

# Maintenance Stormwater Field Guide

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AMERICAN ASSOCIATION  
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## Chapter 1. INTRODUCTION

### Scope and Objective

Highways and other transportation-related sites can be a source of sediment and other pollutants to rivers, lakes, and coastal waters. Best management practices (BMPs) can be used by maintenance workers to reduce the discharge of pollutants from highway storm drain systems.

The intent of this guide is to be a quick reference for maintenance staff on topics related to BMP inspection and common operational practices. Good housekeeping and other pollution source control measures are presented. Using the tips in this guide will help in complying with federal and state regulations for stormwater quality. It will also help achieve a greater level of environmental stewardship. This guide is not a design manual or a substitute for a pollution prevention plan.

### Preface to Readers

This publication includes descriptions of BMPs and how to maintain them. It is organized based on common highway and facility operational practices. Oftentimes a single BMP can be used for many different operations (e.g., street sweeping can be part of normal road maintenance, clean-up required after winter application of sand, and specialized bridge maintenance practices).

The information presented in this guide is based on techniques and control measures considered generally effective in many areas of the country. Local conditions may require that the practices discussed in this guide be altered, or used with other measures. This guide may also be augmented by DOTs to provide more information to suit local practices and field conditions.

The information provided for each BMP includes maintenance frequencies and performance standards. In all cases, this information is to provide guidance specific to highway and DOT facility operation. In no case is such information

meant to supersede, substitute for, or make more stringent well-defined practices or regulatory standards.

## Clean Water Goals

DOTs conduct activities that can pose a threat to water quality if BMPs are not used. These activities include road maintenance, application of traction aides and de-icers, minor road and bridge repairs, fleet maintenance, landscaping, and facility maintenance. DOTs also conduct activities that remove pollutants from the storm drain when done properly, such as street sweeping and storm drain system cleaning.

Follow your DOT procedures for:

- Using BMPs to treat pollutants from highway areas, transportation infrastructure, maintenance areas, storage yards, weigh stations, rest stops, and welcome centers, among others;
- Developing inspection and maintenance procedures and schedules for stormwater BMP implementation;
- Properly disposing of pollutants; and
- Identifying ways to reduce water quality impacts associated with the most common maintenance and operational practices.

This guide provides practical information to DOT staff for selecting and using the most appropriate BMPs for each activity or situation.

## General Tips

### Assessment and Planning

Maintenance staff can benefit from general site and activity assessment, as well as planning before using BMPs. Particular aspects that should be considered include:

- Identify and understand basic drainage patterns of your site, including locations of storm drain inlets, pipes, and other conveyances.

- Identify areas of your site that are most likely sources of sediment and other typically encountered pollutants. Common pollutants associated with roadside activities and facility areas are shown in the tables on the next pages.
- Identify areas that may also be environmentally sensitive to ensure that a stormwater maintenance activity does not disturb an environmental requirement. Obtain any necessary permits before the work.

**Table 1-1. Potential Pollutants Likely Associated with Specific DOT Facilities**

DOT Facility Activity	Potential Pollutants								
	Sediment	Nutrients	Trash	Metals	Bacteria	Oil and Grease	Organics	Pesticides	Oxygen Demanding Substances
Building and Grounds Maintenance and Repair	X	X	X	X	X	X	X	X	X
Parking/Storage Area Maintenance	X	X	X	X	X	X	X		X
Waste Handling and Disposal	X	X	X	X	X	X	X	X	X
Vehicle and Equipment Fueling			X	X		X	X		
Vehicle and Equipment Maintenance and Repair				X		X	X		
Vehicle and Equipment Washing and Steam Cleaning	X	X	X	X		X	X		
Outdoor Loading and Unloading of Materials	X	X	X	X		X	X	X	X
Outdoor Container Storage of Liquids		X		X		X	X	X	X
Outdoor Storage of Raw Materials	X	X	X			X	X	X	X
Outdoor Process Equipment	X		X	X		X	X		
Irrigation	X	X	X		X		X	X	X
Landscape Maintenance	X	X	X		X			X	X

Source: California Stormwater BMP Handbook (slightly modified).

**Table 1-2. Potential Pollutants Likely Associated with Specific DOT Roadside Activities**

DOT Roadside Activity	Potential Pollutants									
	Sediment	Nutrients	Trash	Metals	Bacteria	Oil and Grease	Organics	Pesticides	Oxygen Demanding Substances	
Road, Street, and Highway Operation and Maintenance	Sweeping and Cleaning	X	X	X	X	X	X	X	X	
	Street Repair, Maintenance, and Striping/Painting	X		X			X	X		
	Bridge and Structure Maintenance	X		X	X		X	X		
	Surface Cleaning	X	X	X		X	X	X	X	
Plaza, Sidewalk, and Parking Lot Maintenance and Cleaning	Graffiti Cleaning	X	X	X	X			X		
	Sidewalk Repair	X	X	X						
	Controlling Litter		X	X				X		
	Fountain and Pool Draining		X			X		X		
Fountain, Pool, Lake, and Lagoon Maintenance	Lake and Lagoon Maintenance	X	X	X		X		X	X	
	Mowing/Trimming/Planting	X	X	X		X		X	X	
	Fertilizer and Pesticide Management	X	X					X		
Landscape Maintenance	Managing Landscape Waste		X					X	X	
	Erosion Control	X	X						X	



DOT Roadside Activity	Potential Pollutants									
	Sediment	Nutrients	Trash	Metals	Bacteria	Oil and Grease	Organics	Pesticides	Oxygen Demanding Substances	
Drainage System Operation and Maintenance	Inspection and Cleaning of Stormwater Conveyance Structures	X	X	X		X		X		X
	Controlling Illicit Connections and Discharges	X	X	X	X	X	X	X	X	X
	Maintenance of Inlet and Outlet Structures	X		X	X		X			X
Waste Handling and Disposal	Solid Waste Collection		X	X	X	X		X		X
	Waste Reduction and Recycling			X	X					X
	Hazardous Waste Collection			X	X		X	X	X	
	Controlling Litter			X	X	X		X		X
	Controlling Illegal Dumping	X	X	X	X	X	X	X	X	X
Water and Sewer Utility Operation and Maintenance	Roadside Animal Remains					X		X		
	Water Line Maintenance	X				X	X			
	Sanitary Sewer Maintenance	X				X	X	X		X
Spill/Leak/Overflow Control, Response, and Containment	X	X			X		X		X	

Source: California Stormwater BMP Handbook (slightly modified).

## Ensuring Clean Water

Effective water pollution control must come from a culture of environmental stewardship, similar to a safety program. All staff must have the means to change work efforts, where necessary, to meet environmental protection goals. Good documentation must be kept so that the level of information for required reports is accurate and defensible. A few suggestions to help ensure success:

- Set a point of contact for each activity type and/or facility location. This includes DOT staff, participating contractors, and sub-contractors.
- Monitor weather conditions and adjust plans accordingly to avoid working during storms.

## Work Management

Stormwater pollution prevention is handled by more than one person. Roles and responsibilities should be clearly defined, communicated, and documented prior to work activity. Those should generally include:

- Who is overall lead on stormwater pollution prevention issues at each activity or facility area
- Who is responsible for monitoring changes in weather conditions
- Who is responsible for inspecting and maintaining structural BMPs
- Who is responsible for supervising and implementing good housekeeping practices
- Who is in charge of spill response
- Who is responsible to manage expected and approved non-stormwater discharges
- Who is responsible for record keeping and reporting
- Who is responsible for training of other maintenance personnel on stormwater management and pollution prevention issues

## General BMP Inspection and Troubleshooting

Each BMP presented in this guide has information on inspection, maintenance, and corrective actions. Many of the problems occurring in the field fall into the following general categories and are not associated specifically with any one BMP.

**Table 1-3.** General BMP Troubleshooting

If Your BMP or Site Is Experiencing...	...Then Consider
Erosion	<ul style="list-style-type: none"> <li>• Additional erosion control/soil stabilization BMPs</li> <li>• Diversion using temporary runoff management practices (clear water diversion)</li> <li>• Modifying your maintenance sequence or schedule</li> </ul>
Sediment and Debris Build Up	<ul style="list-style-type: none"> <li>• Additional erosion control/soil stabilization BMPs</li> <li>• More frequent maintenance and clean out</li> <li>• Diversion using temporary runoff management practices (clear water diversion)</li> <li>• Modifying your maintenance sequence or schedule</li> </ul>
Trash Accumulation	<ul style="list-style-type: none"> <li>• Staff training</li> <li>• More covered dumpsters</li> <li>• More frequent trash pickup</li> <li>• Signs for employees</li> <li>• Controlled access to site to limit illegal dumping</li> </ul>
Standing Water	<ul style="list-style-type: none"> <li>• Inspecting inlets and pipes for blockage from trash and debris</li> <li>• Reducing the drainage area to each BMP using runoff management practices</li> <li>• Increasing the size (surface area) of your BMP</li> <li>• Providing additional erosion and sediment control BMPs within the contributing drainage area</li> </ul>
Bypass of Flow	<ul style="list-style-type: none"> <li>• Increasing the size of your BMP</li> <li>• Verifying the size and physical adequacy of inflow and outflow structures, conduits, etc.</li> </ul>

## Chapter 2. ROADSIDE MAINTENANCE ACTIVITIES

### Storm Drain Cleaning and Repair

#### General Description

Drain inlet and culvert maintenance includes the removal of accumulated sediment, trash, and natural debris from under drains, horizontal drains, down drains, gutters, overside drains, scuppers, and deck drains. Drains are maintained to prevent flooding and remove pollutants. Cleaning typically involves traffic control and the use of a backhoe or vactor truck.



**Fig. 2-1.** Crews clean a culvert.

Source: Idaho Transportation Department

#### Maintenance and Inspection

- Culverts and drain inlets should be inspected annually in the Fall and throughout the Winter as needed to determine if cleaning or repairs are required. Storm drain inlets, culverts, and ditches should be cleaned when sediment impairs function, or when 50 percent of the flow area is blocked.
- Downdrains should be inspected annually.

## General Practices for Ditch Maintenance

- Ditches should be cleaned prior to the rainy season. Permitting may be required prior to any work operations. Do not change engineered ditch conditions.
- Ditches and gutters should be sealed or repaired when structural integrity is endangered.
- Dispose of removed material properly.
- Cleaned ditches should be seeded and mulched, if appropriate, as soon as possible. Monitor closely for subsequent erosion until area is stable. Repair as necessary.
- Removed material that has been contaminated with oil, gasoline, or other chemicals must be disposed of by a licensed hazardous materials hauler.



**Fig. 2-2.** Failure to provide routine maintenance at pipe outfalls can lead to larger failures.

Source: RBF Consulting

## General Practices for Culvert Maintenance

- Culverts should only be cleaned or repaired during non-storm periods. If culvert maintenance must be done while water is flowing through the culvert, then clear water diversion should be installed.

- Disturbance of the bed and banks adjacent to the pipe should be limited to that necessary to repair the culvert.
- The work area should be fully restored upon completion with a mix of native, locally adapted, vegetation, if appropriate.
- Wastewater from dewatering activity should be routed to an area that will not drain directly into any stream channel. Consult the appropriate dewatering permit.



*Disturbance of the bed and banks adjacent to the pipe should be limited to that necessary to repair the culvert.*

### **Fish Passage and Aquatic Species Protection**

- Coordinate with your DOT fish and wildlife specialists or local fish and wildlife agencies for assistance in scheduling to avoid aquatic impacts.
- If pumps are used to temporarily divert a stream to facilitate construction, a fish screen should be used to prevent trapping of small fish.

### **Drift Removal**

- Cut and turn driftwood to allow it to flow through and under the structure only where doing so would not endanger any other crossing structures downstream.
- Repair and restore riparian areas temporarily impacted by machinery during drift removal. Coordinate long-term access for drift removal with the appropriate staff and agencies.

### **Vacuum (Vactor) Waste Disposal**

Vactor waste is considered to have a high environmental risk. This risk is due to its makeup of easily transported silts and potentially contaminated liquid fraction.

- Vector liquids should be disposed to an approved sanitary sewer only with permission.
- Where sanitary sewers are not available, the DOT hazardous materials coordinator should specify areas suitable for field decanting of vector solids or liquids under a state permit. Disposal lands should also maintain controls to prevent public access.
- Dispose of vector waste only in locations approved by the DOT environmental division.



*Dispose of vector waste only in locations approved by the DOT environmental division.*

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## Other General Practices

- DO** Do dispose of solid and liquid wastes generated by the cleaning of stormwater facilities in accordance with federal, state, and local regulations.
- DO** Ensure timely inspection and removal of debris for culverts to continue to effectively move water, fish, sediment, and debris.
- DO** Be sure that all appropriate regulatory permits have been obtained prior to performing storm drain maintenance.
- DO NOT** Perform maintenance of storm drains, culverts, or ditches during rainfall, except when emergency conditions warrant.



*Do not perform maintenance of storm drains, culverts, or ditches during rainfall, except when emergency conditions warrant.*

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## Eroding Slope and Channel Areas

### General Description

Slope repair involves repairing erosion, fire, or seismic damage to roadway slopes to prevent pollution discharge to storm drains or surface waters. Such work may involve removal of debris, buttressing, grading, construction of minor drainage improvements, and re-vegetation. Practices to control erosion during repair work include the use of rolled erosion control products (RECPs), tackifiers or binding agents, and mulching. Channels are maintained to remove trash, debris, and excessive vegetation. Channel maintenance can involve minor grading or replacement of riprap, rock, or gabions to reduce erosion.



**Fig. 2-3.** This slope is exhibiting signs of rill erosion and additional BMPs are needed.

Source: *RBF Consulting*

### Slope Preparation

Surface roughening is used as a temporary BMP to reduce the speed of runoff, increase infiltration, reduce erosion, trap sediment, and prepare the soil for seeding and planting by capturing moisture for seed. Surface roughening may be accomplished by furrowing, scarifying, ripping, or disking the soil to create a 2- to 4-inch variation in soil surface.





*Surface roughening should be used in conjunction with other BMPs such as mulching, seeding, or tackifier and should be parallel to the contour of slopes.*

Surface roughening should be used in conjunction with other BMPs such as mulching, seeding, or tackifier and should be parallel to the contour of slopes. Track walking is a method of surface roughening that involves roughening a bare soil with horizontal grooves using tracked construction equipment.

Soil roughening can be done over an entire slope face or channel or just along the contour slope at regular intervals.



**Fig. 2-4.** Track walking is among the most common techniques used to roughen a slope. Grooves should be created parallel to the slope contour line.

Source: RBF Consulting

### Slope Stabilization Using Compost

The use of compost can be effective at stabilizing slopes, at preventing erosion, and in helping vegetation to grow. Unlike other erosion control best practices, compost can be left in place as a soil amendment. Compost can be effectively used on slopes up to a 2:1 (horizontal to vertical) ratio.

- Use Seal of Testing Assurance (STA) certified weed-free compost.
- High-quality, mature compost will provide the most effective results. A low-grade, immature, or unstable compost can contribute to water quality impacts.
- Use compost that is relatively dry (40 percent water content or less) for greater erosion control and water quality benefit.
- Install compost generally at a thickness of 3 inches.
- Extend compost cover for 2 to 3 feet above slope.

### Slope Stabilization Using Rolled Erosion Control Products

Rolled erosion control products (RECPs) include geotextiles and straw blankets. They are manufactured or fabricated into rolls and designed to protect soil from erosion and assist in the growth, establishment, and protection of vegetation. Routine maintenance of RECPs should include:

- Re-anchor loosened matting, and
- Replace missing matting and staples as required.



**Fig. 2-5.** This jute netting is physically deteriorating and requires replacement.

Source: RBF Consulting

### Slope Stabilization Using Tackifiers and Binders

Tackifiers are synthetic bonding agents used to adhere seeding and straw mulch to the soil surface. Wind and surface water flow can displace straw. Tackifiers provide immediate and extended protection from wind and rain, allowing vegetation enough time to grow.

Soil binders are chemical stabilizers that provide temporary soil stabilization for stockpiles, berms, haul roads, or slopes. Soil binders are sprayed onto exposed soil surfaces to hold them in place and minimize wind and runoff erosion.

Common tackifiers and binders include plant-based binders, poly-acrylamide (PAM), and gypsum.



**Fig. 2-6.** No signs of surface depressions or erosion indicate that the binder used here has been adequately applied.

Source: RBF Consulting



**Fig. 2-7.** The binder used in this situation requires a greater application rate, as visibly evident by signs of rill erosion.

Source: RBF Consulting

## Slope Stabilization Using Mulch and Temporary Seed Mixtures

Mulching consists of the application of a protective layer of certified weed-free straw, other plant residue, compost or organic waste, wood mulch, or synthetic material to the soil surface to provide short-term soil protection. Mulch helps protect newly placed soil and seed by absorbing rainfall energy. Mulch can be applied by hand, mechanical, or hydraulic methods.

Mulch enhances plant establishment by conserving moisture and moderating soil temperatures. Mulch should be used in combination with temporary seeding, as well as permanent seeding when conditions may be drier than optimal. On sloping ground, mulching can be used alone, or in combination with seeding and other BMPs, as an added measure to prevent erosion.



**Fig. 2-8.** No visible signs of erosion within the mulch areas or clogging indicate that this storm drain outlet is functioning well. Maintenance is not currently needed.

Source: RBF Consulting

When utilizing mulch to stabilize an area, routine maintenance should include:

- Re-applying mulch to areas of poor coverage or vegetation establishment and to maintain adequate soil protection, and
- Replacing mulch, if washed or blown away.

## Inspection and Maintenance

- Inspections should prioritize and target areas where:
  - Vegetative cover is known historically to be minimal,
  - Slopes constitute a greater percentage of the right-of-way (ROW), and/or
  - Slopes are in close proximity to streams, ditches, shorelines, and storm drains.
- Inspection resources can be used most effectively by identifying channel problem areas before they reach a point of significant failure.

## Inspection of RECP Installations

- Ensure blankets are trenched in at top and bottom of the slope.
- Ensure adequate staple checks are installed (refer to manufacturer's or designer's specifications).
- Ensure staples are driven flush with the soil surface and are preventing the blanket from lifting away from the soil.
- Ensure the entire blanket has good contact with the ground surface.
- Look for any signs of damage from animal activity or traffic.



*Ensure blankets are trenched in at top and bottom of the slope. Ensure the entire blanket has good contact with the ground surface.*

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### **Inspection of Areas Treated with Tackifiers or Binding Agents**

- Routinely inspect areas for signs of erosion.
  - After storms, inspect for signs that runoff has broken through the soil at the top of a slope treated with a soil stabilizer, causing undercutting of the stabilized soil layer and discharge of eroded sediment at a point further down slope.
- 



*Ensure there is continuous, uniform, even coverage to meet local stabilization standards.*

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### **Inspection of Areas Treated with Mulch**

- Ensure there is continuous, uniform, even coverage to meet local stabilization standards.
- Ensure rilling or gullyng does not occur beneath mulch.

## **Other General Practices**

### **When Performing Work on Slope Areas**

- DO** Dispose of slide material so that it will not be washed into wetlands or waterways.
- DO** Implement erosion control methods in a timely manner following failure or erosion.



- DO** Use temporary vegetation or binders to provide immediate stabilization until permanent landscaping is in place.
- DO** Incorporate native seed mixes and landscaping that requires minimal care when establishing permanent vegetation.
- DO** Trench in blankets at the top and bottom of the slope. Trench them in based upon manufacturer specifications.
- DO** Trench at the top of the slope beyond the crest to avoid undercutting.
- DO** Install blankets up and down long slopes with overlapping seams.



*Permanent vegetation should incorporate native seed mixes and landscaping that requires minimal care.*

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### **When Performing Work in Channel Areas**

- DO** Ensure proper permits are in place before work in a channel begins.
- DO** Ensure temporary reinforcing mats, if used, are uniformly in contact with the soil and properly secured, including lap joints.
- DO** Ensure dams, diversions, silt barriers and construction practices minimize sediment suspension.
- DO** Construct temporary stream crossings out of the stream when possible or use materials and practices that minimize streambed disturbance.
- DO** Evaluate alternatives to performing work within a channel.
- DO** Clean tires in accordance with permit requirements before entering a water body.



- DO** Ensure that heavy equipment driven into a water body to accomplish work is clean of petroleum residue.
- DO** Ensure that water levels are below the gearboxes of the equipment in use.
- DO NOT** Allow equipment to enter a channel without the required regulatory permits. Contact a DOT environmental specialist.

### When Using RECPs

- DO** Remove large rocks or vegetation and fix surface rills before placing blankets. The surface must be smooth.
- DO** Place blankets smoothly but loosely on the soil surface without stretching.
- DO** *Optional:* Prepare areas for blanketing by first applying topsoil and/or fertilizer and seed to establish erosion-resistant vegetation growth.
- DO NOT** Stretch blankets.
- DO NOT** Use on excessively rocky sites or on areas where the final vegetation will be mowed.



*Roughen soil surface prior to applying soil binder.*

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### When Using Tackifiers and Binders

- DO** Roughen soil surface prior to applying soil binder.
- DO** Use soil binder on stockpiles to reduce wind erosion.
- DO** Apply tackifier and a binder per the manufacturer's recommended application rates and pre-wetting conditions.
- DO** Apply tackifier and binders with adequate drying time allowed before predicted rainfall, allowing a minimum of 24 hours of curing time.

- DO** Direct runoff from binder-applied areas to a sediment control BMP prior to discharge to a storm drain or water course.
- DO NOT** Apply tackifier or binder during rain events, high winds, or over snow.
- DO NOT** Apply soil stabilizers to frozen soil, areas with standing water, or when the air temperature is below 40 degrees Fahrenheit during the curing period.
- DO NOT** Overspray tackifier and binders onto roads, sidewalks, drainage channels, or existing vegetation.



*Do not overspray tackifier and binders onto roads, sidewalks, drainage channels, or existing vegetation.*

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### When Using Mulch

- DO** Cover the entire site uniformly.
- DO** Apply mulch as soon as possible after seeding.
- DO** Anchor straw mulch by mechanically crimping the straw followed by mulch tackifier.
- DO** Loosely spread straw mulch to a uniform depth over unseeded areas. Refer to local DOT standards.
- DO** Hydraulically apply wood fiber mulch in a uniform manner over designated seeded areas at a rate specified by local DOT standards.
- DO NOT** Apply mulch during windy conditions.
- DO NOT** Place mulch in drainage channels, or on roads, sidewalks, or existing vegetation.

## Street Sweeping

### General Description

The purpose of sweeping is to prevent sediment and associated pollutants located on the street surface from entering storm drains or receiving waters. Sweeping equipment varies considerably and careful consideration should be given to scheduling, timing, and the condition of the roadway being maintained.



**Fig. 2-9.** Street sweeping prevents sediment and associated pollutants located on the street surface from discharging with stormwater.

Source: Colorado DOT

### Maintenance and Inspection

- Street sweeping performance should be visually evaluated whenever site conditions change that may alter pickup efficiency such as:
  - Change in sweeper direction caused by on-street parking or other roadside obstacles,
  - Change in the size or configuration of the adjacent curb-line or median, or
  - Change in roadway surface—rough surfaces reduce sweeper pick-up performance.

- Street sweeping equipment should be inspected quarterly for leaks and other sources of non-stormwater discharge.

### Equipment Type

- If available, use vacuum or regenerative air sweepers in high-sediment and trash areas (typically industrial/commercial).



*If available, use vacuum or regenerative air sweepers in high-sediment and trash areas (typically industrial/commercial).*

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### Equipment Operation

- Adjust brooms frequently to maximize the efficiency of street-cleaning operations.
- Perform regular maintenance on all street-sweeping equipment to prevent or correct fuel and fluid leaks.
- Forward speed is known to affect the efficiency of street-sweeping performance. The optimum average forward speed is five miles per hour (unless specified otherwise by manufacturer).



*Forward speed is known to affect the efficiency of street sweeping performance. The optimum average forward speed is 5 mph (unless specified otherwise by manufacturer).*

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### Air Quality Issues

- Make sure debris piles are covered (e.g., with tarps or permanent covers).

## Other General Practices

- DO** Consider that sealing cracks in roadway surfaces can improve the pick-up efficiency of street sweepers.
- DO** Dispose of all sweepings properly at a landfill.
- DO** Ensure that water applied during sweeping operations is controlled to prevent unpermitted non-stormwater discharges.
- DO** Keep accurate logs of the number of miles swept and the amount of waste collected.
- DO** Where appropriate and practical, place sediment barriers in site-specific locations along stream routes or direct drainage routes.
- DO NOT** Store swept material along roadsides or near storm drain inlets.
- DO NOT** Use kick brooms or sweeper attachments as these tend to spread the dirt rather than remove it, especially in windy conditions.



*Do not store swept material along roadsides or near storm drain inlets.*

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- DO NOT** Perform wet cleaning or flushing of street.
- DO NOT** Sweep up any unknown substance that may be potentially hazardous.
- DO NOT** Load hoppers beyond their capacity.

## Trash and Graffiti Removal

### General Description

Trash, litter, and illegally dumped materials are pollutants. Litter is a high-priority pollutant in some receiving waters.

The need for graffiti removal has the potential to generate and transport pollutants associated with the sand blasting and pressure washing activities.



*Ensure trash receptacles have operable lids that are closed and secure.*

### Maintenance and Inspection

#### Trash Removal from Roadside Areas and Storm Drain Systems

- Increase the number and convenience of trash storage receptacles at rest areas, weigh stations, welcome centers, etc.
- Ensure trash receptacles have operable lids that are closed and secure.
- Provide additional signage to inform the public of littering laws and mandatory fines.
- Maintain storm drain signage if required by a National Pollutant Discharge Elimination System (NPDES) permit.
- Increase the frequency of roadside litter removal during the rainy season to significantly reduce the potential for trash to reach a storm drain outfall.

#### Illegal Dumping

- Stenciling should be applied to urban drain inlets to discourage illegal dumping.

- Illegally dumped materials should be removed as soon as possible and reported to the appropriate supervisor.

## Graffiti Removal

- Schedule graffiti removal activities for dry weather.
- Clean up afterwards by sweeping or vacuuming thoroughly and/or by using absorbent. Care should be taken to properly dispose of absorbent materials when used.



*Clean up after graffiti removal by sweeping or vacuuming thoroughly and/or by using absorbent. Properly dispose of absorbent materials when used.*

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- Direct runoff from sand blasting and high-pressure washing (with no cleaning agents) into a landscaped or dirt area, whenever possible. If such an area is not available, prevent runoff from entering the storm drain system.
- If work generates wash water containing a cleaning compound, plug nearby storm drains and vacuum/pump wash water to a landscaped area or the sanitary sewer. Secure necessary sewer agency permits and approvals before directing flow to the sanitary system.
- Consider using waterless and non-toxic gels and spray compounds.

## Other General Practices

- DO** Coordinate with local and state officials whenever necessary to increase the enforcement of littering laws.

## Vegetated Areas and Invasive Species Management

### General Description

Stormwater BMPs are focused on reduction or elimination of the use of fertilizers, herbicides, pesticides, and sediment that could be discharged to the storm drain system. This can be accomplished through the use of native plants, inert landscape materials, and other integrated roadside vegetative management (IRVM) practices. In some regions, non-native plants require more irrigation compared to native plants, as well as additional nutrients and protection from local pests. The use of fertilizer, herbicides, and pesticides should be reduced or eliminated.

### Maintenance and Inspection

#### Mowing Practices

- Avoid mowing before assessing for noxious weed areas.
- Avoid mowing immediately after spraying for noxious weed control.
- Limit mowing to no more than 8 to 10 feet off edge of pavement in designated water quality problem areas, unless needed to maintain proper functioning of highway (e.g., drainage or snow drift control).

#### Removal of Vegetation and Brush

- Leave cut brush in place in riparian areas to promote habitat, when possible.
- Maintain shade trees along streams and rivers, especially those that assist with bank stabilization.
- Generally, limit brush removal to no more than 20 feet from bridge structures during repair work.
- Generally, limit removal of brush to 10 feet around a culvert, unless the area has noxious weed or invasive species presence.



## Timing and Application of Pesticides, Herbicides, and Fertilizers

- Prior to spray operations, ensure permit coverage and inspect spray routes to “flag” all cross culverts, streams, and wetlands.
- Generally, spot spraying should be conducted rather than blanket spraying.
- Spray weeds during the seedling stage and prior to flowering. Large weeds and brush should first be mowed and then sprayed with herbicide, as necessary.
- Do not spray chemicals when rainfall is forecast within 12 hours.
- Calibrate the spray rig based upon manufacturer’s recommendations to ensure accurate application of sprays.
- Apply spray products using appropriate additives and low-pressure nozzles to reduce drift.
- Treated areas should be posted as required, to state when it is safe for human reentry.
- If an area is treated through irrigation systems, it should also be posted.
- Utilize computer assisted spray trucks whenever available.

## Limitations on the Use of Chemical Controls

- Generally, limit herbicide use to spot spraying of weeds and to locations that cannot be mowed by conventional means (i.e., guardrails and sign posts).
- Do not use chemical vegetative control measures on vegetated treatment BMPs.
- Shut sprayers off 20 to 30 feet before entering designated environmentally sensitive areas and buffers. Identify these locations with permanent markers wherever feasible.



*Generally, limit herbicide use to locations that cannot be mowed by conventional means (i.e., guardrails and sign posts).*

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- Spray product use should be restricted within 100 feet of wetlands, dwellings, public buildings, and parks.
- All spraying to control vegetation within riparian areas should be done by hand. Avoid spraying these areas unless absolutely necessary.

### **Air Quality Issues**

- In order to minimize chemical drift, spray operations should not be conducted during windy conditions of 15 miles per hour or greater.

### **Staff Training**

- Conduct training for DOT staff in the appropriate application of pesticides, herbicides, and fertilizers.
- Require private companies selected for maintenance contracts to possess appropriate licenses for such applications.
- Pesticides, herbicides, and fertilizers should only be applied by qualified applicators.



*In order to minimize chemical drift, spray operations should not be conducted during windy conditions of 15 mph or greater.*

---

## Other General Practices

- DO** After pruning, chipping, and removing vegetation, clean up the work area.
- DO** Consider the potential erosion problems in an area when vegetation is disturbed. Apply soil cover, if needed.
- DO** Cover loads when transporting vegetation debris.
- DO** If pesticides, herbicides, or fertilizers spill, especially into a water body, immediately notify environmental staff and begin efforts to contain and clean the spill when safe and appropriate.
- DO** Use pesticides, herbicides, and fertilizers in accordance with EPA labels.
- DO** Keep records of all spray applications and retain them for at least five years.
- DO** Properly dispose of used drums, cans, and containers.
- DO** Clean and dry equipment used in areas with invasive species, to prevent spreading between other areas of operation.
- DO NOT** Use irrigation for the period recommended by the chemical manufacturer after spray applications.
- DO NOT** Fuel or lubricate equipment, such as weed whackers or leaf blowers, next to drain inlets or watercourses.
- DO NOT** Leave cuttings or chips in areas where they may be easily washed into the storm drainage system.
- DO NOT** Wash spraying application equipment or empty containers in ditches, streams, ponds, or wetlands. Wash water is not permitted into any surface waters, including wetlands.
- DO NOT** Store pesticides, herbicides, and fertilizers for more than 18 months. When storage is necessary, products should be stored inside and in accordance with Department of Agriculture and manufacturer guidelines.



*Do not leave cuttings or chips in areas where they may be easily washed into the storm drainage system.*

## Snow Removal, Traction Aides, and De-icing

### General Description

DOTs are responsible for maintaining passable and safe roadways during winter using plow blades, abrasives, and chemical anti-icing and de-icing agents.

The primary non-structural BMPs used to reduce the environmental impacts of winter maintenance include: proper training of maintenance personnel, street sweeping, improved anti-icing and de-icing practices, and improved sanding practices.



**Fig. 2-10.** Snow removal helps maintain a clear vehicular path of travel. Sand and salt applied to the roadway can be transported offsite and impact stormwater quality. Source: *Idaho Transportation Department*

## Maintenance and Inspection

### Application Methods

- Evaluate road and weather conditions and trends to ensure that the proper type and timing of treatment is made to avoid unnecessary pollutants.
- A timely response to snow and ice events will help prevent a bond from forming between the frozen precipitation and the pavement.
- Plowing and targeted use of anti-icing or de-icing agents are preferable.
- Plow snow or slush prior to applying anti-icing or de-icing chemicals to decrease dilution and increase effectiveness.
- To avoid spillage, do not overload the material spreader.
- Control spreading speeds to reduce bounce and scatter.
- Materials should not be dispersed wider than the plowed area.
- Return unused materials to stockpiles and avoid heavy “end of beat” applications that empty the load.



*Plowing and targeted use of anti-icing or de-icing agents are preferable.*

---

- Wherever feasible, alter application methods and rates in sensitive areas:
  - If allowable based upon local practices, place barriers in site-specific locations along streams or direct drainages to route sanding/anti-icing material away from watercourses.
  - Reduce plowing speed in sensitive areas.

- Stop sidecast sweeping (i.e., over the downhill side of a slope) within 50 feet of structures over water, wherever possible.
- Clean inlets prior to first rain wherever feasible.

### Salt Application

- As snow melts within the shoulder area, avoid or minimize the use of salting directly into drains.
- Be conscious of wind conditions when spreading salt. Maintenance crews should avoid bridge areas where high wind has the potential to blow salt over side rails or into deck drains or scuppers.
- Plowing operations should be timed to allow maximum melting by salt. The need for another salt application can be determined by watching melting snow kicked out behind the vehicle tires and by monitoring surface temperature.



*Plowing operations should be timed to allow maximum melting by salt.*

---

### Post-Winter Cleanup

The timing of post-Winter cleanup of sand and salt is important because the removal of accumulated material in the Spring creates less opportunity for transport during Springtime and Summer rain events.

### Staff Training

Consider inclusion of the following elements and how they affect water quality within staff or contractor training programs:

- General water quality and fishery resource issues.
- Perform preseason “dry runs”. Be sure to note drainage facilities, wildlife crossing structures, and other

facilities requiring delineation or special treatment in plowing, along with possible obstructions.

- Understand the issues involved with material selection quantity and function associated with tractive agents, de-icers, and anti-icing materials.
- Understand how to measure brine concentrations.
- Understand the importance of timely plowing.
- Spreader calibration.
- Spreader controller operation.
- Brine equipment operation.
- Equipment washing procedures.
- Use and interpretation of pavement sensor data and forecasts.
- Understand the role and effective placement of snow-drift control devices (structural snow fences, snow ridging, agricultural stubble, living snow fences).

## Other General Practices

- DO** Make snow and ice control decisions based on ongoing monitoring of pavement temperatures rather than air temperatures.
- DO** Keep accurate records of materials usage to allow monitoring and improvement of operations.



*Snow and ice control decision-making should be based on ongoing monitoring of pavement temperatures rather than air temperatures.*

---

## Bridge Painting

### General Description

Bridge maintenance is complicated by the environmental sensitivities of working in riparian areas or waterway environments. This can include restricted work times to accommodate animal breeding periods. Painting is among the most common maintenance activities on a bridge.

### Painting

Bridge painting/coating/sealing covers all protective and preventative maintenance activities designed to prevent deterioration of a structure's components. Components made of non-weathering steel are generally painted to protect the steel from rust and corrosion. Bridges painted prior to 1975 typically used lead, chromium, or cadmium pigmented paints, which if removed must be handled as a hazardous waste. Best management practices that can reduce stormwater impacts during painting include:

- Apply over-coating as an alternative to removing the existing paint, where feasible.
- Ensure proper surface preparation through removal of oil, grease, dust, soil, or other barriers for effective product bonding.
- Emphasize hand cleaning, wherever practical, over the use of power tools or blasting.
- If blasting is the only practical approach, incorporate the use of a closed system vacuum to minimize debris.
- If closed system vacuums are not feasible or practical, utilize other containment systems or enclosures constructed from scaffolds, screens, tarps, etc.



## Paving and Concrete Repair

### General Description

Paving and concrete construction activities include:

- Sawcutting and pavement demolition and grinding,
- Pavement installation,
- Concrete curing and finishing,
- Sealing,
- Equipment management practices, and
- Striping and pavement marking.



**Fig. 2-11.** Washing down the street after paving and concrete maintenance can create a non-storm-water discharge. Hand or mechanical sweeping is a better option. Source: *RBF Consulting*

### Maintenance and Inspection

- Inspect machinery weekly for leaks and drips unless dictated otherwise by local procedures or regulatory standards.
- Inspect thermoplastic striping and pre-heater equipment shutoff valves to ensure proper working order.

## Other General Practices

### Equipment

- DO** Place drip pans under equipment while not in use.
  - DO** Park paving equipment over plastic to prevent soil contamination.
  - DO** Clean asphalt-coated equipment offsite.
  - DO** When servicing or filling melting tanks, avoid spills by ensuring all pressure is released before removing lids.
- 



*Clean up leaks and spills with absorbent materials.*

---

### Activities and Areas

- DO** Protect drainage inlet structures and manholes either with plastic covering or sediment barriers.
  - DO** Collect removed material by mechanical or manual methods.
  - DO** Properly recycle or dispose of old, spilled, or broken asphalt.
- 



*Protect drainage inlet structures and manholes either with plastic covering or sediment barriers.*

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- DO** Collect and contain residue from grinding operations.
- DO** Clean up leaks and spills with absorbent materials.
- DO** Store materials away from drainage courses and in areas not subject to stormwater run-on.
- DO** Wash out concrete equipment in an approved concrete washout area.

- DO NOT** Apply seal coat, tack coat, slurry seal, or fog seal if rain is predicted during the application or curing period.
- DO NOT** Conduct digout activities in the rain.
- DO NOT** Allow slurry, cooling water, sweepings, or aggregate to enter storm drains or watercourses.
- DO NOT** Allow sand or gravel placed over new asphalt to wash into storm drains, streets, or creeks.
- DO NOT** Pre-heat, transfer, or load bituminous material near drain inlets, storm drainage systems, or watercourses.
- DO NOT** Fill pre-heaters or melting tanks beyond six inches from the top.



*Do not allow slurry, cooling water, sweepings, or aggregate to enter storm drains or watercourses.*

---

## Irrigation and Dry Weather Flow Management

### General Description

Dry weather flow can become contaminated in storm drain pipes, creating water quality issues at storm drain discharge points. Irrigation runoff (excess irrigation) can account for a large portion of dry weather flows entering highway storm drain systems. The major factors contributing to irrigation runoff include:

- The configuration and function of irrigation systems and excess runtime; and
- The lack of adequate maintenance, repair, or service of irrigation systems.

A variety of practices and controls can be employed to reduce irrigation runoff. Practices and controls described below can be used within the ROW area as well as at facility locations.

- Replacement of existing vegetation with drought-tolerant native species.
- System maintenance—detect broken lines or facilities that are not working properly.
- Use smart controllers, drip irrigation, and other similar landscape management practices.
- Develop standard inspection procedures to identify and reduce over-irrigation.

## Maintenance and Inspection

### Replacement of Existing Landscaping

Xeriscape is a style of landscaping that requires little or no irrigation and associated maintenance. It is used primarily in arid regions. Conversion of turf or non-native landscape to xeriscape can result in irrigation demand reduction of up to 75 percent. Xeriscape landscape areas are less likely to have irrigation excess since the applied irrigation is less and spray irrigation practices are typically not used in favor of drip irrigation systems.



*Conversion of turf or non-native landscape to xeriscape can result in irrigation demand reduction of up to 75 percent.*

---

### Smart Controllers and Automated Systems

Irrigation control devices have been developed that can be used to reduce over-irrigation. Smart timers have an estimated reduction of approximately 175 gallons per day per acre. Evapotranspiration (ET) controllers can result in a 50 percent reduction in dry-weather runoff. Common irrigation control devices include:

- Weather-based irrigation controllers,
- Climate-based irrigation controllers, (performance summaries and technical reports for numerous devices are available at [http://www.irrigation.org/swat/control\\_climate](http://www.irrigation.org/swat/control_climate))
- Sensor-based irrigation controllers, (calibration summaries of numerous devices are available at [http://www.irrigation.org/swat/control\\_sensor](http://www.irrigation.org/swat/control_sensor))
- Drip irrigation systems,
- Evapotranspiration (ET) controllers, and
- Smart controllers/pressure drop sensors.



*Irrigation control devices have been developed that can be used to reduce over-irrigation. Smart timers have an estimated reduction of approximately 175 gallons per day per acre. Evapotranspiration (ET) controllers can result in a 50 percent reduction in dry-weather runoff.*

### Targeted Inspection Practices

Irrigation facilities must be inspected and maintained to ensure that they are functioning properly. System pressure-drop sensors can be used to shut off the system when leaks or broken lines are detected.

### Other General Practices

- DO** Inspect and maintain irrigation facilities to avoid dry-weather runoff resulting from damaged systems.
- DO** Shut off broken systems immediately and repair or replace damaged components.

## Chapter 3. FACILITIES MANAGEMENT

### Pollution Prevention Measures

#### General Description—Maintenance Facilities

Activities at maintenance facilities can involve materials and products that are harmful to the environment. Good housekeeping consists of maintaining various pollution prevention practices at maintenance facilities. Source control practices, used when pollutants can be attributed to specific point sources, are discussed under “Material Storage and Source Control,” “Waste Management and Source Control,” and “Vehicles and Equipment.”

#### General Pollution Prevention Practices at Buildings and Yard Areas

Maintenance workers should implement the following pollution prevention measures whenever feasible:

- Sweep paved areas to reduce transport of sediment, debris, and trash. Keeping pavement areas in good condition will make sweeping more effective.
- Stencil drain inlet locations with paint or provide signs prohibiting all non-stormwater flow.
- Keep sufficient emergency materials—such as drain covers, absorbent booms, rags, or sandbags—near inlets.
- Inspect drainage facilities annually, and as needed during the rainy season.
- Minimize pesticide, herbicide, and fertilizer use.
- Renew peeling paint and rust.

### Material Storage and Source Control

#### General Description

Many types of material can be stored or handled at each facility. Care should be taken to limit contact with stormwater.



**Fig. 3-1.** Materials storage areas should always be clearly defined and covered such as this one.

Source: RBF Consulting

## Material Storage

Consider the following for material storage areas:

- Store materials away from drainage systems or other watercourses.
- Cover materials.
- Identify storage area boundaries.
- Provide adequate lighting, fencing, and security.
- Use erosion and sedimentation controls and wind erosion controls.
- Manage stockpiles to avoid the spread of weeds when the materials are used.

## Material Management

- Remove litter, debris, sediment, and any spilled materials.
- Recycle when possible.
- Inspect BMPs regularly as well as before and after rain events.

- Sediment controls—Remove captured sediment. Replace or repair BMPs as needed.
- Drainage Facilities—Take note of their condition. Add additional BMPs if there is excess sediment or debris.
- Contaminated material should not be used as fill. Report any contaminated material.
- Stockpiles having no future use should be removed at least annually.
- Use the “first in, first out” policy for material storage. Avoid ordering more materials than can be stored properly or used in a reasonable timeframe.



**Fig. 3-2.** Stored materials should be organized and placed within containment areas when not in use.

Source: RBF Consulting

## Waste Management and Source Control

### General Description

Solid and liquid waste should be reduced as much as possible by recycling and reuse. Waste that cannot be avoided should be carefully managed based on the type of material.





**Fig. 3-3.** Tires and hazardous waste should always be stored in a covered area whenever possible. Spill response kits should also be kept where they can be accessed if needed.

Source: RBF Consulting

The requirements for handling and disposal vary for the different categories of wastes. A hazardous waste determination may be conducted by using the following:

- Material Safety Data Sheet (MSDS)
- Knowledge of ingredients
- Testing

Wastes which could be classified as hazardous wastes include:

- waste paint filters
- used antifreeze
- used caustic solutions
- waste pesticides
- spent paint abrasives
- waste paints
- spent solvents
- waste motor oil
- old batteries

- shop rags
- waste asphalt emulsions
- waste inks



**Fig. 3-4.** Solid waste receptacles such as this one are effective at preventing contact with stormwater runoff. Source: RBF Consulting

General practices include:

- Arrange for off-site shipment of each full container of hazardous waste within 30 days of filling.
- Maintain manifests of hazardous waste transport.
- Report spills or leaks of hazardous waste immediately. Clean up immediately.
- Train employees in material storage and handling. Training records should be kept for three years.

## Hazardous Waste Management Practices

### Storage Containers

- Keep in good condition.
- Compatible with the wastes contained in them.
- Opened only to add or remove wastes.

- Marked with the dates and labeled with the words “hazardous wastes”.
  - Clearly marked to identify their contents.
  - Kept within a secured area.
  - Recorded in a log of wastes for each container.
  - Inspected weekly for leaks and deterioration.
- 



*Clearly mark storage containers to identify their contents. Inspect storage containers weekly for leaks and deterioration.*

---

### Storage Area Practices

- Keep different waste types separated.
  - Use a secondary containment dike that can hold leaks, spills, and rain runoff.
  - Keep access routes clear in the event of a spill or emergency.
  - Keep proper emergency equipment, such as alarms, phones and fire extinguishers, available.
  - Packaging should:
    - Meet the U.S. DOT specifications for the waste.
    - Sealed tight enough to prevent loss of materials.
    - Kept closed.
    - Allow for free space above the liquid for expansion.
- 



*In storage areas, use a secondary containment dike that can hold leaks, spills, and rain runoff.*

---

### Oil/Water Separators

Oil/water separators are tanks that collect oily water and encourage separation of solids and oil droplets. The oily solids or sludge can then be pumped out of the system. The sludge can be hauled off site, and the wash water can be discharged to a treatment plant.

Each oil/water separator should be cleaned of all liquid and grit at least annually.

- Once all free-floating petroleum products are absorbed, the liquid may be decanted to the municipal sewer system with permit approval, or to a tank for final disposal at a waste water treatment facility or hazardous waste location.
- All grits are to be disposed of at a special waste landfill.
- Once empty, fill with clean water above the bottom of the outflow pipe.

### Floor Drain Maintenance

- Floor drains should be cleaned a minimum of once per year.
- Floor drains should have oil-absorbent socks maintained in them at all times. These petroleum socks should be properly disposed of (as hazardous waste) when they show evidence that oil has been absorbed.

### Manifesting

A hazardous waste manifest must be used with all hazardous waste shipments. These manifests are designed to track shipments from start to finish. The manifest should be completed before shipping hazardous wastes.



*Good records can be used to prove compliance and may avoid problems with regulatory agencies.*

---

## Inventory and Record Keeping

Records are a very important part of regulatory compliance. Good records can be used to prove compliance and may avoid problems with regulatory agencies. Keep the following records:

- Hazardous waste test results.
- Monthly log of wastes.
- Inspections reports.
- Records of training.
- Copies of manifests.
- Spill or leak reports.



**Fig. 3-5.** Providing lids on trash bins is an easy way to prevent wind dispersal and contact with stormwater. Signs are advisable to limit contents.

Source: RBF Consulting

## Trash and Non-Hazardous Wastes

Routine garbage, office trash, and most litter are non-hazardous wastes. These should be stored in trash bins and then sent to landfills. Special haulers and manifests are not needed. Landfills can usually accept the following types of non-hazardous wastes:

- Bricks, glass, pavement, concrete, and masonry;
- Soil, rock, and land-clearing debris;
- Wood, and wood products;
- Wall coverings, plaster, and drywall;
- Plumbing fixtures and electrical wiring; and
- Roofing shingles and other types of roof coverings.

### Trash Bins

Wherever possible, use watertight bins and keep the lids closed.

## Recycling and Reducing Waste

### Recycling

The following materials should routinely be recycled whenever feasible:

- Paper
- Steel drums used for other purposes after they are emptied
- Batteries
- Waste tires and tire scraps
- Used motor, gear, and hydraulic oil
- Used oil filters
- Road signs and posts
- Metal scrap found along the highway

### Re-use

- Guardrails
- Boxes
- Damaged bridge structural steel
- Truck tires

## Spill Prevention, Control, and Response

### General Description

Federal and state regulations specify extensive requirements for the prevention of spills and leaks of hazardous materials and wastes. Federal, state and local agencies should be immediately notified of a hazardous material or waste release. Severe penalties and fines are often imposed for failure to notify. The first and most important step in a spill or leak response is to safely contain the spill and stabilize the situation by following the methods described in the facility's Preparedness, Prevention, and Contingency (PPC) Plan, or similar spill prevention and response plan. The next step is to notify the proper authorities. *In some instances, pollutants may be non-visible.*

### Spill Control and Containment

- To the extent practicable, spills should be covered and protected from stormwater flow.
- Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.
- If the spilled material is flammable, remove any open flames or sources of ignition. Use non-sparking tools and grounding wires, if needed.
- Stop additional material from spilling at its source, if possible.
- Plug any drains that may be impacted.
- Contain the spill by placing absorbent "socks" or sand to prevent the spill from running into storm drains, bare soil, large surface areas, etc.



*Plug any drains that may be impacted by spills.*

---

## Vehicles and Equipment

### General Description

Vehicles and equipment can be a significant source of pollution at DOT facilities. These pollutants can come from maintenance activities as well as washing and fueling operations.

### Maintenance

The following practices apply to equipment maintenance:

- Maintenance should be performed in covered or indoor maintenance areas.
- Inspect equipment for damaged hoses and leaky gaskets and repair or replace as necessary.



**Fig. 3-6.** Leaking fuels are a common source of pollutants within vehicle equipment storage areas.

Source: RBF Consulting

- Drip pans or absorbent materials should be used during vehicle and equipment maintenance work that involves fluids.
- Non-stormwater discharges into storm drainage systems or watercourses are prohibited.





*Use dry methods (e.g., dry rags, vacuuming, or sweeping) for cleaning associated with maintenance in outdoor areas.*

- Utilize pollution prevention and response measures. Any contaminated soil resulting from vehicle or equipment repair should be removed and disposed of.
- Use dry methods (e.g., dry rags, vacuuming, or sweeping) for cleaning associated with maintenance in outdoor areas.



**Fig. 3-7.** A basic drip pan is shown here for use in collecting drip leaks.

Source: RBF Consulting

- Inspect areas following field maintenance to ensure there is no residual contamination that might impact stormwater quality. Clean areas as needed using dry methods (e.g., sweeping or vacuuming).
- Maintain waste fluid containers in leak-proof condition.



*Maintain waste fluid containers in leak-proof condition.*



**Fig. 3-8.** It is always preferable to perform vehicle maintenance in an enclosed garage such as this.

Source: RBF Consulting

### Pre-Operation Inspection

Vehicles and equipment should be inspected for leaks on each day of use. When performing pre-operational inspection:

- Ensure that the vehicle/equipment is clean and in good operating condition. Preventive maintenance should occur in accordance with departmental guidance.



*Place a drip pan under any leaking vehicle or equipment.*

- Place a drip pan under any leaking vehicle or equipment.
- Clean up spilled or leaked fluids immediately.
- Daily pre-trip inspection should be logged and kept for three months, or as otherwise required by local standards.



**Fig. 3-9.** The gravel bags and tarp being used here offer effective containment of possible leaks.

Source: RBF Consulting

### Vehicle Fluid Removal

When removing automotive fluids such as used motor oils or coolant from vehicles or equipment, the following practices should be used:

- Transfer removed fluid to a designated used fluid storage tank as soon as possible.
- If possible, remove fluids directly into a holding tank. For example, newer types of used oil tanks can be connected to the vehicle to pump oil directly into the tank.



*If possible, remove fluids directly into a holding tank.*

- If necessary, drain fluids into a drip pan and then transfer the fluids to the designated container. A larger drip pan may be required to catch any unanticipated splashing.
- Properly remove, clean, and store drip pans promptly after use.
- Designate specific areas for parts cleaning.



**Fig. 3-10.** This a good example of using containment to control fuel leaks identified in the field.

Source: RBF Consulting

### Cleaning Up Spills of Vehicle and Equipment Fluids

Accidental releases of vehicle fluids at maintenance sites can pollute receiving waters. Typical vehicle fluids include oil and hydraulic fluids leaking from vehicles and equipment, accidental spills from fueling operations, and leaks and spills around storage tanks and containers. The following practices are recommended for cleaning up spills of vehicle and equipment fluids (Advanced preparation will assist if and when a spill happens):

- Evaluate the spilled material to determine the appropriate methods for cleaning up the spill.
- Maintain up-to-date spill prevention, control, and response plans.



*Maintain appropriate and adequate supplies of cleanup materials.*

- Maintain appropriate and adequate supplies of cleanup materials at fueling areas, vehicle and equipment maintenance areas, cleaning areas, and vehicle and equipment parking areas.
- Regularly inspect vehicle parking, maintenance, cleaning, and fueling areas for leaks and spills.
- Repair or replace vehicles and equipment that consistently leak.
- Repair or replace, as needed, material and waste storage perimeter controls, containment structures, covers, and liners in order to contain spills and leaks.



**Fig. 3-11.** A leak such as this should be cleaned using a damp mop or absorbent cloth. Do not hose down. Source: RBF Consulting

Vehicle fluids such as oil, fuels, and hydraulic fluids are considered hazardous wastes and require appropriate safe-

ty precautions. For spilled material, immediately contain the material to keep it from spreading and clean it up.

- Place absorbent materials or pads around leaks to soak up spills.
- Place a leaking container in appropriate spill containment or transfer the contents to another container.
- For leaks or spills that occur during storm events, cover and protect the spilled material from stormwater run-on.



*Whenever possible, use “dry shop” methods to clean up spills.*

---

Once the spilled material has been contained, ensure that all of the material and absorbent has been cleaned up.

- Whenever possible, use “dry shop” methods to clean up spills.
- Do not hose down the spill area.
- Use an absorbent-type cloth on fuel pumps or damp mop on pavement in fueling areas.
- If rainwater has accumulated in a contained area where a spill or leak has occurred, treat the contaminated water as a hazardous waste.
- Take additional precautions in situations where dry cleanup methods cannot be implemented to ensure that the water used for cleaning and decontamination is prevented from entering storm drainage systems or receiving waters.
- Dispose of the contaminated wastes (spilled material, used cleanup materials, contaminated rainwater) appropriately.



*Take additional precautions in situations where dry cleanup methods cannot be implemented to ensure that the water used for cleaning and decontamination is prevented from entering storm drainage systems or receiving waters.*

## Washing

Water used in washing cars, trucks, and other vehicles may contain oil, other hydrocarbons, metals, detergents, road salt, and grit. This water must not be discharged to the storm drain or to land.

Vehicle washing should be conducted in designated wash rack areas, where proper wash equipment and drainage are present. Wash water must be contained and directed to a permitted sanitary sewer connection or appropriate disposal site. Under no circumstances should wash water be allowed to directly enter the site storm drain system.



**Fig. 3-12.** Clarifiers such as this one are commonly utilized within wash rack areas.

Source: RBF Consulting



## Vehicle and Equipment Fueling Procedures and Practices

Vehicle and equipment fueling procedures and practices should minimize or eliminate the discharge of fuel spills and leaks.



**Fig. 3-13.** Whenever feasible, wash rack areas and fuel points should be covered.

Source: RBF Consulting

### Bulk Fuel Delivery

- All aboveground and underground storage tanks should be equipped with automatic overfill shutoff valves.
- Spill prevention and control BMPs should be implemented to prevent spillage.
- Spill kits must be located in fueling areas.



*Spill kits must be located in fueling areas.*



## Fueling Area Maintenance

- Label drains at fuel dispensing areas to indicate if they discharge to the storm drain or to the sewer.
- Storm drain inlets may be temporarily covered with spill pads and/or mats during fueling operations.
- Absorbent spill cleanup materials or drip pans should be stored in fueling and maintenance areas and used materials should be disposed in accordance with hazardous waste management BMPs.
- Immediately clean up leaks and drips.
- Hosing off the fueling area is prohibited. Dry shop cleanup practices should be used.
- Manage wastes to reduce adverse impacts on storm-water quality. Fueling areas should be kept free of litter and debris that might become contaminated with petroleum products.
- Maintain and implement a current spill response plan for fueling operations.
- Inspect fueling facilities daily and correct deficiencies.



*Storm drain inlets may be temporarily covered with spill pads and/or mats during fueling operations.*



*Hosing off the fueling area is prohibited. Dry shop cleanup practices should be used.*

---

## Refueling Practices

- Fueling in the field should not be performed near unprotected drainage facilities or watercourses.

- Dedicated fueling areas should be protected from stormwater run-on and runoff. They should be located at least 50 feet from downstream drainage facilities or watercourses.
- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to prevent overfilling.
- Warnings against “topping off” fuel tanks should be posted at fuel dispensers.
- Fueling operations should not be left unattended.
- Absorbent spill cleanup materials should be available in fueling and maintenance areas and should be disposed of properly after use.



*Dedicated fueling areas should be protected from stormwater run-on and runoff.*

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