



EDMONDS COLLEGE  
FACILITIES

# Stormwater Operations and Maintenance Plan

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## A. PURPOSE

The Edmonds Community College campus is a Secondary Permittee under the State of Washington Department of Ecology Phase II Municipal Stormwater Permit ("Permit"), effective August, 2009. Per Permit Section S6.D.6.a, Secondary Permittees are required to develop and implement a municipal operation and maintenance (O&M).

It is based upon the City of Seattle stormwater Source Control Best Management Practices (BMPs) in Volume 1 Source Control Technical Requirements Manual that apply to this campus, Volume 3 City of Seattle Flow Control and Water Quality Treatment Appendix D for stormwater facility maintenance requirements, the King County Surface Water Design Manual (KCSWDM) Appendix A for pipe and ditch maintenance requirements, and Snohomish County Drainage Manual, Volume IV .

As required, the O&M Plan lists procedures to minimize stormwater pollution from high impact activities. The O&M Plan includes appropriate pollution prevention and good housekeeping procedures for all of the following operations, activities, and/or types of facilities that are present within Edmonds Community College boundaries, including but not limited to the following:

1. Stormwater collection and conveyance system, including catch basins, piping, channels, ditches and culverts.
2. Deicing and snow removal on roads and parking lots.
3. Storage, washing and maintenance of vehicle fleets and fueling facilities.
4. External building maintenance, including cleaning and painting.
5. Proper application of fertilizer, pesticides and herbicides on "college grounds" as well as sediment and erosion control, landscape maintenance and vegetation disposal, and trash management for those areas.
6. Stormwater protection at material storage areas, heavy equipment storage areas and maintenance areas not covered under other NPDES permits.
7. Any other facilities that would reasonably be expected to discharge contaminated runoff.

This Plan applies to all employees, visitors, students, and contractors attending or visiting Edmonds Community College Campus. It is commonly applicable to units in Facilities Services who conduct the activities above, including grounds maintenance zones, custodial services and maintenance and construction projects. It is also commonly applicable to faculty and staff of Edmonds Community College.

## B. STORMWATER COLLECTION AND CONVEYANCE SYSTEM

The stormwater collection and conveyance system includes catch basins, piping and other facilities used for stormwater conveyance and/or treatment. This section lists operations and maintenance requirements for catch basins, piping and other facilities.

### 1. Catch Basins

- Most catch basins have a storage area at the bottom to trap sediments, debris, and other particles that can settle out of stormwater, thereby preventing clogging of downstream piping and washing of these solids into the surface water ultimately receiving drainage water.
- When the catch basin is approximately 60 percent full of sediment, sediment can begin to wash into stormwater piping. Oils and grease, petroleum hydrocarbons, debris, metals, sediment, and contaminated water collect in catch basins, oil/water separators, and settling



- basins. Outlet traps (downturned elbows) are required to trap oil and other floatables and must be replaced or repaired when damaged or missing.
- Clean catch basins when they are half full or when the sediment and debris is within 18 inches of the bottom of the outlet pipe. Follow additional manufacturer guidance and requirements on catch basin inspection and maintenance.

## **2. Stormwater Piping**

- Stormwater piping must be in good condition. Piping should be inspected regularly and repaired as needed.
- Permit Section S6.D.3.c requires EdCC develop a storm sewer system map showing the locations of all known storm drain outfalls, labeling the receiving waters, and delineating the areas contributing runoff to each outfall. The map (or completed portions of the map) must be available on request to Ecology and/or to other Permittees or Secondary Permittees. The preferred, but not required, format of submission will be an electronic format with fully described mapping standards.
- Permit Section S6.D.3.d requires EdCC conduct field inspections and visually inspect for illicit discharges at all known outfalls that discharge to surface waters. The EdCC must visually inspect at least one third (on average) of all known outfalls each and develop and implement procedures to identify and remove illicit discharges. Records of inspections and follow-up activities must be maintained.

## **3. Stormwater Containment Vaults and Retention**

- Physically checking sediment build up in the vaults through visual inspection or camera inspections on an annual basis to get a record of buildup and data for safe environmental/financial decisions for scheduling cleaning and maintenance.
- Identifying each retention system with specifications and vital information.
- Develop scheduling and method for cleaning each retention system through PM's in our facilities Megamations database.

## **4. Other Stormwater Facilities**

- Other facilities can include both structural and non-structural stormwater facilities, such as green stormwater infrastructure elements including swales, trees, vegetation, and soil. All of these facilities require routine maintenance to ensure their functionality is maintained. Frequency and level of maintenance varies based on the facility location, function, and exposure to impacts
- Promptly repair or replace all substantially cracked or otherwise damaged secondary containment and any deterioration that threatens the structural integrity of the facilities, and replace cleanout gates, catch basin lids, and rock in emergency spillways, etc as needed.
- Inspect and clean all conveyance systems, and catch basins as needed, and determine whether improvements in operation and maintenance procedures are needed.
- Ensure that storm drain capacities are not exceeded and that heavy sediment discharges to the drainage system are prevented.
- Regularly remove debris and sludge from facilities used for treatment. Dewater, transport, and dispose of the material as solid waste as approved by the local or state government, or have it professionally removed by a contractor. If visual or olfactory indicators of pollution are noted, the waste must be characterized to ensure it is disposed of properly.

# **C. DEICING AND SNOW REMOVAL**

## **1. Snow Removal**

Snow removal is preferred to de-icing with chemicals.



## 2. Selecting Deicers

Deicing and/or anti-icing compounds are used on paved surfaces to control ice and snow. Common pavement deicers include calcium magnesium acetate (CMA), calcium chloride, magnesium chloride, sodium chloride, urea, and potassium acetate. The deicing and anti-icing compounds become pollutants when they are conveyed to storm drains or to surface water after application. Leaks and spills of these chemicals can also occur during their handling and storage

Applications of grit are applied around entrances and steps along with sand for the roads, main entrances, stop sign areas, and sidewalks. Apply only as needed using minimum quantities.

Small quantities of deicers and sand are applied to hazard areas.

- Select de-icers that cause the least adverse environmental impact.
- Apply only as needed using minimum quantities. Where feasible use deicers that cause less adverse environmental impact.
- Store and transfer de/anti-icing materials on an impervious containment pad

## 3. Maintenance After Deicing.

Sweep or clean up accumulated sand, grit from entrances, sidewalks, steps, and roads as soon as possible after the surfaces clear.

# D. STORAGE, WASHING AND MAINTENANCE OF VEHICLES AND EQUIPMENT

Pollutants released while washing vehicles and equipment include surfactants, petroleum hydrocarbons, toxic organic compounds, oils and greases, nutrients, metals, and suspended solids. These pollutants must not be discharged to the storm drainage system or directly into receiving waters.

## 1. Vehicle and Equipment Storage

Ensure that stored vehicles are not leaking oil or other fluids into storm drains.

## 2. Vehicle and Equipment Washing

### Procedures:

- Vehicle washing must be performed at a local car wash and not on campus.
- Equipment washing must be performed in an area where the water residue flows into and is collected in a bed where the waste water is naturally filtered through the soil. Only water or air can be used without any cleaning solutions, even biodegradable solutions. Debris and grass clippings must be picked up and properly disposed.
- If Equipment washing is performed on a hard surface, this wastewater must be collected from cleaning vehicles and equipment and must be discharged into a sanitary sewer drain at a site that is approved for discharge.
- Conduct indoor vehicle and equipment washing in an area that drains to the sanitary sewer and that prevents the wash water from flowing outside and entering the storm drainage system.



### 3. Vehicle and Equipment Maintenance

**Currently: All EdCC vehicles are serviced and maintained through outside vendors.**

- Employees must be educated annually about the need for careful handling of automotive fluids. New employees must be trained upon hiring. Employees that routinely change or handle these fluids must be trained in spill prevention and cleanup. All training must be documented.
- Spill cleanup materials, such as rags and absorbent materials, must always be kept close at hand when changing oil and other fluids. Soiled rags and other cleanup material must be properly disposed of or professionally cleaned and reused.
- Maintenance and repair activities must be conducted indoors.
- Drain all fluids that have the potential to leak from wrecked vehicles, and equipment when they arrive. Store and dispose of fluids properly.
- If the work must be performed outdoors or at a mobile location such as a construction site, drip pans or other containment devices must be used beneath the vehicle or equipment to capture all spills and drips.
- Make sure all outside materials that have the potential to leach or spill to the drainage system are covered, contained, or moved to an indoor location.
- Maintenance and repair areas cannot be hosed down. Instead, they must be swept weekly or more often as needed to collect dirt, and spills must be wiped up with rags and other absorbent materials. If pressure washing is necessary, the wastewater must be collected and disposed of properly. It cannot be discharged to the stormwater drainage system.
- Drains located inside buildings must be connected to the sanitary sewer. Do not allow drains inside maintenance buildings to connect to the sanitary sewer without prior approval by Lynnwood, and Snohomish County.
- If floatable components are present, use an oil/water separator or other appropriate treatment to treat all runoff from the fluid changing area prior to discharge to the sanitary sewer.
- If extensive staining and oily sheen is present, absorbent pillows or booms must be used in or around catch basins and properly maintained to prevent oil from entering the stormwater drainage system.

### 4. Washing and Cleaning of Food Service Equipment

This section applies to washing and cleaning of commercial cooking equipment, such as vent filters, grills, floor mats, and grease and pretreatment devices. Such washing and cleaning should always occur indoors with discharges to the building sanitary sewer or to a holding tank for shipment to an offsite disposal facility or approved treatment system. If the washing activity cannot be moved indoors or contained in a tub, the washing area must drain to a sanitary sewer, holding tank, or process treatment system. Provisions must be made to prevent the flow of stormwater onto the washing area.

- Wash water must be discharged into a sanitary sewer drain. It is illegal to discharge the dirty wash water to the stormwater drainage system. In addition:
- Wipe off the equipment before washing to remove fats, oil, grease and food waste.
- Do not pour cooking grease down the drain. Collect and dispose of all grease properly.
- If roof equipment or hood vents are cleaned, ensure that no wastewater or process water is discharge to the roof drains or stormwater system.



## **E. HARDSCAPES (sidewalks, courtyards, entrances), Lawns, and BUILDING EXTERIOR MAINTENANCE**

### **1. Discharges from Irrigation systems.**

- a. Adjust and maintain sprinkler heads to minimize overspray onto hardscapes as run off.
- b. Monitor run times to minimize runoff and maximum absorption according to soil and elevation.
- c. Installation of drip irrigation to reduce loss of water due to over spray and wind.
- d. Monitor run times if manually operated for drip irrigation so water is utilized by the plants, soil does not become over saturated and does not become runoff.
- e. Installation of computer controls and water sensors to eliminate run off and overwatering.

### **2. Pressure Washing**

- a. Eliminate or minimize exterior pressure washing whenever possible.
- b. Avoid soap when pressure washing; use heat, steam and/or water pressure instead.
- c. If pressure washing building or hardscapes (sidewalks, entrances, patios) with cold water, direct the water and debris into the campus beds and lawns as much as possible to minimize the flow into the storm drains.
- d. Avoid directing spray at the building entrances. Gentle wash down and clean all surfaces surrounding your main area, including windows, adjacent sidewalks, and walls that might have splattering.
- e. TYPE I. If the job generates a lot of sediment or debris, lay filter fabric on the ground or install a commercial catch basin insert in the drain to catch the debris. Dispose of this fabric and its contents appropriately to meet disposal codes.
- f. TYPE II. If the job generates a wash water that is non-regulated (soaps, biodegradable cleaners), seal the catch basins and collect the wash water for disposal in the sanitary sewer if it will meet City of Lynnwood sanitary sewer codes.
- g. TYPE III. If the job generates a hazardous material(lead paint, oils, hydraulic fluid, antifreeze, etc), seal the catch basins, install berms to keep contaminated wash waster from entering storm drains and collect the wash water for appropriate disposal as a hazardous waste. Consult with EHS/facilities whether sampling might be needed.
- h. Don't allow wash water to soak into landscaping unless you have made arrangements with grounds staff.

### **3. Construction, Parking Lot Maintenance, or Related Activities:**

- a. All catch basins within construction site or potential contamination from this site are required to install filter fabric or a commercial catch basin insert in the drain to catch the debris. Dispose of this fabric or insert and its contents appropriately to meet disposal codes.
- b. Active construction sites- street sweeping shall be performed prior to washing the hard surfaces.
- c. All the above for power washing must be observed by the contractor in addition to these two items.

### **4. Use of Solvents or Cleaners**

- a. Avoid the use of acids, solvents, soap or detergents whenever possible. Even products that are labeled "biodegradable" are not allowed to enter storm drains.
- b. If soap or detergents must be used, collect your wash water using berms, plastic and other means. Dispose wash water into a sanitary sewer unless the building is coated in lead paint. If you are washing surfaces coated with lead paint, collect and take a sample of the wash water. If the lead concentration exceeds 3 ppm, the wash water cannot be disposed into the sanitary sewer. It must be managed as hazardous waste.





- c. If you must use solvents, collect the wastewater for disposal as hazardous waste.
- d. If you must use acidic products, collect the wash water for neutralization or characterization.
- e. For more information, see the facilities departments.

## F. APPLICATION OF FERTILIZER AND PESTICIDES

Avoid fertilizer and pesticide application whenever possible. Follow the campus integrated pest management (IPM) plan and use pesticides sparingly. If pesticides or herbicides are used, they must be carefully applied in accordance with label instructions and the Federal Insecticide, Rodenticide and Fungicide Act (FIFRA) and applicable State laws. Maintain appropriate vegetation, properly apply fertilizer where necessary, or consider the use of pest resistant varieties when possible. Also where practical, grow plant species appropriate for the site.

### 1. Application of Pesticides

1. Choose the least toxic pesticide that is capable of reducing the infestation to acceptable levels.
2. Immediately after application, record spraying information into Megamations (Project 60) to maintain proper and current records.
3. Conduct any pest control during the life stage when the pest is most vulnerable. For example, if it is necessary to use a *Bacillus thuringiensis* application to control tent caterpillars, it must be applied before the caterpillars form their cocoons or it will be ineffective. The pest control method should be site-specific rather than using generic.
4. When necessary to use, apply pesticides according to the directions on the label and use the following BMPs:
  - a. Conduct spray applications according to specific label directions and the applicable local and state regulations.
  - b. Do not apply pesticides if it is raining or immediately before expected rain (unless the label directs such timing).
  - c. Ensure that the pesticide application equipment is capable of immediate shutoff in the event of an emergency.
  - d. Do not apply pesticides within 100 feet of open waters including wetlands, ponds, streams, sloughs, or any drainage ditch or channel that leads to open water except when approved by the Department of Ecology (all sensitive areas including wells, streams, and wetlands must be flagged prior to spraying.) Take care to avoid contamination or site disturbance during applications.
  - e. Never apply pesticides in quantities that exceed the manufacturer's instructions.
  - f. Mix pesticides and clean the application equipment under cover in an area where accidental spills will not enter surface water or groundwater and will not contaminate the soil.
  - g. The Environmentally Critical Areas Ordinance (SMC 25.09) also restricts certain described pesticide use within buffer zones of certain sensitive areas.
  - h. Before spraying always check the List for Sensitive Pesticide People in your immediate area of applications. Grounds Department keeps a file on the Sensitive Pesticide People. These people have to be notified in advance of application.



## 2. Storage of Pesticides

1. Store pesticides in Hazardous Specialize Storage Shed or in covered impervious containment.
2. Do not hose down the paved areas to a storm drain or conveyance ditch.
3. Ensure that pesticide-contaminated waste materials are kept in designated covered and contained areas, and disposed of properly.
4. Rinsate from equipment cleaning and/or triple-rinsing of pesticide containers should be used as product or recycled into product.

## 3. Application of Fertilizer

1. Ensure that all fertilizers are applied by properly trained personnel. Document and keep all training records.
2. Ensure that fertilizers are not applied to grass swales, filter strips, or buffer areas that drain to sensitive receiving waters.

# G. MATERIAL AND EQUIPMENT STORAGE

## 1. Outdoor Storage of Materials

This section applies outdoor storage and transfer of solid raw materials, byproducts, or products such as but not limited to gravel, sand, salts, topsoil, compost, logs, sawdust, wood chips, lumber and other building materials, concrete, and metal products typically stored outside in large piles or stacks.

1. Cover and contain materials to prevent erosion whenever possible. Erosion results in stormwater contamination and loss of valuable product.
2. Sweep paved storage areas daily or more often as necessary to collect and dispose of loose solid materials. Do not hose down the contained stockpile area if the discharge will flow into a storm drain or a drainage conveyance.
3. For stockpiles containing more than five cubic yards of erodible or water-soluble materials such as soil, deicing salts for roads, compost, unwashed sand and gravel, and sawdust; and for outside storage areas for solid materials such as logs, bark, lumber, and metal products, do one or more of the following:
4. Store materials inside a building or on a covered outdoor paved area, preferably surrounded by a berm.
5. Place temporary plastic sheeting (polyethylene, polypropylene, hypalon, or equivalent material) over the material. Anchor sheeting to prevent contact with rainfall.
6. For large stockpiles that cannot be covered:
7. Install containment devices, such as a berm or a low wall around the perimeter of the pile and at any catch basins as needed to prevent erosion of the stockpiled material and to prevent discharge of leachate from the stockpiled material off the site or to a storm drain.
8. Ensure that contaminated stormwater is not discharged directly to catch basins without being conveyed through a treatment BMP.
9. Inspect and maintain catch basins regularly (weekly or more often as needed).
10. Maintain the quantity of materials necessary to prevent the erosion of large stockpiles and loss of valuable materials.



## 2. Storage of Contaminated Soils

This section applies to the storage of soils contaminated with toxic organic compounds, petroleum products, or metals.

1. Cover or enclose the storage area for the contaminated soils and contain it with a curb, dike, or berm constructed around the material storage area if possible.
2. Sweep paved storage areas daily or more often as needed. Stock cleanup materials such as brooms, dustpans, and vacuum cleaners near the storage area.
3. Regularly inspect and maintain catch basins and other drainage systems on the site to prevent contaminated materials from entering stormwater and leaving the site. Sediment from such cleaning must be disposed of properly in accordance with applicable law, which may include Washington State Dangerous Waste Regulations.

## 3. Outdoor Portable Container Storage

The following applies to outdoor portable containers used to store accumulated food wastes, vegetable or animal grease, used automotive fluids, liquid feedstock or cleaning compounds, chemicals, or dangerous wastes (liquid or solid), and contaminated stormwater.

1. Wherever possible, store containers on a paved surface under a roof or other appropriate cover or in a building.
2. Store materials in a leak-proof container with a tight-fitting lid.
3. All containers must have labels identifying their contents. Apply labels and position containers so labels are clearly visible. If the material is hazardous waste it should have a hazardous waste label.
4. Place drip pans beneath all taps on mounted containers and at all potential drip and spill locations during the filling and unloading of containers.
5. Inspect container storage areas regularly for corrosion, structural failure, spills, leaks, overfills, and failure of piping systems. Check containers daily for leaks and spills. Replace containers, and replace and tighten bungs in drums as needed.
6. Secure drums in a manner that prevents accidental spillage, pilferage, or any unauthorized use.
7. Place containers mounted for direct removal of a liquid chemical for use by employees inside a containment area as described above. Use a drip pan during liquid transfer.
8. Keep the minimum amount of materials necessary on hand to prevent large quantities of liquids on site.

### **\*\* For hazardous materials, also do the following:**

1. Provide covered secondary containment. Alternatively, the storage area shall be paved and surround by a berm or dike and covered. The dike must be high enough to hold a volume of either 10 percent of the total volume of the enclosed containers or 110 percent of the volume of the largest container, whichever is greater, or if a single container, 110 percent of the volume of that container. The area must be sloped to drain into a dead-end sump for the collection of leaks and small spills.
2. Dangerous wastes that do not contain free liquids must be stored in a designated sloped area with the containers elevated or otherwise protected from stormwater run-on.
3. Ensure that the storage of reactive, ignitable, or flammable liquids complies with the City Of Lynnwood Fire Code and Uniform Fire Code.
4. Keep containers with dangerous waste inside a building unless this is impractical due to site constraints or the requirements of the Lynnwood Fire Code or Uniform Fire Code.



5. If the material is a hazardous waste, you must also comply with hazardous waste rules. Check with Facilities and EHS for more information about what qualifies as hazardous waste and more.

#### **4. Storage of Liquids in Permanent Aboveground Storage Tanks** This section

applies to aboveground storage tanks that contain liquids (excluding uncontaminated water) including, but are not limited to, aboveground heating oil tanks and gasoline and diesel tanks.

1. To prevent stormwater contamination, install secondary containment or a double-walled tank. Add safeguards against accidental releases, including guards around the tanks to protect them from vehicle or forklift damage, and place tags on valves to reduce human error. Design containment areas around the tank so that potential stormwater contamination can be minimized and managed.
2. Locate and design tanks to prevent and minimize stormwater contamination as follows:
3. Locate permanent tanks in an impervious (Portland cement concrete or equivalent) secondary containment area.
4. Surround the secondary containment area with dikes or provide double walled tanks approved by the Underwriters Laboratory (UL). Design the dike to be of sufficient height to provide a containment volume of either 10 percent of the total volume of the enclosed tanks or 110 percent of the volume of the largest tank, whichever is greater, or if a single tank, 110 percent of the volume of that tank.
5. Secondary containment must be emptied regularly to prevent contaminated liquid from overflowing into the drainage system.
6. If the tank containment area is not covered, equip the outlet from the spill-containment sump with a shutoff valve, which is normally closed. The valve should only be opened to convey contaminated stormwater to an approved treatment system or disposal facility or to convey uncontaminated stormwater to a storm drain.
7. Place adequately sized drip pans beneath all mounted taps and locations where drips and spills might occur during the filling and unloading of tanks.
8. Include a tank overfill protection system to minimize the risk of spillage during loading.
9. Implement the following maintenance activities to prevent and minimize stormwater contamination:
10. Inspect tank containment areas regularly to identify problems (e.g., cracks, corrosion, leaks) with components such as fittings, pipe connections, and valves. Replace or repair tanks that are leaking, corroded, or otherwise deteriorating. Document and keep all inspection records.
11. Sweep and clean the tank storage area regularly.

#### **5. Parking Lot Maintenance and Storage of Vehicles and Equipment**

This section applies to parking lots and areas where vehicles or equipment are parked or stored outside.

The following BMPs or equivalent measures are required for activities related to the parking and storage of vehicles and equipment:

1. Sweep or vacuum parking lots, storage areas and driveways regularly to collect dirt, waste, and debris and dispose as solid waste.
2. Sweep or vacuum prior to the use of water hoses or pressure washers to wash areas that drain to a storm drain or to the surface water ultimately receiving drainage water.
3. If a parking lot must be washed and there is a potential of contaminants other than cold water and natural debris, collect and discharge the wash water to a sanitary sewer or



other approved wastewater treatment system, if allowed by Lynnwood, Snohomish County or offsite disposal. Cover storm drains to prevent wash water from entering the surface water ultimately receiving drainage water. The Snohomish Industrial Waste Program regulates discharges to the sanitary sewer. In some cases, contaminated stormwater may need to be pretreated before it is discharged to the sanitary sewer. For approval before discharging wash water to the sanitary sewer contact Facilities.

4. Make sure all outside materials that have the potential to leach or spill to the drainage system are covered, contained, or moved to an indoor location.
5. An oil removal system such as an API or coalescing plate oil/water separator, catch basin filter, or equivalent BMP may be required if there is a potential for contamination of the MS4 system. If a catch basin filter is used, maintain the filter regularly (weekly or as needed) to prevent plugging.

## H. OTHER CAMPUS FACILITIES

### 1. Swales

The following BMPs or equivalent measures are required for activities related to the maintenance of swales:

1. Inspect swales regularly recording information on PM's through Megamations, as needed to identify sediment accumulations and areas of localized erosion.
2. Inspect culverts on a regular basis for scour or sedimentation at the inlet and outlet, clean, and repair as necessary to maintain proper flow without clogging or backing up stormwater.
3. Line trim grasses and weeds to manageable height and clean swales on a regular basis, as needed:
4. Keep swales free of rubbish and debris.
5. Conduct swale maintenance when most effective, usually in late spring, summer and early fall.
6. Do not apply fertilizer unless needed to maintain vegetative growth.
7. Do not leave material from the swale cleaning on roadway surfaces.
8. Sweep and remove dirt and debris that remains on the pavement at the completion of swale cleaning operations.
9. Segregate clean materials from suspect or contaminated materials. Non-contaminated soils may be handled as "clean soils" and non-contaminated vegetative matter can be composted or disposed of in a municipal waste landfill, if permitted. Suspected contaminated or contaminated material removed from ditches must be tested and handled according to the Dangerous Waste Regulations unless testing indicates that it is not dangerous waste.
10. Vegetation in swales often prevents erosion and cleanses runoff:
11. Remove vegetation only when flow is blocked or excess sediments have accumulated.
12. Use grass vegetation, unless specified otherwise by grounds department (e.g., for natural drainage systems).
13. Establish vegetation from the edge of the pavement if possible or at least from the top of the slope of the swale.

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