crushed or damaged pipes.

Periodically inspect the surrounding areas for pollutants, such as leaks from dumpsters, minor spills, and oil dumping. Take action to the pollutant source removed.

#### Cleaning

Remove trash and litter from the vault, inlet, and piping.

Remove oil when it reaches one-inch thickness.

Remove sediment when it accumulates to 6-inches in depth.

#### Safety

Work inside underground structures requires special OSHA-required confined space equipment and procedures. The most practical option may be to contract with a sewer-cleaning contractor.

#### Materials Handling

Disposal of waste from maintenance of drainage facilities shall be conducted in accordance with federal, state, and local regulations, including the Minimum Functional Standards for Solid

Waste handling Chapter 173-304 WAC; guidelines for disposal of waste materials; and where appropriate, Dangerous Waste Regulations, Chapter 173-303 WAC.

Removed sediment must be disposed of in the garbage as solid waste. Contaminated water should be disposed of in a sanitary sewer after oils are removed using oil absorbent materials or other mechanical means. Used oil absorbents should be recycled or disposed according to the manufacture's instructions.

### Repairs

Repair any cracked or defective plates or baffles. Cracks are repaired so that no cracks greater than 1/4-inch are present. Repair any leaks that allow water levels to drop and cause oil to be washed from the unit.

Repair all security and access features so they are fully functional. This includes locking lids, covers, and ladder rungs.

Follow the practice described under the Activity: Installation, Repair and Replacement of Enclosed Drainage Systems.

## **Flow Control Structures/Flow Restrictors**

Flow control structures and flow restrictors direct or restrict flow in or out of a facility. Outflow controls on detention facilities are a common example where flow control structures slowly release stormwater at a specific rate. If these flow controls are damaged, plugged, bypassed, or not working properly, the facility could overtop or be releasing water at too high of a rate. This would likely damage streams habitat and property. Site plans should have detailed drawings showing how the flow control structures should appear. Consult a licensed professional engineer or the City of Camas Public Works Department for assistance.

### **Maintenance Results**

- R2 Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R7 Maintain or restore the intended infrastructure function.
- R9 Protect infrastructure.

### **Procedures**

#### Inspection

Inspect at least once per year for all features listed under Cleaning and Repairs, or when a facility does not drain properly or other problems occur.

#### Cleaning

Remove sediment within 18-inches of the bottom of an orifice plate.

Remove trash and debris that may block the orifice plate.

Remove any trash or debris that may block an overflow pipe.

#### Safety

Work inside underground structures requires special OSHA-required confined space equipment and procedures. The most practical option may be to contract with a sewer-cleaning contractor.

#### Materials Handling

Disposal of waste from maintenance of drainage facilities shall be conducted in accordance with federal, state, and local regulations, including the Minimum Functional Standards for Solid Waste handling Chapter 173-304 WAC; guidelines for disposal of waste materials; and where appropriate, Dangerous Waste Regulations, Chapter 173-303 WAC.

Removed sediment must be disposed of in the garbage as solid waste. Contaminated water should be disposed of in a sanitary sewer after oils are removed using oil absorbent materials or other mechanical means. Used oil absorbents should be recycled or disposed according to the manufacturer's instructions.



### Repairs

Repair or replace to original design specification any outlet orifice that is enlarged, bypassed, or damaged.

Make certain that overflow outlets are not blocked.

Structures should be securely in place and within 10 percent of vertical.

Repair outlet pipe structures that have leaking connections or holes not specified by the design.

Repair or replace a non-functional or damaged cleanout gate.

Repair or replace damaged orifice plates to original design specification.

No outflow controls can be modified with approval of the City of Camas Public Works Department engineer.

Follow the practice described under the Activity: Installation, Repair and Replacement of Enclosed Drainage Systems.

## Storm Sewer/Drain Pipe

Storm sewer pipes convey stormwater. Storm pipes are constructed of many different types of materials and are sometimes perforated to allow groundwater to be collected by the storm system. Storm pipes are cleaned to remove sediment or blockages when problems are identified. Storm pipes must be clear of obstructions and breaks to prevent localized flooding.

### Maintenance Results

- O1 Avoid or minimize sediment and pollutant discharges from the work area.
- O2 Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- O7 Maintain or restore the intended infrastructure function.
- O8 Prevent or reduce flooding.
- O9 Protect infrastructure.

### Procedures

#### Inspection

Pipes are difficult to inspect requiring special equipment and training. Usually, if a problem occurs the owner needs to call a sewer or plumbing contractor to inspect, repair, or clean pipelines.

#### Cleaning

Clean pipes when sediment depth is greater than 20 percent of pipe diameter. When cleaning a pipe, minimize sediment and debris discharges from pipes to the storm sewer. Install downstream debris traps (where applicable) before cleaning and then remove material.

Generally, use mechanical methods to remove root obstructions from inside storm sewer pipes. Do not put root-dissolving chemicals in storm sewer pipes. If there is a problem, remove the vegetation over the line.

#### Safety

Work inside underground structures requires special OSHA-required confined space equipment and procedures. The most practical option may be to contract with a sewer-cleaning contractor.

#### Materials Handling

Sediment and debris from pipes should be disposed in the garbage as solid waste. Pick out any rocks first.

#### Repairs

Repair or replace pipes when a dent or break closes more than 20 percent of the pipe diameter.

Repair or replace pipes damaged by rust or deterioration.

Follow the practice described under the Activity: Installation, Repair, and Replacement of Enclosed Drainage Systems.

## Underground Detention Systems

Some detention systems consist of underground tanks or vaults that are usually placed under paved areas. They hold and slowly release stormwater runoff from roofs and pavement.

Tanks and vaults are confined spaces where work requires special OSHA-required training and equipment.

### Maintenance Results

- R1 Avoid or minimize sediment and pollutant discharges from the work area.
- R2 Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R7 Maintain or restore the intended infrastructure function.
- R9 Protect infrastructure.

### Procedures

#### Inspection

Inspect annually for the features listed under Cleaning and Repairs.

Periodically inspect the manhole and surrounding areas for pollutants such as leaks from dumpsters, minor spills, and oil dumping. Take action to have the pollutant source removed.

#### Cleaning

Remove trash and litter from the vault, inlet, and piping.

Clean air vents that have one-half of their area plugged.

Remove sediment when it accumulates to 1/10<sup>th</sup> the depth of a rectangular vault or 1/10<sup>th</sup> the diameter of a round tank or pipe.

#### Safety

Work inside underground structures requires special OSHA-required confined space equipment and procedures. The most practical option may be to contract with a sewer-cleaning contractor.

#### Materials Handling

Disposal of waste from maintenance of drainage facilities shall be conducted in accordance with federal, state, and local regulations, including the Minimum Functional Standards for Solid Waste handling Chapter 173-304 WAC; guidelines for disposal of waste materials; and where appropriate, Dangerous Waste Regulations, Chapter 173-303 WAC.

Removed sediment must be disposed of in the garbage as solid waste. Contaminated water should be disposed of in a sanitary sewer after oils are removed using oil absorbent materials or other mechanical means. Used oil absorbents should be recycled or disposed according to the manufacture's instructions.

### Repairs

Repair any cracked or defective plates or baffles. Cracks are repaired so that no cracks greater than 1/4-inch are present.

Any part of a tank or pipe that is bent out of shape more than 10 percent of its design shape must be replaced or repaired.

Repair any joints that are cracked and allow soil into the facility.

Repair all security and access features so they are fully functional. This includes locking lids, covers, and ladder rungs.

Follow the practice described under the Activity: Installation, Repair and Replacement of Enclosed Drainage Systems.

# Operation & Maintenance Procedures

## Special Facilities

## Public & Private Systems

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## Drywells

Drywells are perforated, open-bottomed manholes used to infiltrate stormwater into the ground. While not the intended use, drywells trap sediment and some of the oil pollutants in stormwater runoff. Drywells are more likely to fill with oily sediment in areas that lack swales or other treatment facilities. Fine oil sediment can clog drywells and lead to localized street flooding. Also, pollutants discharged into drywells can migrate into groundwater. Drywells were often installed in closed topographic depressions, areas with will-drained soils, or areas having inadequate storm sewers. Often, drywells contain groundwater.

### Maintenance Results

- R1     Avoid or minimize sediment and pollutant discharges from the work area.
- R2     Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R7     Maintain or restore the intended infrastructure function.
- R8     Prevent or reduce flooding.
- R9     Protect infrastructure.

### Procedures

#### Inspection

Drywells should be inspected at least once a year and no less than once every five years.

Periodically inspect the manhole and surrounding areas for pollutants such as leaks from dumpsters, minor spills, and oil dumping. Take action to have the pollutant source removed.

If a problem with flooding or slow drainage occurs, observe or inspect the drywell for infiltration rate and observe water level depths if monitoring wells are installed.

#### Cleaning

Clean out drywells when sediment depth is greater than 1/3 of the distance between the vase and inlet pipe.

Drywell cleaning should be performed in a way that makes certain removed sediment and water is not discharged back into the storm sewer.

#### Safety

Work inside underground structures requires special OSHA-required confined space equipment and procedures. The most practical option may be to contract with a sewer-cleaning contractor.

#### Materials Handling

Disposal of waste from maintenance of drainage facilities shall be conducted in accordance with federal, state, and local regulations, including the Minimum Functional Standards for Solid Waste handling Chapter 173-304 WAC; guidelines for disposal of waste materials; and where appropriate, Dangerous Waste Regulations, Chapter 173-303 WAC.

Removed sediment must be disposed of in the garbage as solid waste. Contaminated water should be disposed of in a sanitary sewer after oils are removed using oil absorbent materials or other mechanical means. Used oil absorbents should be recycled or disposed according to the manufacture's instructions.

### Repairs

If the drywell does not dissipate stormwater, it should be replaced or repaired.

It is possible to restore some drywell capacity by water-jetting clogged openings.

Another option is installing a new drywell or drainage trench, and converting the clogged drywell into a sediment trap. This has the advantage of providing a sediment trap and some amount of spill trapping. The sediment trap conversion requires grouting the holes, covering the base with concrete, and adding piping. Alterations to any storm facility **cannot** be done without approval from the City of Camas.

If there is standing water in a drywell, it probably is into the water table. Drywells in the water table should be rebuilt to prevent stormwater from going directly into groundwater.

Repair all security and access features so they are fully functional. This includes locking lids, covers, and ladder rungs.

Follow the practice described under the Activity: Installation, Repair, and Replacement of Enclosed Drainage Systems.



## **StormFilter™ (Leaf Compost Filter)**

The StormFilter is a patented system for treating stormwater. The systems have evolved during the last 10 years from very simple above ground filter beds to a variety of vault devices containing cylindrical filters filled with leaf compost pellets. StormFilter facilities consist of cartridges filled with one or a combination of media. Media can be selected to target pollutants specific to a particular site. The cartridges are housed in pre-cast or cast in-place concrete vaults or in a steel catch basin configuration. Each configuration uses baffles to promote settling of solids and separation of oils and other floatable materials. The majority of pollutants are captured by the media and held in the cartridges. Some additional settling will occur in the inlet and cartridge bays of each vault.

### **Maintenance Results**

- R1     Avoid or minimize sediment and pollutant discharges from the work area.
- R2     Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R7     Maintain or restore the intended infrastructure function.
- R9     Protect infrastructure.

### **Procedures**

#### Inspection

Inspect the StormFilter every six months. The inspection should determine sediment depth and the specific maintenance and repairs needed.

Inspect annually for cracks large enough to let soil enter the vault, broken or defective plates and baffles, and crushed or damaged pipes.

Periodically inspect the manhole and surrounding areas for pollutants such as leaks from dumpsters, minor spills, and oil dumping. Take action to have the pollutant source removed.

#### Cleaning

Remove trash and litter from the vault, inlet, and piping.

Remove sediment when it accumulates to 6-inches in depth in settling chambers.

Remove sediment when it accumulates on filter media.

Replace media cartridges per manufacture's recommendation.

#### Safety

Work inside underground structures requires special OSHA-required confined space equipment and procedures. The most practical option may be to contract with a sewer-cleaning contractor.

#### Materials Handling

Disposal of waste from maintenance of drainage facilities shall be conducted in accordance with federal, state, and local regulations, including the Minimum Functional Standards for Solid

Waste handling Chapter 173-304 WAC; guidelines for disposal of waste materials; and where appropriate, Dangerous Waste Regulations, Chapter 173-303 WAC.

Removed sediment must be disposed of in the garbage as solid waste. Contaminated water should be disposed of in a sanitary sewer after oils are removed using oil absorbent materials or other mechanical means. Used oil absorbents should be recycled or disposed according to the manufacture's instructions.

### Repairs

Repair any cracked or defective plates or baffles. Cracks are repaired so that no cracks greater than 1/4-inch are found.

Replace media cartridges if it takes longer than an hour for water to empty through media or if water frequently overflows the treatment chamber. Replace defective cartridges.

Repair all security and access features so they are fully functional. This includes locking lids, covers, and ladder rungs.

Follow the practice described under the Activity: Installation, Repair, and Replacement of Enclosed Drainage Systems.

## **Infiltration Systems (work in-progress)**

Due to the dominance of clay soils within the City of Camas, infiltrations systems are not allowed, except on a case-by-case basis.

### **Maintenance Results**

- R1     Avoid or minimize sediment and pollutant discharges from the work area.
- R2     Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R7     Maintain or restore the intended infrastructure function.
- R10    Meet public expectations for aesthetics

### **Procedures**

#### *Inspection*

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# Operation & Maintenance Procedures

## Miscellaneous Activities

## Public & Private Systems

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## **Fences, Gates, and Water Quality Signs**

Fences are installed around the perimeter of storm sewer facilities as a means of protecting the public, as they restrict entrance to the facility. Gates are installed to allow for maintenance access. Gates will be secured shut, typically with a double lock system that allows access to the City and to the property owner's maintenance crew.

Water Quality Signs are installed on the fences, or on sign poles, within public view as a means of educating the public as to the presence of a storm sewer facility. These signs also have a number located in the upper right hand corner that is cross referenced, at the City, to an address and maintenance responsibility.

### **Maintenance Results**

- R5     Protect public safety and health.
- R7     Maintain or restore the intended infrastructure function.
- R9     Protect infrastructure.

### **Procedures**

#### Inspection

Inspect fences, gates, and water quality signs during facility maintenance.

#### Repairs

Repair any opening that allows entry into the facility, including access beneath the fence.

Replace any missing gates.

Repair broken gate hinges or gates which do not close and lock properly.

Replace any missing signs or signs that have more than a 20 percent unreadable surface.

Repair sign posts that lean more than 8-inches off vertical.

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## **Access Roads and Easements**

Most stormwater facilities have access roads to bring in heavy equipment for facility maintenance. These roads should be maintained for inspection access and ease of equipment access.

### **Maintenance Results**

- R1 Avoid or minimize sediment and pollutant discharges from the work area.
- R2 Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R7 Maintain or restore the intended infrastructure function.
- R10 Meet public expectations for aesthetics.

### **Procedures**

#### Inspection

Inspect once a year or when facilities are maintained.

#### Cleaning

Remove litter when mowing or when there is any accumulation.

Remove any debris that blocks roads or may damage tires.

#### Vegetation Management

Manage vegetation as for the rest of the facility. Trees and shrubs may be removed from access roads and easements if they block access for necessary maintenance or will prevent or harm intended stormwater facility function. Use of pesticides is prohibited unless prior approval is received from the City.

#### Repairs

Correct any bare or eroded soils by seeding or a cover BMP.

Repair road surfaces when they may lead to erosion or limit equipment access.

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## **Pavement Sweeping**

Pavement sweeping is performed as a means of removing sand, dirt, and litter from streets and curb gutters. Sweeping also reduces dust during dry weather. Pavement sweeping is also part of storm sewer maintenance procedure because it limits the amount of sediment washed into the storm sewer facilities. The water quality procedure for street sweeping focuses on sediment removal and disposal. Reducing the amount of sediment washed into catch basins, curb inlets, detention facilities, drywells, and other facilities can save money because sweeping is generally cheaper than removing sediment from facilities. Sweeping also helps protect facilities from clogging with sediment.

### **Maintenance Results**

- R2 Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R5 Protect public safety and health.
- R10 Meet public expectations for aesthetics.

### **Procedures**

#### Inspection

Inspect on a weekly basis, depending on traffic volumes.

#### Cleaning

Sweep the site to help keep sediment from entering storm sewer systems and water bodies.

Sweeping is especially useful for cleaning up work areas.

Sweeping can be as easy as using a couple of push brooms or as involved as using mechanical methods.

#### Materials Handling

Disposal of waste from maintenance of drainage facilities shall be conducted in accordance with federal, state, and local regulations, including the Minimum Functional Standards for Solid Waste handling Chapter 173-304 WAC; guidelines for disposal of waste materials; and where appropriate, Dangerous Waste Regulations, Chapter 173-303 WAC.

Sweepings should be disposed of as solid waste or under a program permitted by the Southwest Washington Health District.

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# Operation & Maintenance Procedures

## Enclosed Storm Sewers System

## Public & Private Systems

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## **Installation, Repair, and Replacement of Enclosed Drainage Systems**

This chapter includes tasks such as repair and replacement of pipe, catch basins, drywells, and manholes. It also includes drainage projects that add new pipes, catch basins, or infiltration structures. New drainage projects are subject to regulations under CMC 15.36 Erosion/Sediment Control Plans.

### **Maintenance Results**

- R1     Avoid or minimize sediment and pollutant discharges from the work area.
- R2     Prevent parking areas, roads, drainage systems, and drainage facilities from becoming pollutant sources.
- R7     Maintain or restore the intended infrastructure function.
- R8     Prevent or reduce flooding.

### **Procedures**

#### *Cleaning*

Avoid or minimize vegetation removal. If work is near a stream or wetland, there are regulatory requirements that must be met.

Prevent debris, oils, cleaning agents, and sediment from entering waterways.

Avoid or minimize work in wet weather. This will reduce the problems of containing sediment.

Carry spill control kit on-site to contain and clean up possible small spills in the work area, e.g. oil spills.

Protect our storm systems:

- Install sediment traps around curb inlets and catch basins, e.g. biobags or gravel filled pillows.
- Install catch basin inserts.
- Sweep or vacuum dust and debris from the repair job. Do not wash materials into storm sewers.
- Place stockpiles away from drainage ways, wetlands, and natural wetland and habitat buffers. Cover stockpiles or contain them with berms or other containment devices.
- At stream crossings, trap material using screens or another approved form of containment. Use containment BMP's to protect roadside ditches during wet weather.

Ensure that along with the approved erosion/sediment control measures that are in-place prior to construction, that there is an emergency sediment control kit for unexpected problems; e.g. trench dewatering. This should include:

- Sediment bag,
- Additional biobags and catch basin inserts,
- Push brooms and flat edge shovels.

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## **Minor Culvert Repair (not in a natural stream)**

This activity is for the replacement or repair of culverts and inlets. It applies only to structures that are in ditches that are specifically for storm drainage. These are ditches that do not carry water during dry weather. If there is any question about whether the ditch is a storm drain or a stream, consult with the Washington Department of Fish and Wildlife and the City of Camas Public Works Department.

### **Maintenance Results**

- R1     Avoid or minimize sediment and pollutant discharges from the work area.
- R3     Avoid or minimize vegetation removal.
- R7     Maintain or restore the intended infrastructure function.
- R8     Prevent or reduce flooding.
- R9     Protect infrastructure.

### **Procedures**

Comply with erosion/sediment control requirements in CMC 15.32.

Avoid or minimize vegetation removal. If work is near a stream or wetland, there are likely to be regulatory requirements.

Other than to address a threat to public safety or property due to flooding, perform work during the dry season.

Minimize soil disturbance.

Use sediment controls to trap any sediment and prevent sediment from entering the storm sewer and water bodies. Sediment trapping BMP's are to be used to the extent practical during emergencies. An emergency sediment control kit is highly recommended.

Use cover BMP's to prevent erosion of bare soil. Vegetate bare soils.

## **Major Culvert Repair (at a Stream Crossing)**

This activity is the replacement or repair of culverts and inlets bridging a stream or ditch with flowing water during dry weather. If there is any question about whether the ditch is a storm drain or a stream, consult the Washington Department of Fish and Wildlife and the City of Camas Public Works Department.

These projects must meet all regulatory requirements.

- SEPA
- Shoreline
- HPA Permit
- Flood Plain

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# Operation & Maintenance Procedures

## Vegetation Management

## Public & Private Systems

April 2009

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## General Goals and Philosophy

The City of Camas recognizes the special importance of the rivers, streams, wetlands, ponds, and stormwater control and treatment facilities. The sensitive nature of such habitat, their plant and animal communities, and their direct link with other waterways require that we establish specific policies to ensure their health. All landscape management decisions for controlling unwanted vegetation, diseases, and pests should follow Integrated Pest Management (IPM) principles and decision-making rationale. These are as follows:

- Proper planning and management decisions begin the IPM process.
- Cultural methods of vegetation and pest control are preferred and are first employed.
- Mechanical means of vegetation and pest control are next in line of preference, and are utilized where feasible.
- Biological methods of vegetation and pest control are considered before chemical means, where they are feasible.
- Botanical and synthetic pesticides are used only when no other feasible methods exist.

## General Procedures

### Use Only Appropriate Plants

The City of Camas has adopted a list of approved plants for use in development projects, and to assist homeowners in choosing appropriate plantings. The list also has prohibited undesirable plants. Only plants approved for use on the City of Camas Plant List are allowed for use within the City's right-of-way, storm sewer facilities, and wetland buffers.

### Mulching

Mulches and other ground coverings are useful during the installation and restoration of landscapes as well as their ongoing maintenance. Mulches meet a variety of needs. They suppress weeds, help to retain moisture around plants, reduce possible erosion, and provide visual enhancement.

Always consider the possible impacts when using mulches, which may include:

- Inadvertent introduction of non-native plants and diseases to the site.
- Leaching of substances such as tannins from the mulch into nearby waterways.
- Migration of mulch material in waterways.
- Nutrient leaching into waterways.

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## **Vegetation and Pest Management in Storm Sewer Facilities**

Storm sewer facilities include biofiltration treatment swales, treatment wetlands, treatment ponds, detention ponds, open channels, and infiltration basins. Stormwater control facilities discharge to surface water or groundwater directly or through pipes or ditches. Facilities are built to remove pollutants and to control the discharge rate of stormwater.

Generally, vegetation should be maintained to blend into surrounding areas. Storm sewer facilities can also provide habitat for birds, amphibians, and other aquatic life. Promoting native vegetation, where feasible, improves habitat. Swales often blend into intensively managed landscapes. Pond perimeters can include native vegetation.

The use of pesticides, and in most cases fertilizer, is not compatible with the task of pollutant removal or where there is a direct discharge of stormwater to streams and groundwater.

### **Features of Storm Sewer Facilities:**

- There is a mix of native and non-native plants.
- Generally not used by the public.
- Include areas managed to promote design function, such as turf in swales.
- Managed landscapes may be nearby.
- May be used by fish and wildlife.

### **Objectives for Storm Sewer Facilities:**

- Maintain healthy plant communities.
- Avoid or minimize need for chemical intervention.
- Control invasive plants where feasible.
- No bare soil areas are allowed.
- Tolerance for natural appearance and weeds.

### **Procedures**

The vegetation management focus is in establishing and maintaining healthy low-maintenance native plantings and sustaining the design function of vegetated filters, such as biofiltration swales. This includes controlling invasive plants where feasible, and planting cover on bare soils.

***Only use plants on the City of Camas approved plant list.***

In some cases, the original plantings may not be appropriate for the actual conditions at a facility. One example is a frequently flooded swale that cannot support normal turf. In cases like this, replace turf with appropriate wetland plants if the underlying drainage problem cannot be fixed.

Consider the use of soil amendments, such as compost before using fertilizer.

Limit mulch use to covering bare soil while establishing plantings.

Chemical use should be avoided within 25 feet of any area that holds or conveys surface water or stormwater. This includes the base of a biofiltration swale.

Trees or shrubs that hinder accessibility to access roads may be trimmed (or removed if within the access road) when access is required for maintenance by heavy equipment.

Trees that pose a risk to stormwater structures due to root growth should be removed and replaced by smaller shrubs.

## **Vegetation and Pest Management in Wetland Areas**

Constructed wetlands are built to treat stormwater. As water bodies, treatment wetlands connect to streams and groundwater. Constructed wetlands also play host to insects, fish, amphibian, and birds that are sensitive to horticultural chemicals. Because of this, chemical use should be avoided or minimized in wetland buffers. Wetland management has a low tolerance for invasive or non-native plants.

Procedures listed here apply only to those parts of a constructed wetland that are not subject to inundation or saturation during the growing season.

### **Features of Constructed Wetlands:**

- Limited public access.
- Plants may or may not be well established, depending on age and condition.
- May provide fish and wildlife habitat.

### **Objectives for Constructed Wetlands:**

- Maintain health plant communities.
- Avoid or minimize need for chemical intervention.
- Low tolerance of invasive and non-native plants.
- Bare soil areas are not allowed.

### **Procedures**

There should be a plan for establishing and maintaining vegetation in a newly constructed wetland facility. If there is a plan, follow it. If there is not a plan, follow these Procedures. Maintenance focuses on establishing and sustaining healthy native plantings. This includes more vigorously controlling invasive plants. It also includes covering for bare soil.

***Only use plants on the City of Camas approved plant list.***

Consider the use of soil amendments such as compost before using fertilizer.

Limit mulch use to covering bare soil while establishing plantings.

Chemical intervention is to be minimized and is to be avoided, whenever possible, within 25 feet of areas subject to inundation during the growing season.

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# Operation & Maintenance Procedures

## Example “Storm Sewer System Maintenance Notification”

### Public & Private Systems

April 2009

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# CITY OF CAMAS

## STORM SEWER SYSTEM MAINTENANCE NOTIFICATION

Date Inspected: \_\_\_\_\_  
 Facility Name (subdivision/commercial/industrial): \_\_\_\_\_  
 Address or Location: \_\_\_\_\_  
 Contact Information: \_\_\_\_\_  
 Complete Maintenance by: \_\_\_\_\_ Re-inspected on: \_\_\_\_\_

### TYPE OF FACILITY:

Detention Pond: Wet \_\_\_\_\_ Extended Dry \_\_\_\_\_ Other \_\_\_\_\_

Water Quality Swale: Yes No Wetlands in Vicinity: Yes No Possible

Other Comments: \_\_\_\_\_

**GENERAL LOCATION SKETCH:** Show approximate dimensions, north arrow, structure locations, access location, name of nearest road, etc. As-Builts Available: Yes No

### Facility Check List:

Item	Yes	No
Located Access		
Located Inlet		
Located Outlet		
Located Orifice		
Slopes (Note Excess)		
Fenced / Gated		
Needs a Lock		
1-3 Photos Taken		
Outlet Type: Standpipe, Grated, Pipe, Open Channel, Other		

Other Comments:

### GENERAL MAINTENANCE NEEDS:

Mowing Ability: \_\_\_\_\_% Weed Eater Ability (due to fence/steep slopes): \_\_\_\_\_%

Remove the following: Blackberries Scotch broom Thistle Trees in Pond/Swale Cattails

Silt Removal Needed: Yes No If Yes, From: Inlet / Outlet Structure Pond / Swale

Inlet Protection: Adequate / Inadequate Outlet Protection: Adequate / Inadequate

Overflow Protection: Adequate / Inadequate Protection Needs: additional rock / vegetation removal

Trash Debris and/or Vegetation Removal Needed: Yes No

Erosion Damage: Severe Minor None Recommended Repairs: \_\_\_\_\_

Vegetation: Dense Average Sparse Needs: Replacement Additional Seeding

Additional Work Needed After Initial Vegetation Removal: yes / no

Description: \_\_\_\_\_

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