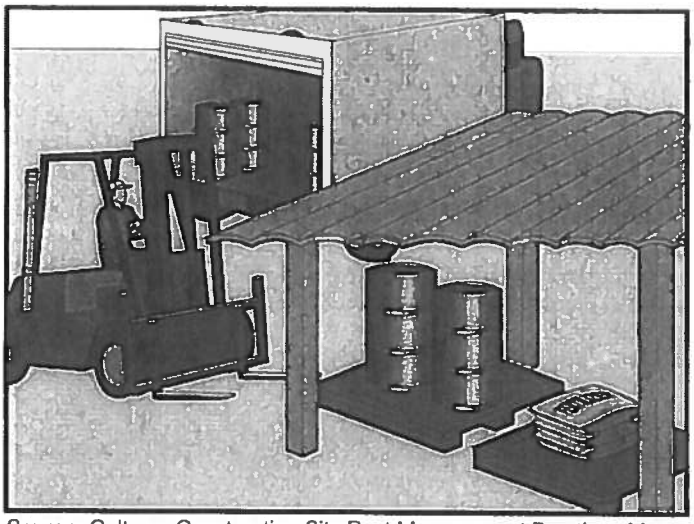
Attachment A-8
HDOT Construction Best Management Practices and Supplemental Sheets

Material Delivery and Storage SM-2



Source: Caltrans Construction Site Best Management Practices Manual, 2003

Description

Practices and procedures that promote proper handling and storage of construction materials to prevent or reduce storm water pollution, injury to workers or visitors, groundwater pollution, and soil contamination.

Applications

Storage and handling activities on construction sites involving one of the following:

- Soil;
- Soil stabilizers and binders;
- Fertilizers;
- Pesticides and herbicides;
- Detergents;
- Plaster;
- Hazardous chemicals such as acids, lime, glues, paints, solvents, and curing compounds;
- Petroleum products such as fuel, oil, and grease; and
- Asphalt and concrete products.

Installation and Implementation Requirements

- Provide training for employees and contractors on proper material delivery and storage practices and procedures.
- Designate on-site material delivery and storage areas. Areas shall be located near construction entrances and away from watercourses. Earth berms or other containment measures shall surround storage areas.

Installation and Implementation Requirements (Continued)

- Flammable materials shall comply with the fire codes of Honolulu. Contact the local Fire Marshal for site specific requirements. Refer to the Flammable and Combustible Liquid Code, NFPA30 for more information.
- Maintain accurate and up to date records of material delivered and stored on-site.
- Minimize on-site inventory.
- Retain a complete set of material safety data sheets on-site.
- Minimize handling of hazardous materials.
- Store materials under cover during the rainy season.
- Store chemicals, drum, and bagged materials on a pallet and when possible, under cover in secondary containment.
- If drums must be stored in an uncovered area, place them at a slight angle to minimize ponding of rainwater on the lids to minimize corrosion.
- Hazardous chemicals shall be well-labeled and stored in the original containers.
- Employees with emergency spill cleanup training shall be present during unloading of dangerous materials or liquid chemicals.
- Any significant residual materials remaining on the ground after the completion of construction shall be removed and properly disposed. If the residual materials contaminate the soil, then the contaminated soil shall also be removed and properly disposed.

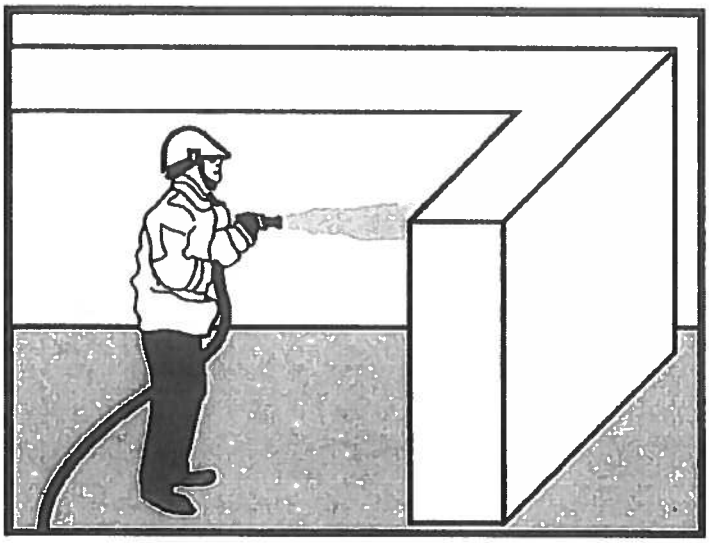
Limitations

Storage sheds shall comply with building and fire code requirements.

Inspections and Maintenance

- Storage areas shall be clean and well organized.
- An ample supply of spill cleanup materials shall be kept with work crew supplies.
- Conduct weekly inspections of material containers for corrosion.
- Conduct weekly inspections of storage areas which may require repair or replacement.

Material Use SM-3



Source Modified from Caltrans Construction Site Best Management Practices Manual, 2003.

Description

Minimizing or eliminating the discharge of pollutants to the storm drain system or adjacent water bodies by reducing hazardous material use on-site, using alternative products, and training employees in proper handling and use of construction materials.

Applications

Activities involving use of one of the following materials:

- Fertilizers;
- Detergents;
- Herbicides;
- Plaster;
- Petroleum products such as oil, fuel, and grease;
- Soil stabilizers and binders;
- Asphalt and concrete components; and
- Other hazardous materials such as acids, lime, glues, adhesives, paints, solvents, and curing compounds.

Installation and Implementation Requirements

- Restrict use of materials to only when and where necessary to complete the construction activity.
- Reduce or eliminate on-site use of hazardous materials. Refer to SM-9 (Hazardous Waste Management) in this manual for more information regarding use of hazardous materials.
- Carefully select appropriate material needed for the task.
- Do not remove the original label. Comply with manufacturer's labels, which include product information regarding uses, protective equipment, flammability, ventilation, and mixing of chemicals.

Installation and Implementation Requirements (Continued)

- Dispose container only after all of the product has been used.
- Restrict amount of herbicide prepared to quantity necessary for the current application. Comply with the recommended usage instructions. Do not apply fertilizers or herbicides during or just before a rain event.
- An ample supply of cleanup materials for spills shall be readily accessible.
- Provide employee training on proper material use.

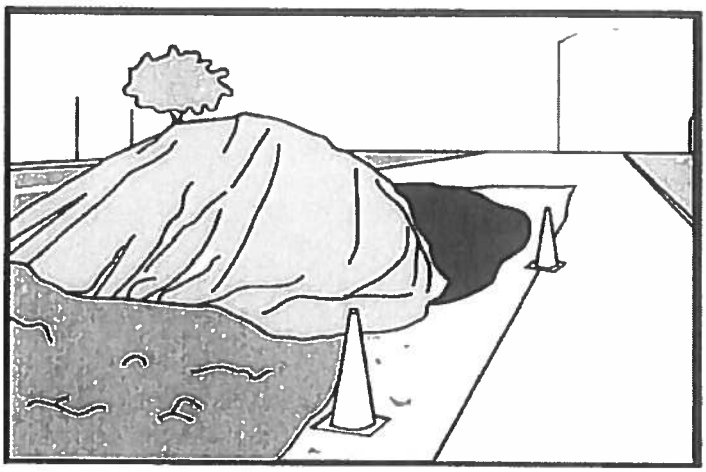
Limitations

Alternative materials may not be available or appropriate for certain construction activities.

Inspections and Maintenance

- Provide training to all new employees at the beginning of their employment.
- Provide periodic training to all employees involved in handling construction materials.

Protection of Stockpiles SM-4



Description

Stockpile protection measures reduce the potential for air and storm water pollution originating from stockpiles of construction materials, including soil and paving materials.

Applications

Projects requiring stockpiles of construction materials.

Installation and Implementation Requirements

- Stockpiles shall be located a minimum of 50 feet away from concentrated runoff.
- Place bagged materials on pallets and under cover.
- Provide physical diversion to protect stockpiles from concentrated runoff.
- Cover stockpiles with plastic or comparable material prior to a rain event and during the rainy season.
- Place silt fence, fiber filtration tubes, or straw wattles around stockpiles.

Limitations

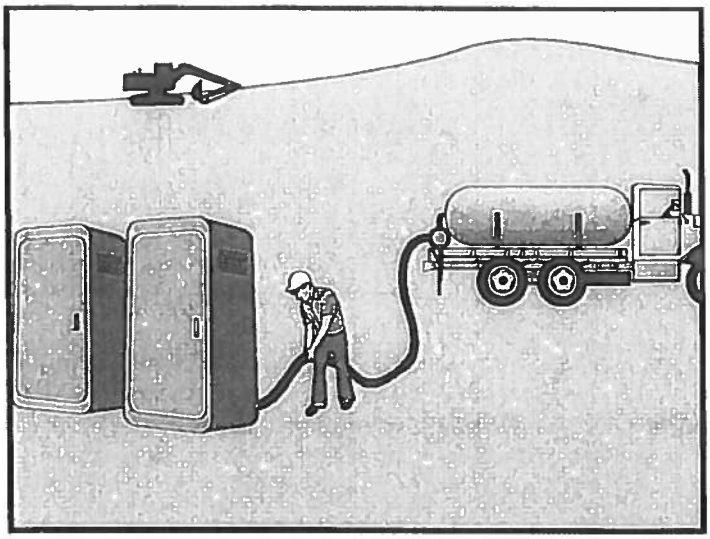
Stockpiles are only applicable for temporary storage of material.

Inspections and Maintenance

Periodic replacement and repair of materials used for stockpile protection.

Sanitary/Septic Waste Management

SM-7



Source: Caltrans Construction Site Best Management Practices Manual, 2003

Description

Practices and procedures to reduce or prevent the discharge of sanitary wastes from construction sites into the storm drain system or adjacent water bodies.

Applications

Construction sites containing temporary or portable sanitary/septic waste systems.

Installation and Implementation Requirements

- Locate sanitary facilities in a convenient place away from drainage facilities.
- Untreated wastewater shall not be discharged to the ground or buried.
- Comply with the State of Hawaii, Department of Health requirements when using an on-site disposal system such as a septic system.
- Avoid illicit discharges by properly connecting temporary sanitary facilities to the sanitary sewer system.
- Sanitary/septic systems discharging to the sanitary sewer shall comply with the local wastewater treatment plant requirements.
- A licensed service provider shall maintain sanitary/septic facilities in good working order.
- Schedule regular waste collection by a licensed transporter.

Limitations

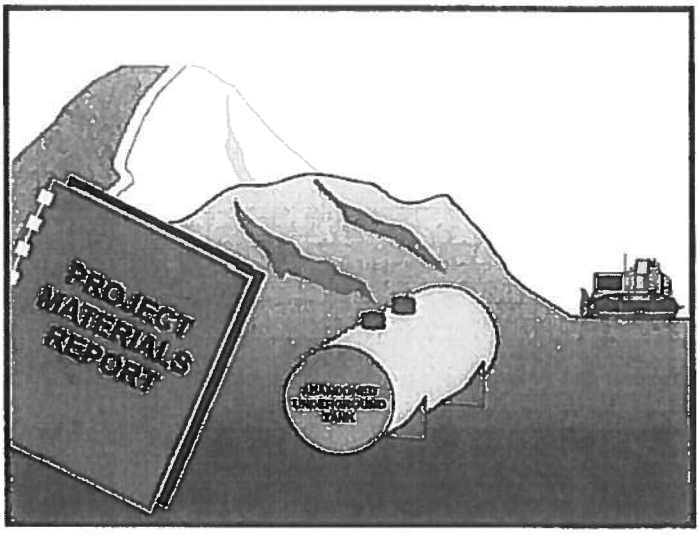
None

Inspections and Maintenance

- Inspect and maintain facilities regularly.
- Schedule regular waste collection.
- Prevent illicit discharges.

Contaminated Soil Management

SM-8



Source: Caltrans Construction Site Best Management Practices Manual, 2003.

Description

Practices and procedures to prevent or reduce the discharge of pollutants to the drainage system, adjacent water bodies, or land.

Applications

Projects in urbanized or industrial areas where previous site usage, undetected spills or leaks, illicit discharges, or underground storage tank leaks may have contributed to soil contamination.

Installation and Implementation Requirements

- Research records of previous site uses and activities.
- Identify soil discoloration, odors, soil property differences, abandoned underground tanks or pipes, or buried debris to determine possible soil contamination.
- Prevent leaks and spills.
- Test soil at a certified laboratory if soil is suspected of contamination.
- Coordinate with the State of Hawaii, Department of Health for required permits and to determine treatment and disposal options of contaminated soil.

Limitations

Dispose of contaminated soils at DOH-permitted facilities. Transfer contaminated soils via DOH-approved transporter.

Inspections and Maintenance

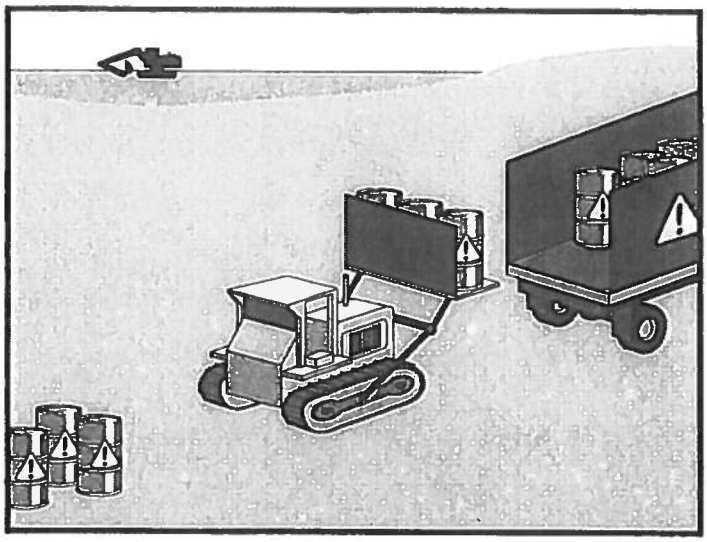
- Conduct daily inspections of excavated areas for evidence of contaminated soil.
- Regularly inspect hazardous waste disposal areas and receptacles.
- Monitor on-site contaminated soil storage and disposal procedures.

Inspections and Maintenance (Continued)

- Prevent leaks and spills by implementing Spill Prevention and Control practices and procedures.

Hazardous Waste Management

SM-9



Source: Caltrans Construction Site Best Management Practices Manual, 2003

Description

Practices and procedures to prevent or reduce the discharge of hazardous waste to the land, storm drain system, or adjacent water bodies.

Applications

Handling procedures on construction sites involving one of the following hazardous wastes:

- Paints and solvents;
- Petroleum products such as oils, fuels, and grease;
- Herbicides;
- Acids for cleaning masonry;
- Concrete curing and repair compounds; and
- Contaminated waste material.

Hazardous waste management shall also be implemented for wastes from existing structures including:

- Sandblasted material such as grit or chips containing lead, cadmium, or chromium-based paints;
- Asbestos; and
- Polychlorinated Biphenyls (PCBs). Older transformers are a common source of PCBs.

Hazardous Waste Management

SM-9

Installation and Implementation Requirements

Recognize potentially hazardous waste by implementing the following:

- Review product label and shipping papers;
- Identify key words such as flammable or ignitable (able to catch fire); carcinogenic (causes cancer); toxic or poisonous (injures or harms people or animals); and hazardous, danger, caustic or corrosive (burns through chemical action). Hawaii Administrative Rules (HAR) Title 11, Chapter 261 includes a list of hazardous waste and criteria;
- Review material safety data sheets (MSDS) from the manufacturer and supplier of the product; and
- Contact DOH, Hazardous Waste Program Office at 586-4226 for additional questions and information.

Material use practices and procedures for hazardous waste management include the following:

- Dispose container only after all of the product has been used;
- Keep the original product label on the container since it includes important safety and disposal information;
- Restrict amount of herbicide prepared to quantity necessary for the current application. Comply with the recommended usage instructions. Do not apply herbicides during or just before a rain event; and
- Remove as much paint from brushes on painted surface. Avoid cleaning or rinsing water-based paint brushes in soil, streets, gutters, storm drains, or streams. Rinse from water-based paints shall be discharged into the sanitary sewer system. Filter and re-use solvents and thinners. Dispose of oil-based paints and residue as a hazardous waste.

Waste recycling and disposal practices and procedures for hazardous waste management include the following:

- Designate areas for collection of hazardous wastes;
- Store hazardous materials and wastes in covered containers;
- Provide secondary containment for hazardous waste containers;
- Keep wastes separate to prevent chemical reactions which make recycling and disposal difficult;
- Recycle useful materials such as oil or water-based paint;
- Avoid disposal of toxic liquid wastes (solvents, used oils, and paints) or chemicals (additives, acids, and curing compounds) in dumpsters allocated for construction debris;
- Schedule periodic waste collection to prevent overflow of containers; and
- Ensure collection, removal, and disposal of hazardous waste complies with regulations.

Installation and Implementation Requirements (Continued)

Hazardous waste management training shall include the following:

- Awareness of potential dangers from hazardous wastes;
- Identifying hazardous wastes;
- Proper hazardous waste storage and disposal procedures;
- Safety procedures for hazardous wastes;
- Placement of warning signs in areas recently treated with chemicals;
- Use of cleanup materials for spills;

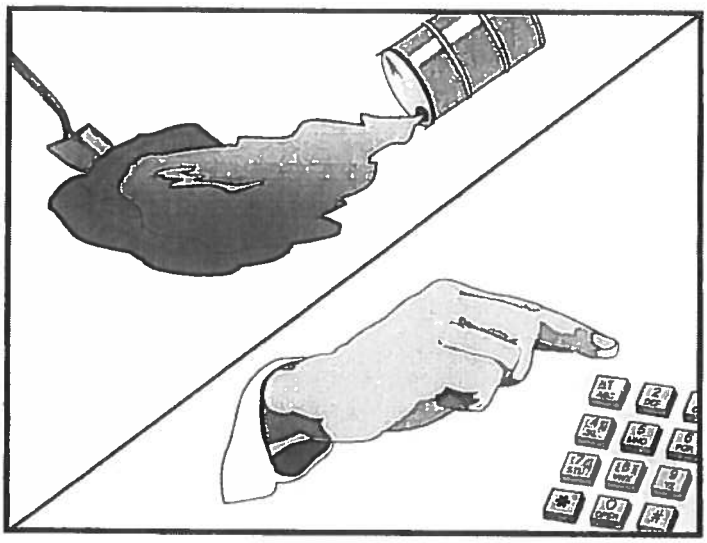
Limitations

Hazardous waste that cannot be reused or recycled shall be disposed of by a licensed hazardous waste hauler.

Inspections and Maintenance

- Regularly inspect hazardous waste collection and storage areas and containers.
- Schedule hazardous waste collection regularly.

Spill Prevention and Control SM-10



Source: Caltrans Construction Site Best Management Practices Manual, 2003

Description

Practices and procedures to reduce or prevent leaks or spills which may be discharged into the storm drain system or adjacent water bodies.

Applications

Construction projects involving the storage of chemicals or hazardous substances.

Installation and Implementation Requirements

General Requirements include the following:

- Store hazardous materials and wastes in covered containers and protect containers from vandalism;
- Maintain an ample supply of cleanup materials for spills shall be readily accessible;
- Train employees on proper spill prevention and cleanup; and
- Review spill response requirements at all applicable work sites.

Cleanup Requirements include the following:

- Immediately clean up leaks and spills;
- Use minimal water to clean up spills on paved surfaces. For small spills, use a rag. For general cleanup, use a damp mop. For larger spills, use absorbent materials. Properly dispose of materials used to clean up hazardous materials; and
- Avoid hosing down or burying dry material spills.

Reporting includes the following:

- Report significant spills to the U.S. coast Guard, Hawaii State Office of Hazard Evaluation and Emergency Response, and City and

Installation and Implementation Requirements (Continued)

County of Honolulu agencies, such as the Fire Department and

- Per federal regulations, report significant spills of oil onto an adjoining shoreline or into a water body to the National Response Center at 800-424-8802 (24 hour).

Vehicle and equipment maintenance activities requirements include the following:

- Use a designated area and/or secondary containment for on-site repair or maintenance activities. These areas shall be located away from drainage courses;
- Complete regular inspections of on-site vehicles and equipment, including delivery trucks and employees' vehicles, for leaks. Do not allow vehicles or equipment with leaks on-site;
- Secondary containment devices such as drop cloths and drain pans shall be used to catch leaks or spills while removing or changing fluids from vehicles or equipment;
- Place drip pans or absorbent materials under paving equipment not in use;
- Use absorbent materials on small spills. Avoid hosing down or burying spills. Remove and properly dispose of cleanup materials;
- Immediately transfer used fluids to the appropriate waste or recycling containers. Avoid leaving full drip pans and open containers on-site;
- Drain excess oil from oil filters prior to disposal by placing filter in a funnel over a waste oil recycling drum. Recycle oil filters if this service is available; and
- Store all cracked batteries in a non-leaking secondary container even if the acid appears to have drained out. Handle dropped batteries as cracked batteries until assured it is not leaking.

Vehicle and equipment fueling activities requirements include the following:

- Use designated areas for required on-site fueling. Fueling areas shall be located away from drainage courses;
- Avoid "topping off" of fuel tanks; and
- Use secondary containment devices such as drain pans to catch spills or leaks while fueling.

Limitations

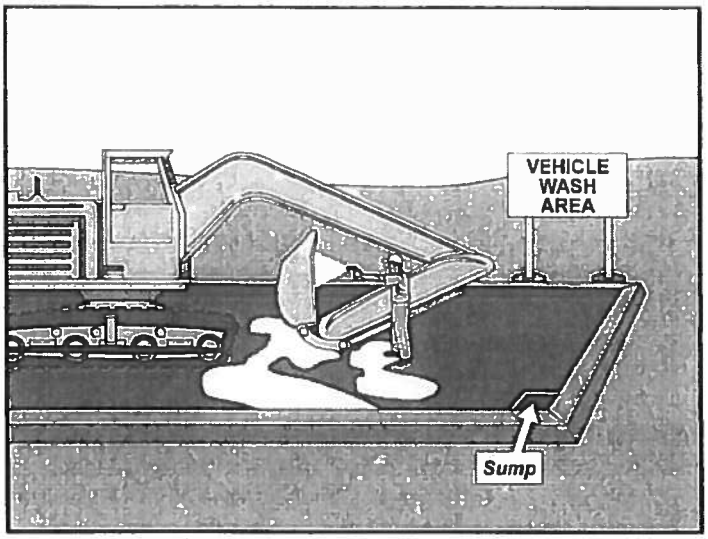
Use of a private spill cleanup company may be necessary.

Inspections and Maintenance

- Update spill prevention and control plans and stock necessary cleanup materials as the chemicals used or stored on-site change.
- Ample supplies of materials for spill control and cleanup shall be located on-site near maintenance and material storage or unloading areas.

Vehicle and Equipment Cleaning

SM-11



Source: Caltrans Construction Site Best Management Practices Manual, 2003

Description

Practices and procedures to reduce or prevent the discharge of pollutants from vehicle and equipment cleaning activities to storm drain.

Applications

Construction or maintenance activities involving cleaning of vehicles and equipment.

Installation and Implementation Requirements

- Use off-site vehicle wash racks or commercial washing facilities when practical. Off-site cleaning facilities may be better equipped to properly handle and dispose of wash waters.
- If on-site cleaning is necessary, designate bermed wash areas for cleaning activities. The wash area may be sloped to facilitate collection of wash water and evaporative drying.
- Minimize water use to avoid the need for erosion and sediment controls for the wash area.
- Use phosphate-free, biodegradable soaps.
- Train employees on pollution prevention measures.
- Steam cleaning shall not occur in uncontained areas. Significant pollutant concentrations may be generated from steam cleaning.

Limitations

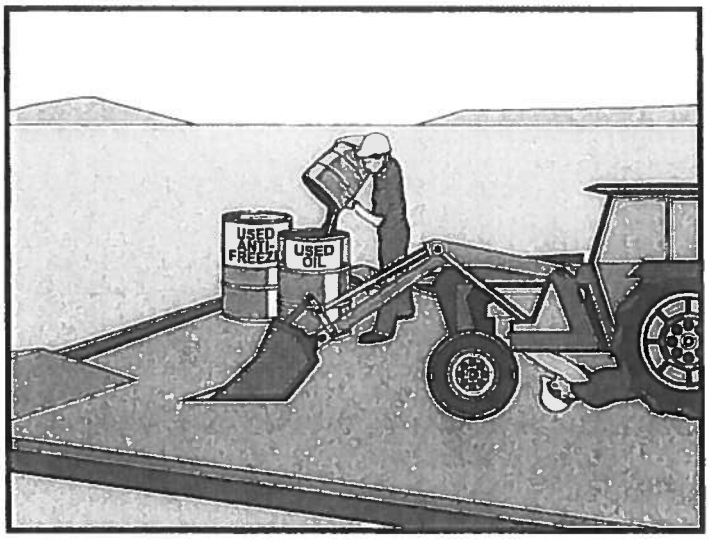
Some soaps labeled phosphate-free and/or biodegradable have been shown to be toxic to fish before the soap degrades. Do not discharge wash water directly into streams.

Inspections and Maintenance

- Train employees on implementation of revised procedures.
- Inspect and maintain structural controls.

Vehicle and Equipment Maintenance

SM-12



Source: Caltrans Construction Site Best Management Practices Manual, 2003

Description

Practices and procedures to prevent or reduce the discharge of pollutants from vehicular and equipment maintenance procedures into the storm drain system or adjacent water bodies.

Applications

Construction sites with on-site areas for storage and maintenance of vehicles and equipment.

Installation and Implementation Requirements

- Prevent excessive accumulation of oil and grease by keeping vehicles and equipment clean.
- Use off-site repair and maintenance facilities where practical.
- Designate a maintenance area away from drainage courses to prevent pollutants from entering the drainage system.
- Place drip pans or drop cloths under vehicles and equipment to absorb spills or leaks.
- Provide an ample supply of readily accessible spill cleanup materials.
- Use absorbent materials on small spills. Promptly remove and properly dispose of absorbent materials. Do not hose down or bury small spills.
- On-site vehicles and equipment shall be inspected regularly for leaks and all leaks shall be immediately repaired.
- Incoming vehicles and equipment shall be checked for leaks. Leaking vehicles and equipment shall not be allowed on-site.

Installation and Implementation Requirements (Continued)

- Segregate and recycle wastes from vehicle/equipment maintenance activities such as used oil or oil filters, greases, cleaning solutions, antifreeze, automotive batteries, and hydraulic and transmission fluids.
- Properly dispose of wastes generated by vehicle/equipment maintenance activities.
- Provide employee training on proper maintenance and spill cleanup practices and procedures.

Limitations

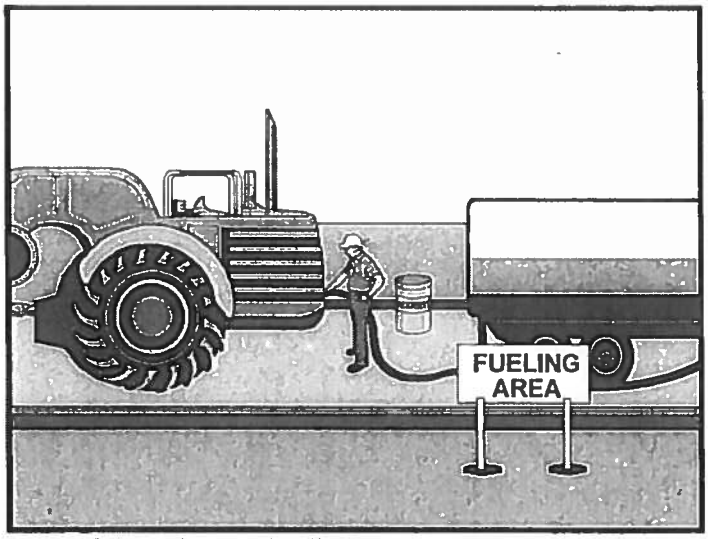
Off-site maintenance facility may not be easily accessible.

Inspections and Maintenance

- Regularly inspect vehicle and maintenance areas.
- Ample supplies of spill cleanup materials shall be kept on-site.

Vehicle and Equipment Refueling

SM-13



Source: Caltrans Construction Site Best Management Practices Manual, 2003

Description

Practices and procedures to prevent or reduce the discharge of pollutants to storm water from vehicle and equipment fuel leaks or spills.

Applications

Construction or maintenance activities involving fueling of vehicles or equipment.

Installation and Implementation Requirements

- Comply with Federal and State requirements regarding stationary, above ground storage tanks.
- Use off-site fueling sites when practical. Off-site fueling sites may be better equipped to service and handle spills due to multiple vehicles or pieces of equipment.
- If on-site fueling is necessary, locate designated fuel areas away from drainage courses to prevent contamination of storm water.
- Avoid "topping-off" of fuel tanks.
- Drip pans or drop cloths shall be used to absorb leaks or spills during fueling.
- Absorbent spill cleanup materials shall be available and located in fueling areas.
- Use absorbent materials on small spills instead of hosing down or burying the spill. Promptly remove and properly dispose the absorbent materials.
- Minimize mobile fueling of construction equipment by transporting equipment to designated areas for fueling.
- Train employees on proper fueling and cleanup procedures.

Vehicle and Equipment Refueling

SM-13

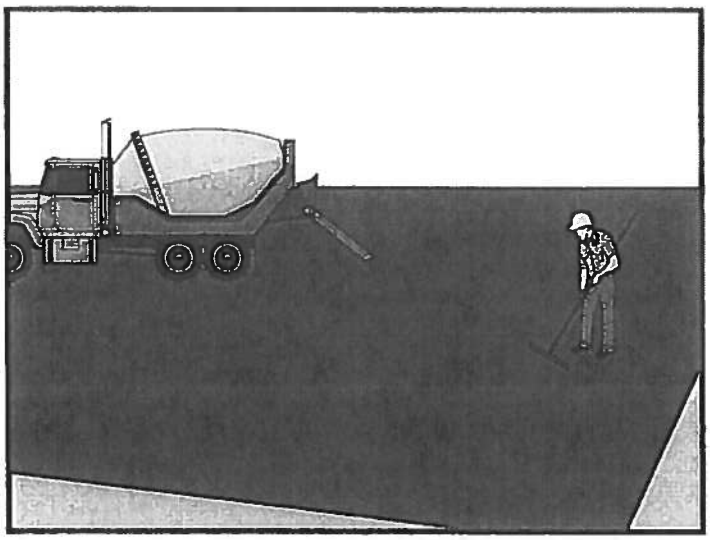
Limitations

Off-site fueling of vehicles and equipment may not be practical.

Inspections and Maintenance

- Ample supplies of materials for fuel spill control and cleanup shall be located on-site near fueling areas.
- Regularly inspect fueling areas and storage tanks.

Paving Operations SM-19



Source: Caltrans Construction Site Best Management Practices Manual, 2003.

Description

Practices and procedures to prevent or reduce the discharge of pollutants into the storm drain system or adjacent water body from paving, saw cutting, or grinding activities.

Applications

- Paving equipment storage.
- Asphalt cleaning.
- Removal of existing asphalt or concrete.
- Concrete, asphalt, seal coat, tack coat, or slurry applications.
- Recycling of pavement.

Installation and Implementation Requirements

- Limit paving operations during wet weather when possible.
- Store materials for paving activities away from concentrated runoff.
- Use asphalt emulsions as prime coat when possible.
- Place drip pans under paving equipment to contain leaks and spills. Clean up spills with absorbent materials.
- Place geotextile filter fabric over drain inlet structures and manholes during application of tack coat, seal coat, slurry seal, and fog seal.
- Saw cut slurry shall be removed from site by vacuuming. Provide storm drain protection during saw cutting.
- Refer to SM-5 (Concrete Waste Management) in this manual for activities involving Portland cement concrete.
- Adhere to the following when paving involves asphaltic concrete (AC):
  - Properly dispose of old or spilled asphalt. Collect and remove broken asphalt. Recycle asphalt when possible;
  - Excess sand and gravel shall be swept to prevent discharge into

Installation and Implementation Requirements (Continued)

the storm drainage system or adjacent water body; and

- Comply with storm water permitting requirements for industrial activities if paving requires an on-site mixing plant.

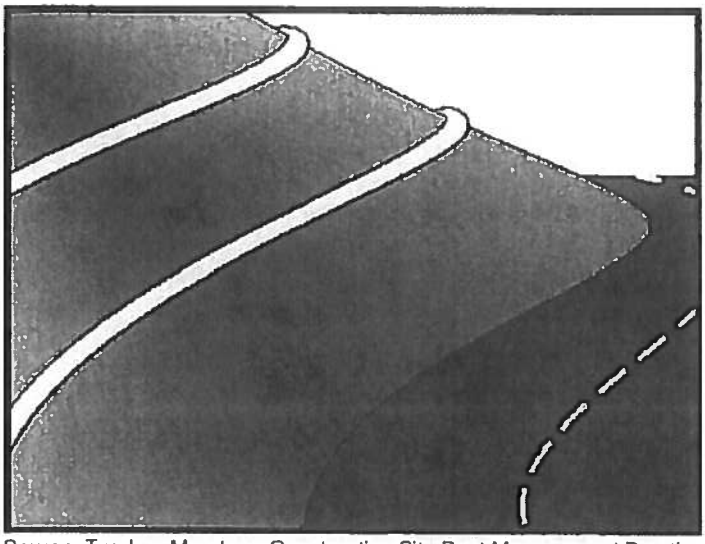
Limitations

Restrict paving operations during wet weather to prevent contact between storm water and paving materials.

Inspections and Maintenance

- Ample supplies of drip pans and absorbent materials shall be kept on-site.
- Inspect inlet protection equipment.
- Monitor employees to ensure appropriate paving practices and procedures are being implemented.

Compost Filter Berm SC-8



Source: Truckee Meadows Construction Site Best Management Practices Handbook, 2003.

Description

A dike consisting of composted material and placed perpendicular to runoff to reduce flow velocity and retain sediment and other pollutants.

Applications

- Along the site perimeter.
- Along the slope face.
- Check dam in small drainage ditches.
- Inlet protection for storm drains.
- Appropriate for small drainage areas and low surface velocity flows (less than 1 cfs).
- May be used in combination with other BMPs such as a compost blanket or silt fence for high rainfall areas and steeper or longer slopes.

Installation and Implementation Requirements

- Usually located at the base of slopes, however, additional berms may be used for increased erosion protection.
- Berm size is determined by factors including slope length and grade, soil characteristics, climate, and presence of existing vegetation.
- Berms may be vegetated or unvegetated.
- Compost quality shall comply with all local, state, and Federal requirements.

Installation and Implementation Requirements (Continued)

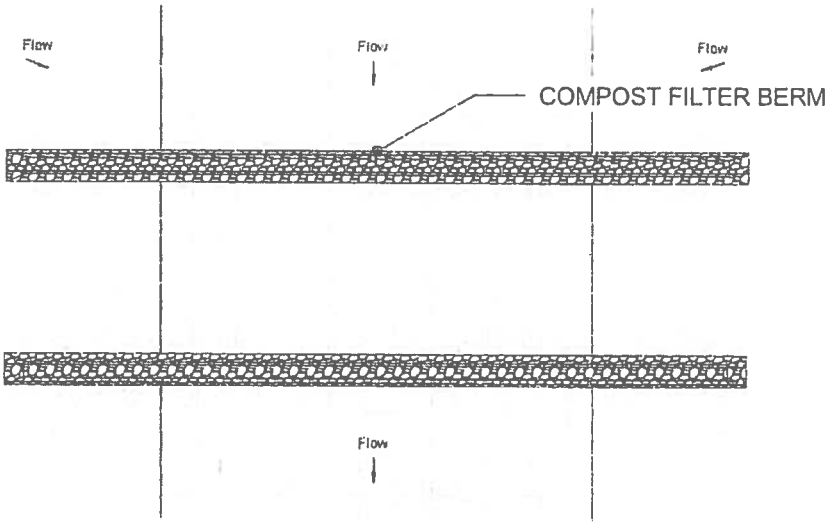
- Installation of a compost filter sock, which consists of a mesh tube filled with composted material, as a type of compost filter berm shall comply with the following:
  - Assemble by tying a knot at one end of the mesh sock, filling the sock with compost, and knotting the other end of the sock. A pneumatic blower may be used to fill the sock with compost;
  - Use a filter sock equivalent to the length of the slope where practicable;
  - When use of multiple socks is required, place socks end-to-end and interlock the ends;
  - Anchor filter socks to ground; and
  - Turn ends of filter sock up slope to prevent flow around ends.
- Material for compost berm may be left at the site and used as a soil amendment.
- Mesh socks filled with compost may also be used for areas of concentrated flow such as near streams or shorelines.

Limitations

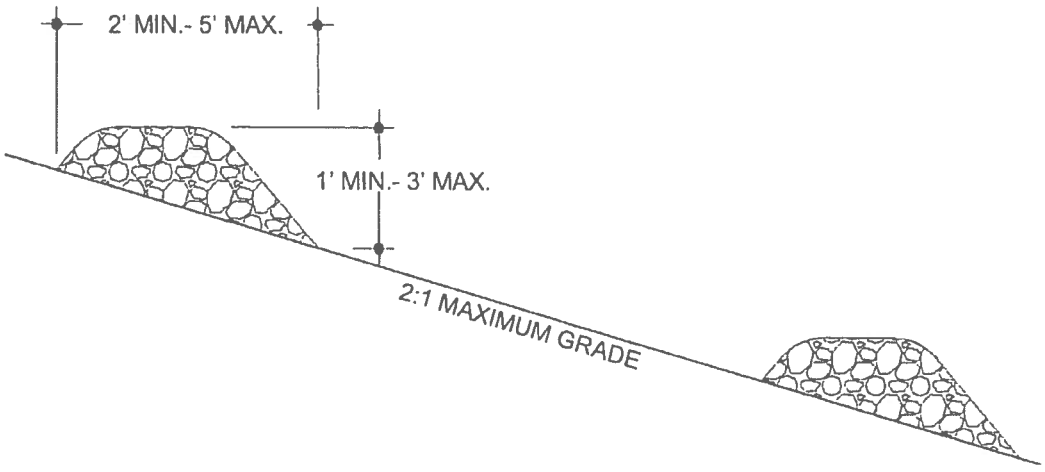
- Unsuitable for areas with concentrated runoff unless a low flow rate and small drainage area warrants use of a filter berm.
- Heavy vegetation must be removed to ensure close contact of compost with the ground surface.

Inspections and Maintenance

- Inspect weekly during dry periods as well as within 24 hours of any rainfall of 0.5 inch or greater which occurs in a 24-hour period and daily during periods of prolonged rainfall.
- Remove sediment which has accumulated to within 1/3 of the berm height.
- Replace disturbed or damaged areas of the berm.
- Significant washout may indicate a larger berm or additional BMPs such as a compost blanket or silt fence are required.



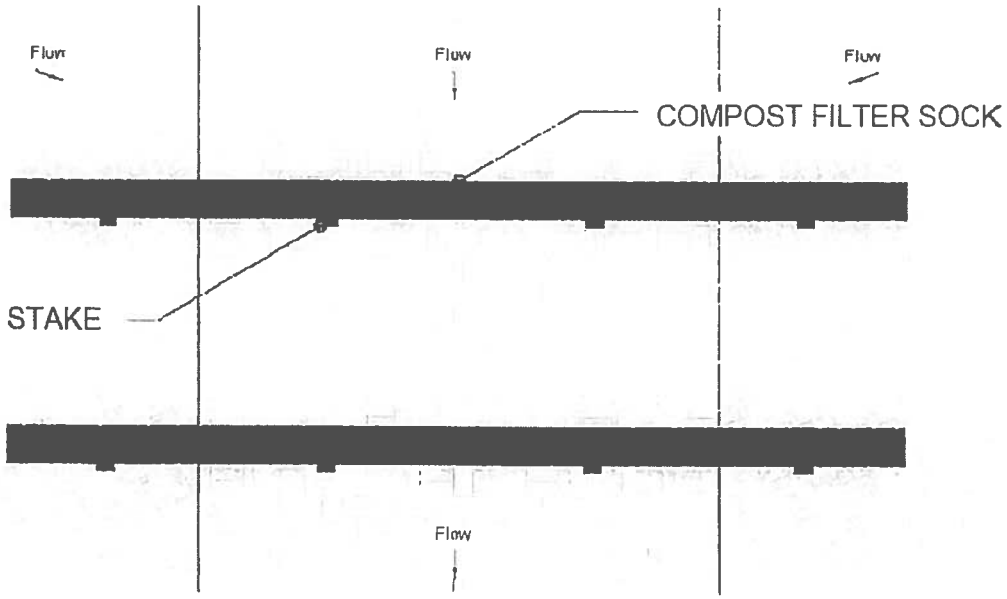
PLAN
NTS



SECTION
NTS

COMPOST FILTER BERM

Source: Texas Commission on Environmental Quality, www.tceq.state.tx.us/assets/public/assistance/compost/erosioncontroldrawings.pdf accessed September 2006.



PLAN
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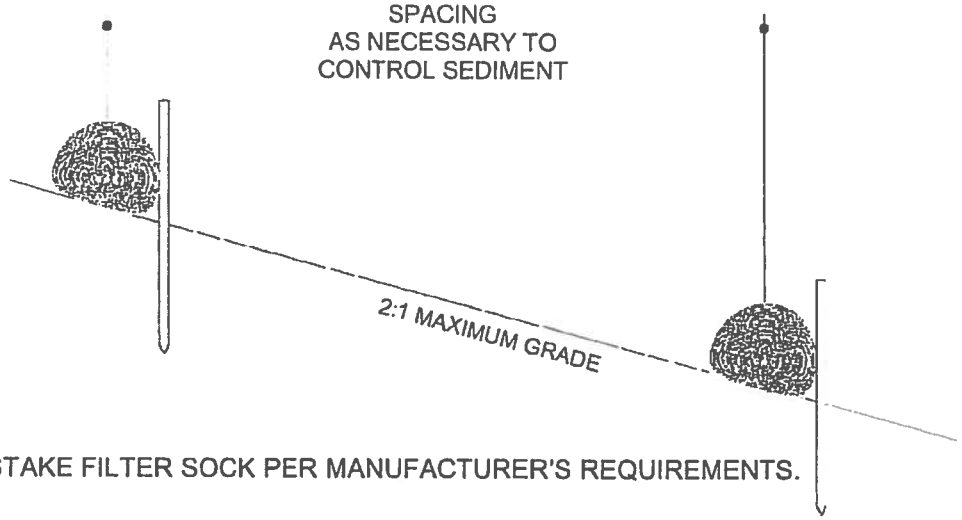
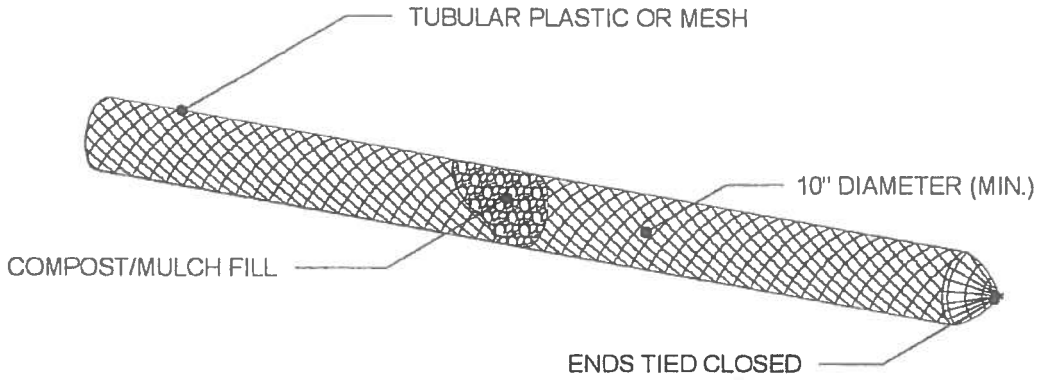


NOTE: STAKE FILTER SOCK PER MANUFACTURER'S REQUIREMENTS.

SECTION
NTS

COMPOST FILTER BERM (FILTER SOCK)

Source: Adapted from Texas Commission on environmental Quality, www.tceq.state.tx.us/assets/public/assistance/compost/erosioncontroldrawings.pdf accessed September 2006



COMPOST FILTER BERM (FILTER SOCK)
NTS

Source: Texas Commission on Environmental Quality, www.tceq.state.tx.us/assets/public/assistance/compost/erosioncontroldrawings.pdf accessed September 2006.