Appendix H – BMP Instruction and Detail Specifications

BMP Specifications that will be used on the site are inserted in this section.

Concrete, paint, stucco and other washout guidance

National Pollutant Discharge Elimination System/State Disposal System Construction Stormwater Permit requirements

Use this guidance for managing all liquid and solid wastes generated by washout operations (concrete, stucco, paint, form release oils, curing compounds, and other construction materials) related to construction activity on National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) construction stormwater permitted sites. To protect water quality, the NPDES Construction Stormwater Permit requires best management practices (BMPs) for concrete and other washout wastes on construction sites.

Background

The chutes of concrete mixers and hoppers of concrete pumps are typically rinsed out after delivery of concrete. Tools, hand mixers and wheel barrows are also washed to prevent hardening. Hardened concrete is relatively benign. However, liquid concrete wash water is a caustic material due to a high pH and it contains hazardous metals such as chromium. These materials can leach into the ground and contaminate groundwater. The high pH can inhibit plant growth and harm aquatic life if the runoff migrates to a lake or stream. Solids from liquid waste that are improperly disposed of can clog storm drain pipes and cause flooding. In order to comply with the prohibition of discharging any materials other than treated stormwater, there must be a means to prevent the discharge of washout water from the cleanup of stucco, paint, form release oils, curing compounds, and other construction materials.

The Minnesota Pollution Control Agency (MPCA) believes that groundwater and surface water can be protected from liquid concrete and other washout wastes through proper use of BMPs at NPDES/SDS construction stormwater permitted sites. Installing washout facilities not only prevents pollution but also is a matter of good housekeeping at a construction site.

Washout at construction sites

Washout facilities are used to contain all concrete and liquid wash water generated by the construction activity. Liquid and solid washout wastes must be contained in a leak-proof container and cannot contact the ground. The washout containers should be covered to prevent exposure to rainfall and potential overflow.

Washout facilities should also be used for cleaning other cementitious (cement-like) construction materials from tools and equipment such as stucco, mortar, plaster and grout. Depositing the wash water into a container allows evaporation and hardening to occur for easier disposal and to prevent runoff of liquids.

Recover and recycle wash water back into the truck

While the Construction Stormwater Permit does not allow concrete chute rinse water to come into contact with the ground, the permit does allow the wasting, the end of the load of plastic structural concrete to come into contact with the ground. After drying,

the remaining solids may be used as a fill material, a component in recycled aggregate or any other commercially useful application. Up to 0.5 cubic yards of concrete solids may be managed/buried on-site. If concrete solids are buried on-site, they should be at least two feet below the surface and must not be buried within three feet of the groundwater table. Quantities larger than 0.5 cubic yards of concrete solids must either be managed with the rest of the site's solid wastes or obtain an approval from the MPCA's solid waste program for other beneficial use options.

There are circumstances where concrete washout may be allowed onto a prepared compacted road bed. This allowance is intended for slip form paving type machines that cannot be readily moved off the paving area to a washout station. The area where wash water will flow onto must be compacted and will be paved over the next day. There must be a barrier of some type to keep the wash water on the compacted road bed until it dries. This allowance is not intended for truck washouts.

A concrete washout sign must be installed at each temporary washout facility to inform the site personnel to use the designated facilities. The facility should be located close to the concrete pouring or mixing operation and be easily accessible by concrete mix trucks. It is also important to locate the facility so that spills or overflows will be directed away from storm drain inlets, curb and gutters, water conveyances or surface waters. The facility will need to be inspected regularly for leaks, damage, or potential overflow and receive regular maintenance.

Washing of applicators and containers used for paint, concrete, or other materials

The permittee must comply with the prohibition of discharges other than stormwater (Part V.C) that includes the washout and cleanout of stucco, paint, concrete, form release oils, curing compounds, and other construction materials. The permittee must provide effective containment for all liquid and solid wastes generated by washout operations and provide an effective means to eliminate the discharge of these wastes to the site or receiving waters. To comply, the permittee should evaluate and incorporate methods in the Stormwater Pollution Prevention Plan to prevent these discharges such as:

1. Direct all wash water into a leak-proof container or leak-proof pit. The container or pit must be designed so that no overflows can occur due to inadequate sizing or precipitation;
2. Handle washout or cleanout wastes as follows:
   - Do not dump liquid wastes in storm sewers
   - Dispose of liquid wastes properly
   - Remove and dispose of hardened concrete waste consistent with the handling of other construction wastes
3. Locate any washout or cleanout activities as far away as possible from surface waters and stormwater inlets or conveyances, and, to the extent practicable, designate areas to be used for these activities and conduct such activities only in these areas.

Self-contained washout facility

Best management practices

There are many BMP options for disposal of liquid and solid wastes from washout activities. Many ready mix trucks are now equipped with the ability to collect chute wash water and solids and return them to the concrete plant for recycling or re-use.

Services are also available for hire that deliver a prefabricated washout container to collect concrete chute rinse water as well as wash water from tools and equipment generated on-site. Some services provide the containers alone without providing maintenance and disposal of materials, while other companies offer complete service that includes delivery of containers and regular pickups of solid and liquid waste materials. If these options are not available, the site owner and contractor can install a washout containment facility. A leak-proof container can be purchased or constructed onsite using an impermeable plastic or vinyl liner. The operators at the site will need to ensure no rips or tears develop in the liners or the liner will need to be replaced.

Concrete washout service

Washout facilities should be designed to promote evaporation where feasible to harden the concrete or other washout wastes for disposal as a solid waste. Hardened concrete can also be crushed for reuse as a construction material. However, if stored liquids have not evaporated and the washout is nearing capacity, vacuum and dispose of the waste in an approved manner. The local municipal wastewater treatment plant may be contacted to determine if there are special disposal requirements for concrete or other washout waters at their facility.

If the waste is stored onsite, remove the liquids or cover the washout facility before predicted rainstorms to prevent overflows. Companies that offer prefabricated and watertight washout containers generally offer a vacuum service to remove the liquid material. In case of a spill, immediately contain the spread of the spill, recover spilled materials, clean up the area and properly dispose of materials. Hardened concrete solids can be removed whole or broken up first depending on the type of equipment available on-site. In accordance with Minn. R. 7035.2860, subp. 4, item I; the hardened concrete can be used as a substitute for conventional aggregate. If the material is not utilized in accordance with the standing beneficial use determination referenced above, up to 0.5 cubic yards of concrete washout solids may be managed on-site. If concrete washout solids are buried on-site, they should be at least two feet below the surface and must not be buried in the groundwater table. Quantities larger than 0.5 cubic yards of concrete washout solids must either be managed with the rest of the sites solid wastes or obtain an approval from the MPCA's Solid Waste program for other beneficial use options.

Road construction concrete cutting or grinding slurry

Other operations on-site such as saw cutting, coring, grinding and grooving or construction of exposed-aggregate concrete surfaces may generate a similar liquid wastewater. Process wastewater generated by these operations cannot be discharged into any of the nation's waterways. The MPCA recommends that liquid and solid wastes generated by these operations be handled in accordance with the fact sheet *Road Construction Concrete Slurry Guidance* found at

Local requirements

In addition to state requirements, please note that there may be city, county or watershed management organization requirements that may be more stringent than those found in the NPDES/SDS Construction Stormwater Permit.

Definitions

Concrete-chute rinse-off water: Liquid wastes generated when a ready mix truck operator washes non-structural concrete materials off the chutes used to deliver concrete to a project.

STUCCO WORK & PAINTING

Description

Stucco work and painting are activities that include the use of hazardous materials. These materials are toxic to fish and the aquatic environment and require proper handling and disposal to minimize or eliminate discharges to gutters, storm drains, and watercourses. Extra care with these types of wastes must be required on every constructions site.

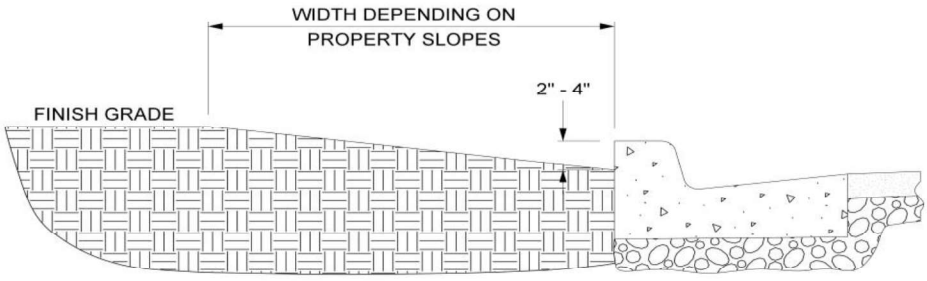
Control Measures

All materials should be placed, during work activity on plastic sheets large enough to contain drips and spills. Provide secondary containment in paint mixing and cleanup areas. After work has completed, sheets should be rolled in on themselves and placed in a waste receptacle designated to receive this type of waste. All leftover paint needs to be removed from the site, or disposed of in a paint washout bin designed to contain paint. There are services available that supply these specialized paint washout bins and retrieve them when full.

Never allow paint and/or stucco to be washed into a gutter, on the ground or into a storm drain inlet.

BMP: Cutback Curb

CC



DESCRIPTION:

Temporary sediment trap formed by excavation behind the curb. The purpose is to intercept sediment laden runoff from the site during construction and retain sediment onsite.

APPROACH:

- A cutback curb is installed when discharge from the site runs over the curb causing sediment to enter the roadway.
- Cutback curbs should be implemented in conjunction with other BMPs whenever possible and should not be used to replace other feasible BMPs.
- Cutback curbs should typically be installed at the site entrance when access is needed.
- The depth may be required to increase if more sediment storage is necessary.
- Other sediment traps, such as V ditches or depressed park strips, may also be acceptable.
- Excavate soil behind curb to a depth of 2-4 inches.
- The cutback could be implemented behind a sidewalk if sidewalk exists.

LIMITATIONS:

- Only remains effective for a limited time. Should not be used as a primary control measure for more than 4 months.
- Only applicable when the site is sloped towards the curb such that runoff overtops the curb.
- On severe slopes, the cutback may become ineffective and may also compromise the integrity of the curb. Therefore, a cutback should not be installed on a slope that exceeds 5%.

MAINTENANCE:

- Inspect monthly and after significant rainfall.
- Clean out excess sediment as required.
- Allow sediment laden water to infiltrate before cleaning.

APPLICATIONS

- ☐ Manufacturing
- ☐ Material Handling
- ☐ Vehicle Maintenance
- ☒ Construction
- ☐ Commercial Activities
- ☐ Roadways
- ☐ Waste Containment
- ☒ Housekeeping Practices

TARGETED POLLUTANTS

- ■ Sediment
- ☐ Nutrients
- ☐ Heavy Metals
- ☐ Toxic Materials
- ☐ Oxygen Demanding Substances
- ☐ Oil & Grease
- ☐ Floatable Materials
- ☐ Bacteria & Viruses

- ■ High Impact
- ☒ Medium Impact
- ☐ Low or Unknown Impact

IMPLEMENTATION REQUIREMENTS

- ☐ Capital Costs
- ☒ O&M Costs
- ☒ Maintenance
- ☐ Training

■ High ☒ Medium ☐ Low

J·U·B Engineers, Inc.

Wind Erosion Control

WEC–1 Dust Control

Definition

Dust control is a practice used to reduce the air transport of dust during construction activities by stabilizing exposed surfaces and minimizing activities that suspend or track dust particles.

Purpose

Control dust so dust does not infiltrate into stormwater and does not cause discomfort or nuisance to occupants of the Project site or neighboring properties.

Conditions Where the Practice Applies

Wind erosion control BMPs should be applied to all construction earth disturbing activities, including the following construction activities:

- Construction vehicle traffic on unpaved surfaces.
- Drilling and blasting activities.
- Sediment tracking onto paved roads.
- Soils and debris storage piles.
- Batch drop from front-end loaders.
- Areas with unstabilized soil.
- Final grading/site stabilization.

Specifications: Design and Installation

<u>Preventive Measures:</u>

- Schedule construction activities to minimize exposed area.
- Quickly stabilize exposed soils.
- Identify and stabilize key access points prior to construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Direct most construction traffic to stabilized roadways within the Project site.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the Project.
- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for wet suppression or chemical stabilization of exposed soils.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances.
- Stabilize inactive construction sites using BMPs such as vegetation.
- Limit the amount of areas disturbed by clearing and earth moving operations by scheduling these activities in phases.
- Cover stockpiles with plastics and make sure they are secure.

Sources include EPA, SWRCB, Caltrans, CASQA

Wind Erosion Control

WEC–1 Dust Control

Maintenance & Inspection

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, and weekly throughout the life of the Project.
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- Check areas protected to ensure coverage.
- Most dust control measures require frequent, often daily, or multiple times per day attention.

DESCRIPTION:
Employee training, like equipment maintenance, is a method by which to implement BMPs. Employee training should be used in conjunction with all other BMPs as part of the facility's SWPPP.

The specific employee training aspects of each of the source controls are highlighted in the individual information sheets. The focus of this information sheet is more general, and includes the overall objectives and approach for assuring employee training in stormwater pollution prevention. Accordingly, the organization of this information sheet differs somewhat from the other information sheets in this chapter.

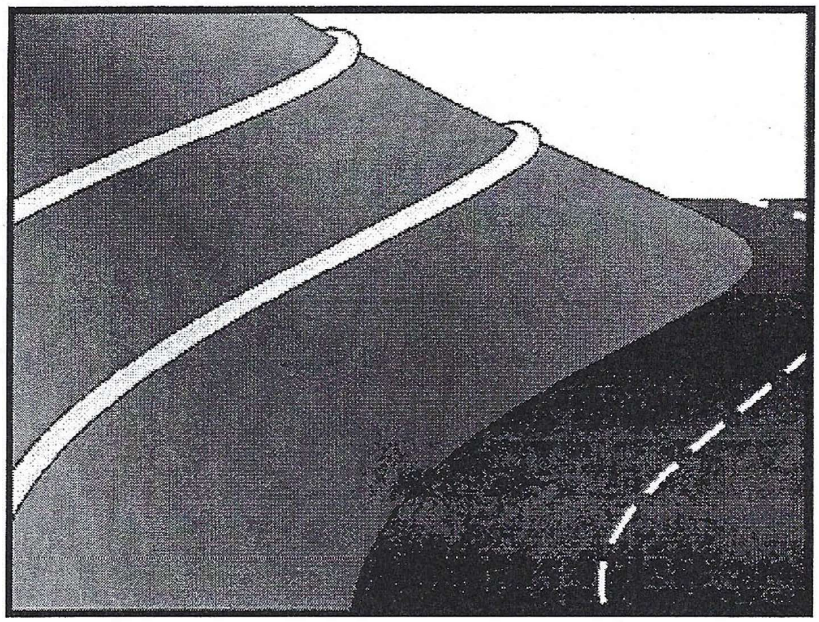
OBJECTIVES:
Employee training should be based on four objectives:

- Promote a clear identification and understanding of the problem, including activities with the potential to pollute stormwater;
- Identify solutions (BMPs);
- Promote employee ownership of the problems and the solutions; and
- Integrate employee feedback into training and BMP implementation.

APPROACH:

- Integrate training regarding stormwater quality management with existing training programs that may be required for your business by other regulations.
- Businesses that are not regulated in Federal, State, or local regulations, may use the information in this handbook to develop a training program to reduce their potential to pollute stormwater.
- Employee training is a vital component of many of the individual source control BMPs included in this manual.

SE-Fiber Rolls



Objectives

EC	Erosion Control	!KI
SE	Sediment Control	O
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

O Primary Objective

!KI Secondary Objective

Description and Purpose

A fiber roll consists of straw, flax, or other similar materials bound into a tight tubular roll. When fiber rolls are placed at the toe and on the face of slopes, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff. By interrupting the length of a slope, fiber rolls can also reduce erosion.

Suitable Applications

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
- At the end of a downward slope where it transitions to a steeper slope
- Along the perimeter of a project
- As check dams in unlined ditches
- Down-slope of exposed soil areas
- Around temporary stockpiles

Limitations

- Fiber rolls are not effective unless trenched

Targeted Constituents

Sediment
Nutrients
Trash
Metals
Bacteria
Oil and Grease
Organics

Potential Alternatives

SE-1 Silt Fence
SE-6 Gravel Bag Berm
SE-8 Sandbag Barrier
SE-9 Straw Bale Barrier

- Fiber rolls at the toe of slopes greater than 5:1(H:V) should be a minimum of 20 in. diameter or installations achieving the same protection (i.e. stacked smaller diameter fiber rolls, etc.).
- Difficult to move once saturated.
- If not properly staked and trenched in, fiber rolls could be transported by high flows.
- Fiber rolls have a very limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.

Implementation

Fiber Roll Materials

- Fiber rolls should be either prefabricated rolls or rolled tubes of erosion control blanket.

Assembly of Field Rolled Fiber Roll

- Roll length of erosion control blanket into a tube of minimum 8 in. diameter.
- Bind roll at each end and every 4 ft along length of roll with jute-type twine.

Installation

- Locate fiber rolls on level contours spaced as follows:

  Slope inclination of 4:1(H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.

  Slope inclination between 4:1 and 2:1(H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).

  Slope inclination 2:1(H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).

- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.
- Stake fiber rolls into a 2 to 4 in. deep trench with a width equal to the diameter of the fiber roll.

  Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.

  Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.

- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.

Removal

- Fiber rolls are typically left in place.

- Iffiber rolls are removed, collect and dispose of sediment accumulation, and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

Costs

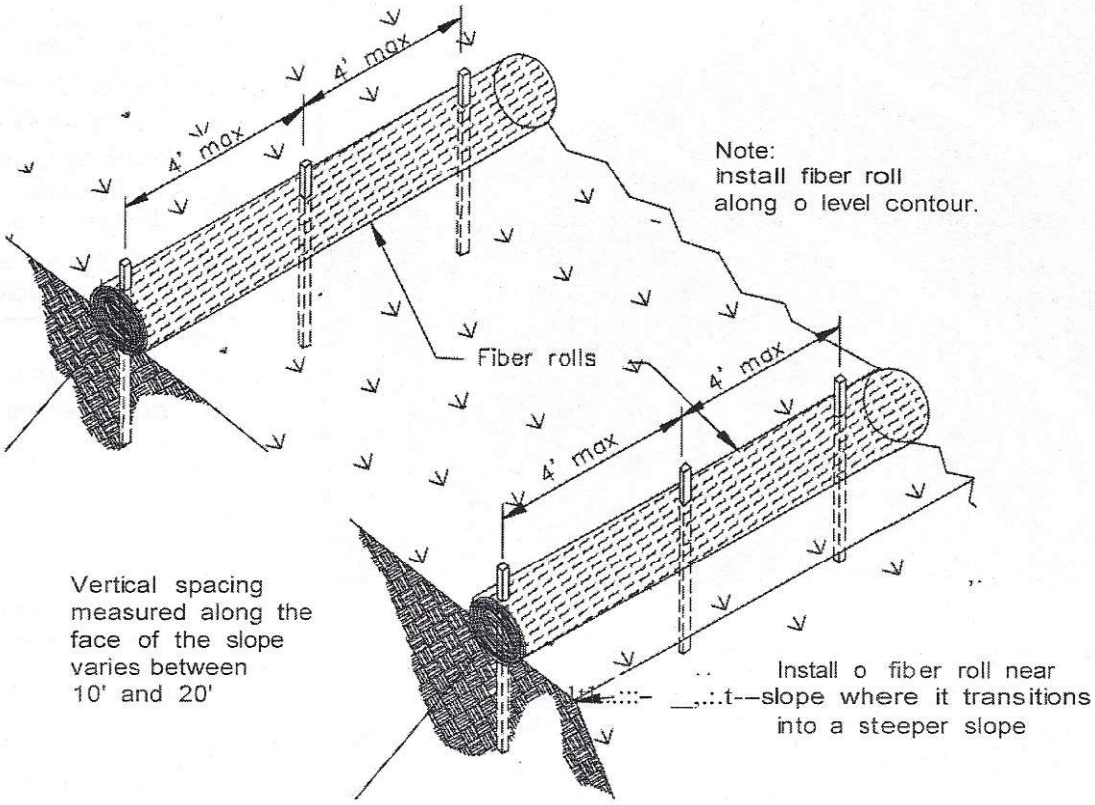
Material costs for fiber rolls range from $20 - $30 per 25 ft roll.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- Ifthe fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-half the designated sediment storage depth, usually one-half the distance between the top of the fiber roll and the adjacent ground surface. Sediment removed during maintenance may be incorporated into earthwork on the site of disposed at an appropriate location.
- Iffiber rolls are used for erosion control, such as in a mini check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.

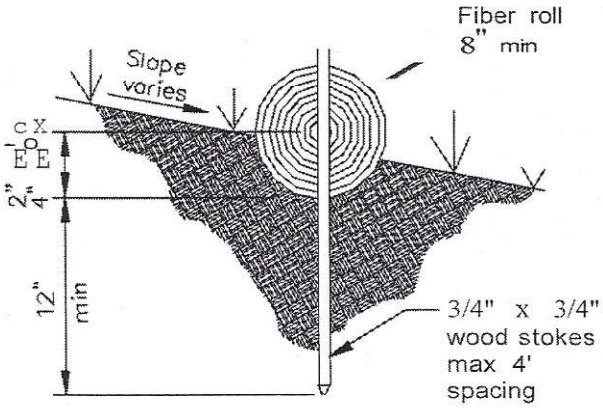
References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



TYPICAL FIBER ROLL INSTALLATION

N.T.S.



ENTRENCHMENT DETAIL

N.T.S.

Waste Management

WM–1 Material Delivery and Storage

Definition

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in a designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

Purpose

Minimize or eliminate the exposure of stormwater to construction materials to prevent pollution of the stormwater system.

Conditions Where the Practice Applies

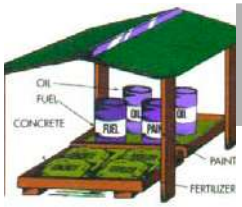
These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Specifications: Design and Installation

The following steps should be taken to minimize risk:

- Material Safety Data Sheets (MSDS) should be supplied for all materials stored.
- Construction site areas should be designated for material delivery and storage.
- Temporary storage area should be located close to the entrance of the site but away from vehicular traffic to prevent accidents. Also locate storage areas away from the Project perimeter, waterways, and stormdrains.
  - Avoid transport near drainage paths or waterways.
  - Surround with earth berms.
- Material storage areas shall be covered. Store materials in secondary containment including non-reactive materials such as detergents, oil, grease, and paints.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items in secondary containment.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the Fire Marshal at the UCSB Environmental Health & Safety department on campus to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable



Waste Management

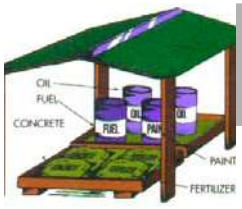
WM–1 Material Delivery and Storage

and Combustible Liquid Code, NFPA30.

- Keep an up to date inventory of materials delivered and stored onsite.
- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- Chemicals should be kept in their original labeled containers.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If residual materials remain on the ground after construction is complete, properly remove materials and any contaminated soil. See WM – 8 Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- All temporary containment facilities and material storage areas shall be covered and have secondary containment.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Proper storage instructions should be posted at all times in an open and conspicuous location.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.
- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment



Waste Management

WM–1 Material Delivery and Storage

facilities for storage.

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.
- Stockpiles should be protected in accordance with WM – 5 Stockpile Management.
- Materials should be stored indoors within existing structures or sheds when available.
- An ample supply of appropriate spill clean up material should be kept near storage areas.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.
- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any and all spills immediately.
- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See BMP Contaminated Soil Management.

Maintenance & Inspection

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, and weekly throughout the life of the Project.
- Keep an ample supply of spill cleanup materials near the storage area.
- Keep storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.
- Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

Non-Stormwater Management

NSM–7 Paving and Grinding

Definition

Procedures and practices for conducting paving, saw cutting, and grinding operations to minimize the transport of pollutants to the stormdrain system and to the Project site perimeter.

Purpose

Prevent the discharge of pollutants from paving operations, using measures to prevent runon and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

Conditions Where the Practice Applies

These procedures are implemented where paving, surfacing, resurfacing, grinding, or saw cutting, may pollute stormwater runoff or discharge to the stormdrain system or watercourses.

Specifications: Design and Installation

<u>General</u>

- Avoid paving during the wet season when feasible.
- Reschedule paving and grinding activities if rain is in the forecast.
- Train employees and subcontractors in pollution prevention and reduction.
- Store materials away from stormdrains and drainage courses to prevent stormwater runon, see WM – 1 Material Delivery and Storage.
- Protect drainage courses, particularly in areas with a grade, by employing BMPs to divert runoff or to trap and filter sediment.
- If paving involves an onsite mixing plant, follow the stormwater permitting requirements for industrial activities.
- Stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses. These materials should be stored consistent with WM – 5 Stockpile Management.
- Disposal of PCC and AC waste should be in conformance with WM – 3 Temporary Concrete Washout and Waste Management.
- Do not wash sweepings from exposed aggregate concrete into a stormdrain system. Collect and return to aggregate base stockpile or dispose of properly.

<u>Saw Cutting, Grinding, and Pavement Removal</u>

- Shovel or vacuum saw-cut slurry and remove from site. Cover or barricade stormdrains during saw cutting to contain slurry.
- When paving involves AC, the following steps should be implemented to prevent the discharge of grinding residue, uncompacted or loose AC, task coats, equipment cleaners, or unrelated paving materials:
  - Minimize sand and gravel from new asphalt from getting into stormdrains, streets, and creeks by sweeping.
  - Old or spilled asphalt must be recycled or disposed as approved by the University's Representative.

Sources include EPA, SWRCB, Caltrans, CASQA

Non-Stormwater Management

NSM–7 Paving and Grinding

- AC grindings, pieces, or chunks used in embankments or shoulder backing must not be allowed to enter any stormdrain or watercourses. Install an erosion control BMP until the structure is stabilized or permanent controls are in place.
- Collect and remove all broken asphalt and recycle when practical; otherwise, dispose of properly.
- Any AC chunks and pieces used in embankments must be placed above the water table and covered by at least 1 foot of material.

- Do not allow saw-cut slurry to enter stormdrains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine, should not be allowed to flow across the pavement, and should not be left on the surface of the pavement. See also WM – 3 Temporary Concrete Washout and Waste Management.
- Dig out activities should not be conducted in the rain.
- Collect pavement dig out material by mechanical or manual methods. This material may be recycled if approved by the University's Representative for use as shoulder backing or base material at locations approved by the University's Representative.
- When approved by the University's Representative, stockpile material removed from roadways away from stormdrain inlets, drainage ditches, and watercourses and stored consistent with WM – 5 Stockpile Management.
- Disposal or use of AC grindings shall be approved by the University's Representative. See also WM – 3 Temporary Concrete Washout and Waste Management.

<u>Asphalt Concrete Paving</u>

- If paving involves asphaltic cement concrete, follow these steps:
  - Do not allow sand or gravel placed over new asphalt to wash into stormdrains, streets, or watercourses. Vacuum or sweep loose sand and gravel and properly dispose of this waste by referring to WM – 2 Trash Containment.
  - Old asphalt must be disposed of properly. Collect and remove all broken asphalt from the site and recycle whenever possible.

<u>Portland Cement Concrete Paving</u>

- Do not wash sweepings from exposed aggregate concrete into a stormdrain system. Collect and return to aggregate base stockpile or dispose of properly.
- Allow aggregate rinse to settle. Then allow rinse water to dry in a temporary pit as described in WM – 3 Temporary Concrete Washout and Waste Management.
- Do not allow saw-cut Portland Concrete Cement (PCC) slurry to enter stormdrains or watercourses.

Non-Stormwater Management

NSM–7 Paving and Grinding

Sealing Operations

- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate must not be allowed to enter any stormdrain or water courses. Apply temporary perimeter controls until structure is stabilized.
- Drainage inlet structures and manholes shall be covered with filter fabric during application of seal coat, tack coat, slurry seal, and/or fog seal. Once these coats are complete remove the filter fabric and install approved stormdrain inlet protection.
- Seal coat, tack coat, slurry seal, or fog seal shall not be applied if rainfall is predicted to occur during the application or curing period.

Paving Equipment

- Leaks and spills from paving equipment can contain toxic levels of heavy metals and oil and grease. Place drip pans or absorbent materials under paving equipment when not in use. Clean up spills with absorbent materials rather than burying. See NSM – Vehicle and Equipment Practices and WM – 6 Spill Prevention and Control.
- Substances used to coat asphalt transport trucks, asphalt trucks, and asphalt spreading equipment shall not contain soap and shall be non-foaming and non-toxic.
- Place plastic materials under asphaltic concrete (AC) paving equipment while not in use, to catch and/or contain drips and leaks.
- Paving equipment parked onsite shall be parked over plastic to prevent soil contamination.
- Clean asphalt-coated equipment offsite whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in WM – 2 Trash Containment. Any cleaning onsite shall follow NSM – 3 Vehicle and Equipment Practices.

Thermoplastic Striping

- All thermoplastic striper and pre-heater equipment shutoff valves shall be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering the stormdrain inlets, the stormwater drainage system, or watercourses.
- The pre-heater shall be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move when the vehicle is deadheaded.
- Contractor shall not pre-heat, transfer, or load thermoplastic near stormdrain inlets or watercourses.
- Clean truck beds daily of loose debris and melted thermoplastic. Thermoplastic

Non-Stormwater Management

NSM–7 Paving and Grinding

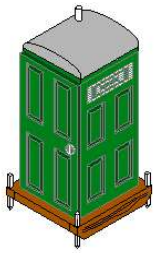
waste shall be disposed of properly.

Raised/Recessed Pavement Marker Application and Removal

- Do not transfer or load bituminous material near stormdrain inlets, the stormwater drainage system, or watercourses.
- Melting tanks shall be loaded with care and not filled to beyond six inches from the top to leave room for splashing when vehicle is deadheaded.
- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- On large scale Projects, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.
- Waste shall be disposed of properly.

Maintenance & Inspection

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, and weekly throughout the life of the Project.
- Inspect and maintain machinery regularly to minimize leaks and drips.
- Ensure that employees and subcontractors are implementing appropriate measures during paving operations.
- Keep ample supplies of drip pans or absorbent materials onsite.



Waste Management

WM–4 Sanitary Waste Management

Definition

Practices and procedures such as providing convenient, well-maintained facilities, and arranging for regular service and disposal prevents the discharge of pollutants to stormwater from sanitary and septic waste.

Purpose

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste.

Conditions Where the Practice Applies

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Specifications: Design and Installation

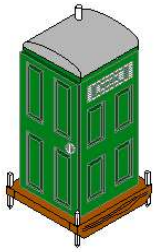
Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

Storage and Disposal Procedures

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, the Project perimeter, and from traffic circulation. When there is a risk of high winds, temporary sanitary facilities should be secured (staked down or tied to a sturdy structure) to prevent overturning.
- Temporary sanitary facilities should be located on a permeable surface at all times. If a temporary sanitary facility needs to be placed on an impermeable surface than it must be placed in an overflow pan or bin.
- Wastewater should not be discharged or buried within the Project site.
- Only reputable, licensed sanitary and septic waste haulers should be used.
- Sanitary facilities should be located in a convenient location.
- Untreated raw wastewater should never be discharged or buried.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.
- Regular waste collection by a licensed hauler should be arranged before facilities are full. Sanitary and septic facilities should never overflow.

Education

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary and septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary and



Waste Management

WM–4 Sanitary Waste Management

septic waste.

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Maintenance & Inspection

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, and weekly throughout the life of the Project.
- Arrange for regular waste collection.
- If high winds are expected, portable sanitary facilities must be secured with spikes to prevent over turning.

Secondary Containment

Minimum Measure: Prevent accidental releases or spills

Subcategory: Fuels and Oils / Hazardous Materials

Secondary Containment

Secondary containment is a safeguard measure used to prevent accidental releases or spills of toxic or hazardous substances to the environment (water, soil & air). Secondary containment can be a structure that is chemically compatible to hold a release and remain liquid tight until clean up occurs. Secondary containment can also be an engineered means to redirect a spill away from water or other sensitive receptor to a temporary diversion system.

I. What is required?

Fuel tanks stored on site must have secondary containment and all other spill sources that may be a threat to human health or the environment must have secondary containment. The phrase "may be a threat" is subjective, and without prescriptive regulatory guidance, PEs and Ecology inspectors use professional judgment to determine the necessary and reasonable secondary containment requirements that fit each individual circumstance.

Permit or specification language does not have exemption language that allows projects to deviate from the requirements when secondary containment is impractical. However, PEs has the authority to modify Standard

Specification requirements as reasonably necessary, whether to allow for deviations or to increase protection measures in high risk situations.

II. What needs secondary containment?

Requirements

Secondary containment requirements are not straightforward and regulatory guidance is not black and white. This is a good thing, because secondary containment should be adjusted to match site specific conditions without unnecessarily increasing project costs.

The NPDES Permit **requires** secondary containment for:

1. On-site fueling tanks (except double walled tanks)
   NOTE: Even though "Doubled-walled tanks do not require additional secondary containment," extra preventative measures may still be necessary with high risk construction activities in environmentally sensitive areas.
2. Chemicals, liquid products, petroleum products, and other materials that ***have the potential*** to pose a threat to human health or the environment. (*This is a **subjective and left to interpretation** based on Other Factors described below)*.

Single Walled Fuel Tanks

The 401 or HPA Permits ***may*** **require more stringent** secondary containment for in water or over water work activities.

Material Storage

Regulatory inspectors in the Northwest Region typically expect the following materials and work activities to always have secondary containment:

- Fuel tanks (single walled)
- Fuel transfer activities, for both mobile and stationary areas
- Volumes of stored or used liquid located adjacent/up gradient to water, where there is a reasonable potential of a worst case scenario spill could reach water. Examples such as:
  - Large volumes stored in drums and tanks
  - Large volumes used in large generators and pumps, hydraulic power packs
  - Moderate volumes located directly near water (within 5-10 ft) or unprotected drainage system that directly discharges to water
- Storage of material that may potentially pose a threat to

Fuel Transfers

human health or the environment that is not in constant or regular daily use (i.e., general good housekeeping practices following Ecology's BMPs)

Other Factors

Multiple other factors must be considered when deciding what needs secondary containment. To assess spill risks, evaluate the project and the surrounding environment and consider worst case scenarios. Consider how things could fail and how to prevent or protect in event of a failure.
Consider the location, type and quantity of stored materials or any risky construction activities (e.g., fueling) and take into account the topography (slope and gradient) and the proximity to water or other environmentally sensitive areas. Could a worst case scenario spill reach water?

Apply practicality and use common sense when enforcing secondary containment requirements. Use "worst case" to assess risk, but apply the knowledge listed below to establish reasonable means to manage the risk. Recognize that there is only so much energy, time, and money to expend to achieve full compliance on a project. Make a good faith effort to control pollution sources and require what is reasonable based on the project specific circumstances and environmental conditions.

Consider the following factors when making a judgment call pertaining to secondary containment:

1. Surrounding environment
2. Timeframe in use
3. Condition of equipment
4. Security and vandalism
5. Weather
6. Available manpower
7. Equipment and materials

Surrounding Environment

1. Is the work located over water, or below the Ordinary High Water Line?
2. Is the work or storage area located near environmentally sensitive areas, such as
   a) stormwater systems and ditches that discharge directly to water or wetlands?
   b) shallow groundwater or protected drinking water aquifers?
3. What is the distance of the nearest waterway or drainage system?
4. Will rain/stormwater come in contact with chemicals, fuels, or other hazardous materials used or stored on the project

Spill + Water = BIG/MULTIPLE FINE$

If the project is near water or other sensitive receptor, you may need to apply increased protections. It is not *only* about secondary containment, because other measures like using pristine equipment, increased maintenance and inspection, enhanced security, and increased man power should also be considered in lieu of or together with varied levels of secondary containment needs.

Timeframe in Use

1. Will the spill source be on the project for a long period of time?
2. Would the containment structure become susceptible to wear and tear?

Long Term Project = Increased Risk

Depending on the project location, increased security of the project, storage and staging areas (i.e., fencing & lightening) may be needed. Don't forget the IFC requirements for fittings, devices and padlocks that prevent malicious tampering or siphoning.

Consider increasing the robustness of containment to increase the durability and resistance of wear and tear and exposure to weather elements over time. Or, ensure regular inspection, maintenance and replacement of containment throughout the entire project.

Condition of Equipment

1. Is equipment relatively new and/or in good condition?
2. Based on experience, is there a reasonable potential for equipment failure?
3. Does the equipment have unprotected high pressure hoses and valves?
4. Could high vibrations or friction cause increase wear and tear on containment structure?

Portable Pump

Equipment Must Be Maintained

Secondary containment is not an option for leaking equipment. Equipment should always be inspected and maintained; otherwise it should be removed from the job site. Leaking equipment usually results in violations.

Many spills are a result of sprays from hydraulic hoses due to damage, chaffing, sharp bend points, broken fittings or maintenance /testing. Hoses should be protected from damage. Some hydraulic power packs have built in secondary containment.

Inspections, tests, maintenance and repair are the first lines of defense against spills. If these are not performed appropriately, or the nature of the work is in environmentally sensitive areas, add or increase secondary containment protection measures. Otherwise, if the first lines of defense are faithfully carried out, secondary containment of equipment may not be necessary.

Security and Vandalism

1. Is the project located in an area easily accessible by pedestrians?
2. Is there a high rate of crime in the project area?
3. Does the project and designated areas have adequate fencing and lighting?
4. Does equipment and storage tanks have protection measures, such as
   a) devices, such as Power Cord and Plug Locks, oil pump starters
   b) padlocks on pumps or hoses to secure to hanger
   c) anti-siphoning device
   d) self closing nozzles
   e) automatic shut off valves
   f) locks on drain or other valves

Fencing

Electrical Locks

AST Fill Port Lock

Alarm Systems

Cap Lock

Emergency Shut-Off Valve

Locking Container

Weather

1. Is construction work occurring during the raining season?
2. Could extreme hot or cold temperatures cause plastic or structures to become brittle or fracture

Weathered Plastic

Plastic Cover

Cover with Containment Pallet

How's the Weather?

Increase protection measures to prevent storm water from coming in contact with hazardous substances stored or used on the project. Otherwise, storm water polluted with chemicals must be diverted with drainage controls, contained, and sampled to determine proper disposal (See Ecology BMP C153, page 4-46).

Ecology BMP C153, page 4-46 directs that during the wet weather season (Oct 1 – April 30), each secondary containment facility shall be covered during non-working days, prior to and during rain events.

Areas with increased rainfalls (e.g., Quillayute & Quinault) must consider whether the 110% containment capacity can adequately hold a spill plus precipitation. A cover system may be a more effective means of protection.

Extreme cold or hot temperatures may cause some plastics to crack or melt. If unexpected extreme weather conditions occur, increase the frequency of inspections, maintenance, repair and replacement of plastic secondary containment systems. If extreme conditions are typical for the project area (i.e., summer months in Yakima or winter months in Spokane), then contact product manufactures for recommendations on materials that are capable of withstanding those conditions. Learn the minimum and maximum temperatures the material can tolerate.

Available Manpower

1. Is there a commitment of man power to conduct regular frequent inspections?
2. Is there staff on hand who are trained and experienced in spill response?

Trained staff on hand?

Increase protective measures if there is a lack of staff or expertise to conduct inspections, maintenance, documentation, and spill response actions. Consider stronger durability, increased capacity, fail safe diversions, cover, added spill kits, and increased security.

Equipment and Materials

1. Is there an adequate supply of equipment and materials to quickly control and remove any quantity of spills?
2. Is the equipment and materials located where they are immediately available?

Enough materials on hand?

Equipment available?

Secondary containment methods must be added or enhanced to compensate for the lack of equipment or materials that are used to immediately control, contain, and/or remove spilled product and associated contaminated media.

Secondary containment should be appropriately constructed based on the surrounding environment and specific project circumstances. Sometimes, other preventative measures can be used in lieu of secondary containment, as approved by the PE. Following the same rational described in the IFC Section 3404.2.10, secondary containment can be altered or even waived based on site specific circumstances. For example, secondary containment can be avoided all together if materials are not stored on the project and only brought on site for immediate use on an as needed basis (e.g., mobile fuel trucks instead of temporary above ground tanks). On the other hand, although not required, secondary containment may be reasonable for double-walled fuel tanks, such as a tank located in a high construction traffic zone, with little or no security and placed immediately up gradient and adjacent to a water body.

PEs and inspectors must rely on their professional judgment and use their discretion to determine what is reasonable. HazMat Specialists are available to assess spill risks and provide recommendations. If the PE determines that secondary containment is not practical or necessary, the PE should be prepared to present a rational argument that demonstrates the PE is aware of the circumstance and has considered the predicted flow direction, rate of flow, and total quantity and whether the worst case scenario spill could reasonably be expected to reach a water body; And/or describe alternative measures that provide equivalent environmental protection.

III. How should secondary containment be built and maintained?

It isn't always easy to assess whether secondary containment is adequate. The proper method of secondary containment is a matter of good engineering practice, thus there is no approved specific method. A few pointers are provided to help evaluate a containment system's ability to effectively hold a spill for at least 72 hours. Types of secondary containment are driven by the following primary variables:

1. Chemical Type
2. 72 Hour Spill Holding Timeframe
3. Quantity
4. Surface Topography
5. Vibration Damage
6. Frequency of Inspection and Maintenance

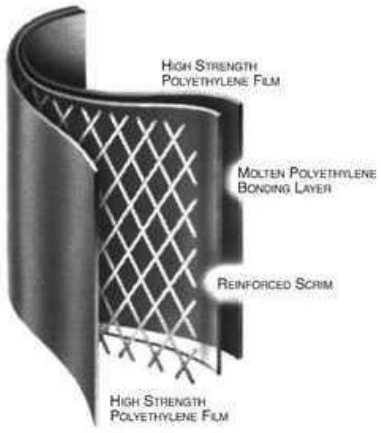
Chemical Type

The type of chemical dictates what material is chemically compatible to hold a spill without disintegrating or breaking through, thus being considered "impervious." Vendors of spill response and containment equipment can help determine products that will properly contain various chemical substances.

Petroleum products (gasoline, diesel, hydraulic oil, etc.) are the primary chemicals stored or used on most projects. Typical products used to contain petroleum spills include temporary structures such as pop-up pools or materials like plastic sheeting used as a liner in containment systems.

Chemically Compatible?

Extra Heavy Duty Liner



Plastic sheeting is made in various thicknesses. A thickness of 20-25 mil is recommended for temporary containment liners that is expected to last one to two years. A 6 mil thickness punctures or tears easily, but it may be effective for short term durations, with little wear and tear and not exposed to extreme hot or cold environments.

Polyvinyl Chloride (PVC) plastic sheeting liners can be made to resist oils, alcohols, hydrocarbons, waste products and other corrosive liquids. PVC liners are lightweight, flexible and best used where soil conditions are stable with minimal amount of sharp rocks. PVC's flexibly allows for stretching to help prevent stress cracking, which may occur with High Density Polyethylene (HPDE). PVC has a wide range of thicknesses available, from 6 to 45 mils or more.

High Density Polyethylene (HDPE) essentially does the same as PVC, but is slightly stiffer which may provide increased durability and resistance properties.

72-Hour Spill Holding Timeframe

Ecology's BMP C153 requires that containment must hold a spill for at least **72 hours** in order to be considered "sufficiently impervious." The 72 hour standard first came from EPA's attempt to define "sufficiently impervious" in 40 CFR Part 112 (Oil Pollution Prevention regulation). The rationale was that a containment system that is impervious to oil for 72 hours would allow time for discovery and removal of an oil discharge in most cases. In the 2002 rule revisions the proposed EPA 72 hour standard was withdrawn; however Ecology continues to maintain the 72 hour standard per BMP C153. Ecology expects spill cleanup work to start immediately once a spill is discovered and in most cases be completely cleaned up within 72 hours.

BMP C153

"Secondary containment facilities shall be impervious to the materials stored therein for a minimum contact time of 72 hours"

For storage of large quantities of chemicals other than petroleum, consider asking the product supplier to specify in writing that the containment system meets Ecology's 72 hour impermeability standard. If there is a justifiable reason that clean up cannot feasibly occur within 72 hours of a spill (highly uncommon), provide additional protection measures (i.e., increased inspections, limit quantities stored, etc.) and then consider more robust products that exceed the 72 hour standard.

Quantity

The NPDES permit and amended Specification 1-07.15(1) requires the capacity to equal 110% of the volume contained in the largest tank (or container) within the containment structure. The extra 10% is intended to accommodate precipitation and a safeguard against miscalculations.

Ecology's Spill Prevention, Preparedness and Response Program began creating a new Excel tool to help calculate containment volumes. For more information or a copy of this calculation tool, contact the Ecology Spills Program at 360-407-6458. For area calculations, see EPA example at: http://www.epa.gov/region6/6sf/sfsites/oil/samppln.htm

EPA Example Calculation

Formula: **(volume of single largest tank + 10%) x 0.1337 cubic feet/gallon**

Question: **What is the area of the minimum containment volume for a 25,000 gallon fuel tank?**

Calculation:
25,000 gal + 10% = 27,500

27,500 x 0.1337 = 3676.75

Surface Topography

Secondary containment should be as level as possible. If using plastic sheeting, the surface should be clear of rocks and debris that could puncture the material. If a containment structure must be placed on a slope, the downhill slide of the structure wall must be taller. Ecology's Excel tool (mentioned above) also helps calculate dimensions of secondary containment walls on slopes.

Sloped Surfaces

Vibration Damage

Increase protection if operating equipment is subject to vibration. Use thicker material, vibration dampening, and require more frequent inspections.

Hydraulic Hoses Subject to Vibration Damage

Maintenance Schedule Log

Frequent Inspections

Frequency of Inspection and Maintenance

The frequency of inspection and maintenance depends on several variables as described above. Inspection and maintenance should be regular, routine and documented as necessary.

IV. What encourages compliance?

Good communication is the best means to encourage compliance. When a regulatory inspector is assigned to a project, increase your chances of a positive outcome by clarifying gray areas in advance with respect to how the inspector might interpret the permit conditions. Ask for clarifications. Inspections are designed to help and the Contractor maintain legal compliance. Do not be afraid to ask for technical assistance, whether it be from Ecology or your HazMat Specialist. Working together is important and discussions to improve the situation are encouraged.

To prevent the most common spill violations, projects should

i) follow their Spill Prevention, Control and Countermeasures (SPCC) Plan,

ii) give more attention to secondary containment needs, and

iii) encourage better housekeeping practices.

Unfortunately sometimes, there is a lack of resources or commitment to comply with the requirements. Some projects lack the manpower, equipment and material to expeditiously follow the SPCC plan or permit requirements. When a contractor fails to comply with a PE's repeated attempts to correct a problem, here are a few suggestions.

i) Remind staff and Contractors about the significant costs and fines associated with spills. In addition to construction delays and clean up costs, there are significant fines. Under water quality regulations, a spill to water is $10,000 to $100,000 per day **per violation.** Damage to habitat may also result in a Natural Resource Damage Assessment fine. For habitat protected under the Endangered Species Act, damage or "taking" of habitat may result in civil penalties up to $25,000 per violation. There can by many violations in a single spill incident.

ii) Call the HazMat Specialist to conduct an internal assessment, where the specialist works directly with the PE and then the PE uses the report to communicate and encourage compliance

iii) Call local fire marshal, who enforces the International Fire Code

iv) Call Ecology's spill prevention program to request an informal assessment

v) Utilize some of the following Standard Specification "hammers" to contractually force compliance:

vi) **1-05.1 Authority of the Engineer** – The Engineer and Project Engineer can suspend all or part of the Contract Work. can also use other resources to complete the Work.

vii) **1-05.2 Authority of Assistants and Inspectors** –Inspectors are not authorized to accept or approve any Work not meeting the intent of the Contract. Inspectors have the authority to reject defective material and suspend Work that is being done improperly, subject to the final decision of the PE.

- Compliance with environmental laws and regulations is part of the Contract.

viii) **1-05.6 Inspection of Work and Materials** – The Engineer can order the Contractor to remove and replace materials used without inspection. The Contractor shall correct any substandard Work or materials. The Engineer will reject unsuitable Work or materials or materials even though previously inspected or paid for.

- This condition allows to reject secondary containment structures, systems or BMPs that are not installed properly.

ix) **1-05.7 Removal of Defective and Unauthorized Work** – will not pay for unauthorized or defective Work. This is anything that doesn't conform to the Contract, Work done beyond the lines and grades set by the Plans or Engineer, or extra Work and materials furnished without the Engineer's approval.

- This applies to improper secondary containment structures, systems or BMPs.

x) **1-05.13 Superintendents, Labor, and Equipment of Contractor** – The Engineer can, with written statement, remove a superintendent from the project for failing repeatedly to follow the Engineers written or oral orders, directions, instructions, or determinations. This also applies to other employees of the Contractor.

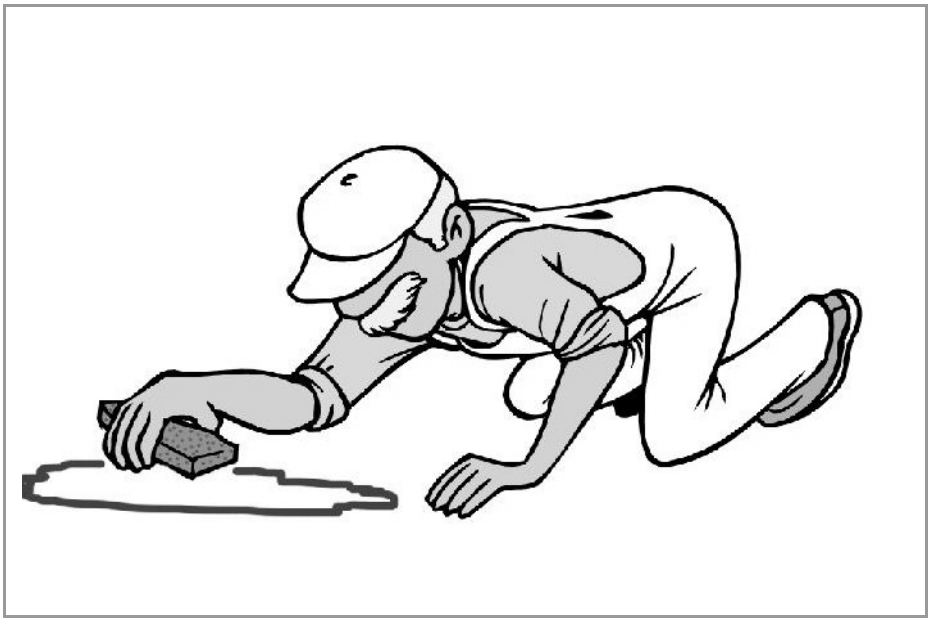
- Poor environmental performance caused by the Contractor, whether chronic or acute, does not have to be tolerated.

xi) **1-08.1 Subcontracting** – Approval to subcontract shall not relieve the Contractor's responsibility to carry out the Contract or to relieve the Contractor of any obligation or liability under the Contract. In addition, the Engineer can request the Subcontractor to be removed from the project.

xii) **1-08.6 Suspension of Work** – The Engineer may suspend all or any part of the Work if unsuitable weather prevents satisfactory and timely performance of the Work, if the Contractor does not comply with the Contract, or it is in the public interest.

Suspending work is usually a last resort effort, but it does catch the Contractor's attention because they are responsible for any lost working days.

*Information obtained from Washington State Department of Transportation



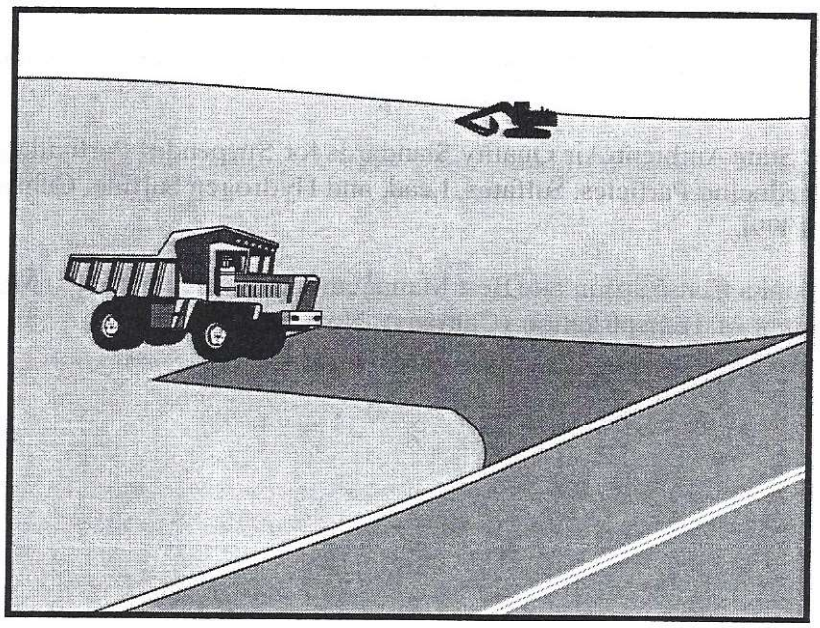
DESCRIPTION:
Practices to clean-up leakage/spillage of on-site materials that may be harmful to receiving waters.

APPLICATION:
All sites

GENERAL:
- Store controlled materials within a storage area.
- Educate personnel on prevention and clean-up techniques.
- Designate an Emergency Coordinator responsible for employing preventative practices and for providing spill response.
- Maintain a supply of clean-up equipment on-site and post a list of local response agencies with phone numbers.

METHODS:
- Clean-up spills/leaks immediately and remediate cause.
- Use as little water as possible. NEVER HOSE DOWN OR BURY SPILL CONTAMINATED MATERIAL.
- Use rags or absorbent material for clean-up. Excavate contaminated soils. Dispose of clean-up material and soil as hazardous waste.
- Document all spills with date, location, substance, volume, actions taken and other pertinent data.
- Contact the Salt Lake County Health Department (313-6700) for any spill of reportable quantity.

Stabilized Construction Entrance/ Exit TC-1



Objectives

EC	Erosion Control	!K!
SE	Sediment Control	!K!
TC	Tracking Control	O
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

O Primary Objective

!K! Secondary Objective

Targeted Constituents

- Sediment
- Nutrients
- Trash
- Metals
- Bacteria
- Oil and Grease
- Organics

Potential Alternatives

None

Description and Purpose

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dilt onto public roads by construction vehicles.

Suitable Applications

Use at construction sites:

- Where dirt or mud can be tracked onto public roads.
- Adjacent to water bodies.
- Where poor soils are encountered.
- Where dust is a problem during dry weather conditions.

Limitations

- Entrances and exits require periodic top dressing with additional stones.
- This BMP should be used in conjunction with street sweeping on adjacent public right of way.
- Entrances and exits should be constructed on level ground only.
- Stabilized construction entrances are rather expensive to construct and when a wash rack is included, a sediment trap of some kind must also be provided to collect wash water runoff.

Stabilized Construction Entrance/ Exit TC-1

Implementation

General

A stabilized construction entrance is a pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights of way or streets. Reducing tracking of sediments and other pollutants onto paved roads helps prevent deposition of sediments into local storm drains and production of airborne dust.

Where traffic will be entering or leaving the construction site, a stabilized construction entrance should be used. NPDES permits require that appropriate measures be implemented to prevent tracking of sediments onto paved roadways, where a significant source of sediments is derived from mud and dirt carried out from unpaved roads and construction sites.

Stabilized construction entrances are moderately effective in removing sediment from equipment leaving a construction site. The entrance should be built on level ground. Advantages of the Stabilized Construction Entrance/Exit is that it does remove some sediment from equipment and serves to channel construction traffic in and out of the site at specified locations. Efficiency is greatly increased when a washing rack is included as part of a stabilized construction entrance/exit.

Design and Layout

- Construct on level ground where possible.
- Select 3 to 6 in. diameter stones.
- Use minimum depth of stones of 12 in. or as recommended by soils engineer.
- Construct length of 50 ft minimum, and 30 ft minimum width.
- Rumble racks constructed of steel panels with ridges and installed in the stabilized entrance/exit will help remove additional sediment and to keep adjacent streets clean.
- Provide ample turning radii as pait of the entrance.
- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.
- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment trapping device before discharge.
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.
- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. Do not use asphalt concrete (AC) grindings for stabilized construction access/roadway.

- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.
- Designate combination or single purpose entrances and exits to the construction site.
- Require that all employees, subcontractors, and suppliers utilize the stabilized construction access.
- Implement SE-7, Street Sweeping and Vacuuming, as needed.
- All exit locations intended to be used for more than a two-week period should have stabilized construction entrance/exit BMPs.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMPs are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect local roads adjacent to the site daily. Sweep or vacuum to remove visible accumulated sediment.
- Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment.
- Keep all temporary roadway ditches clear.
- Check for damage and repair as needed.
- Replace gravel material when surface voids are visible.
- Remove all sediment deposited on paved roadways within 24 hours.
- Remove gravel and filter fabric at completion of construction

Costs

Average annual cost for installation and maintenance may vary from $1,200 to $4,800 each, averaging $2,400 per entrance. Costs will increase with addition of washing rack, and sediment trap. With wash rack, costs range from $1,200 - $6,000 each, averaging $3,600 per entrance.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, USEPA Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Depa ltment of Transportation (Caltrans), November 2000.

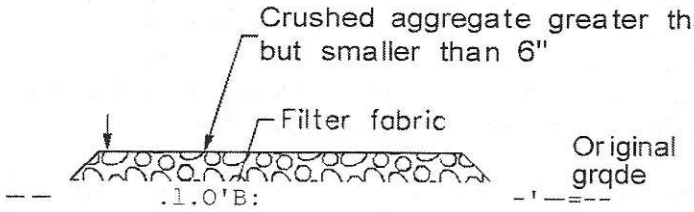
Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 199i.

Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters, EPA 840-B-9-002, USEPA, Office of Water, Washington, DC, 1993.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Stabilized Construction Entrance/ Exit TC-1



SECTION B-B
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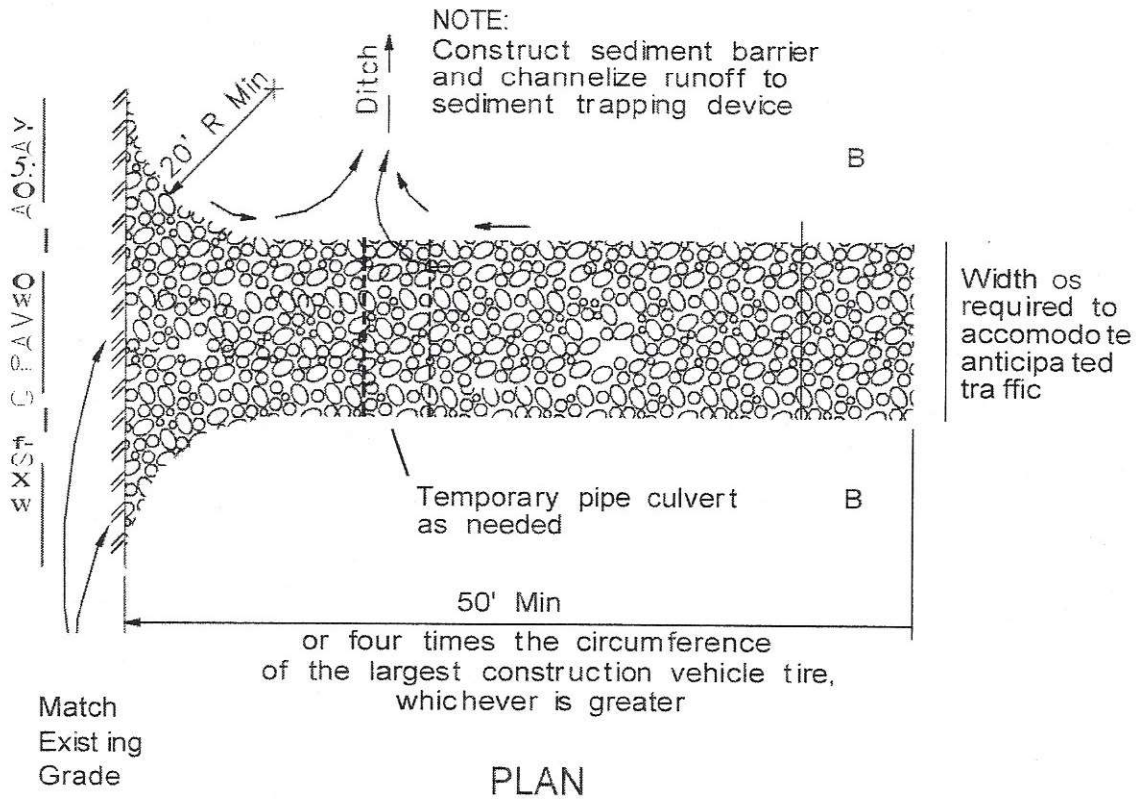
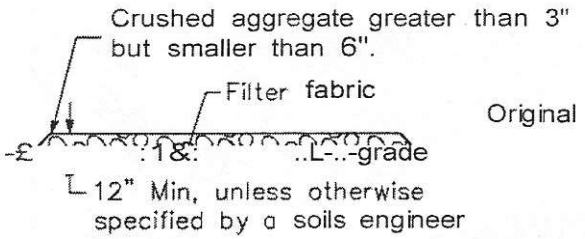


PLAN
NTS

Stabilized Construction Entrance/ Exit TC-1



SECTION B-B
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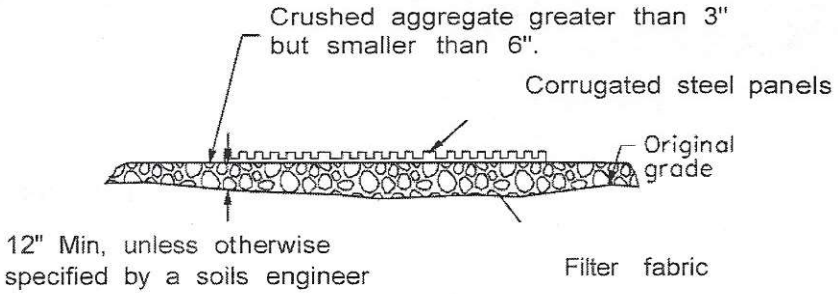
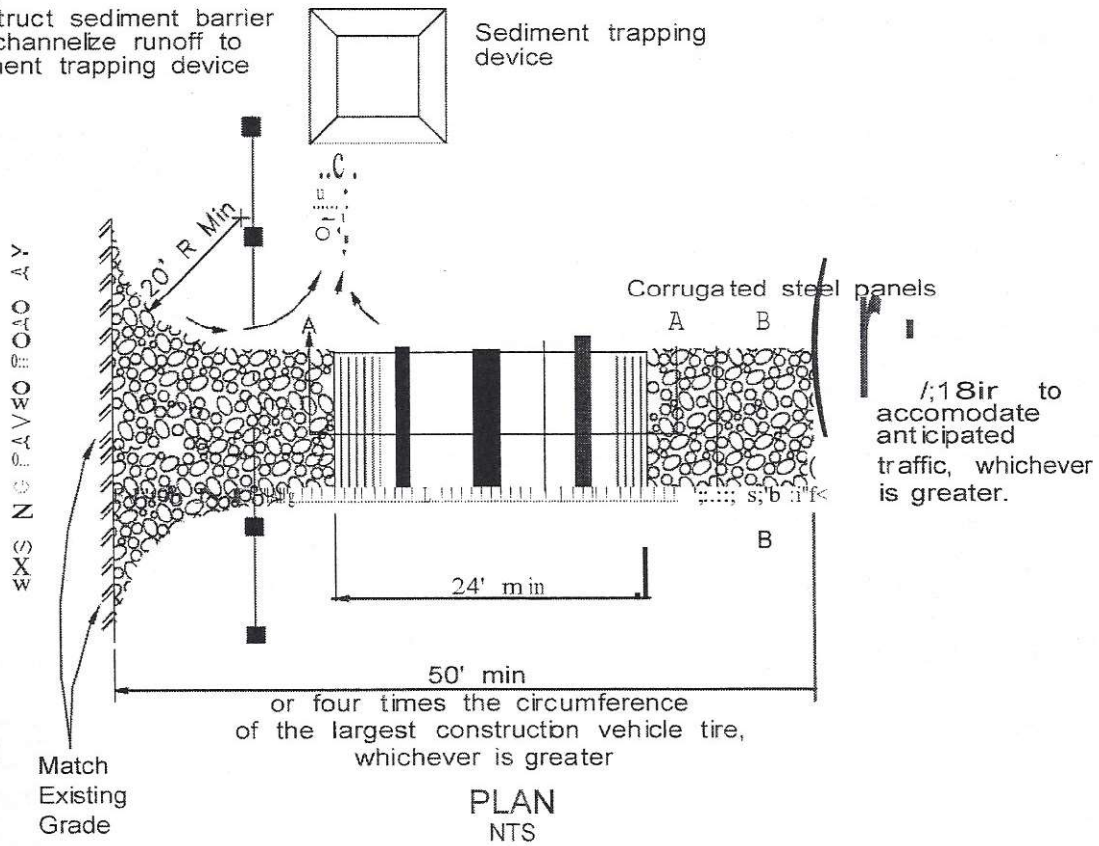


SECTION A-A
NOT TO SCALE

NOTE:
Construct sediment barrier and channelize runoff to sediment trapping device



PLAN
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Waste Management

WM–5 Stockpile Management

Definition

Stockpile Management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, paving materials such as Portland Cement Concrete (PCC) rubble, Asphalt Concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called "cold mix" asphalt), and pressure treated wood.

Purpose

To prevent air and stormwater pollution from stockpiles of various construction materials.

Conditions Where the Practice Applies

Implement in all Projects that stockpile soil and other materials.

Specifications: Design and Installation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

- Locate stockpiles a minimum of 50 feet away from concentrated flows of stormwater, stormdrain inlets, and the site perimeter.
- Protect all stockpiles from stormwater runon using a temporary perimeter sediment barrier such as gravel bags, fiber rolls, or cutback curb.
- Protect all stockpiles from stormwater and wind erosion by completely covering with some type of tarp or covering. Secure the tarp with stakes or gravel bags to ensure the tarp does not blow off or expose any portion of the stockpile. Stockpiles must be covered at all times.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WEC – 1 Dust Control.
- Manage stockpiles of contaminated soil in accordance with WM – 8 Contaminated Soil Management.
- Place bagged materials in the material storage area, in secondary containment, and under cover.

<u>Protection of Non-Active Stockpiles</u>

Non-active stockpiles of the identified materials should be protected further as follows:

Soil Stockpiles

- Soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.

Stockpiles of Portland Cement Concrete Rubble, Asphalt Concrete, Asphalt Concrete Rubble, Aggregate Base, or Aggregate Sub Base

- The stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.

Stockpiles of "Cold Mix"

- Soil stockpiles should be placed on and covered with plastic or comparable

Waste Management

WM–5 Stockpile Management

material at all times.

Stockpiles/Storage of Pressure Treated Wood with Copper, Chromium, and Arsenic or Ammonical, Copper, Zinc, and Arsenate

- Treated wood should be covered with plastic or comparable material at all times.

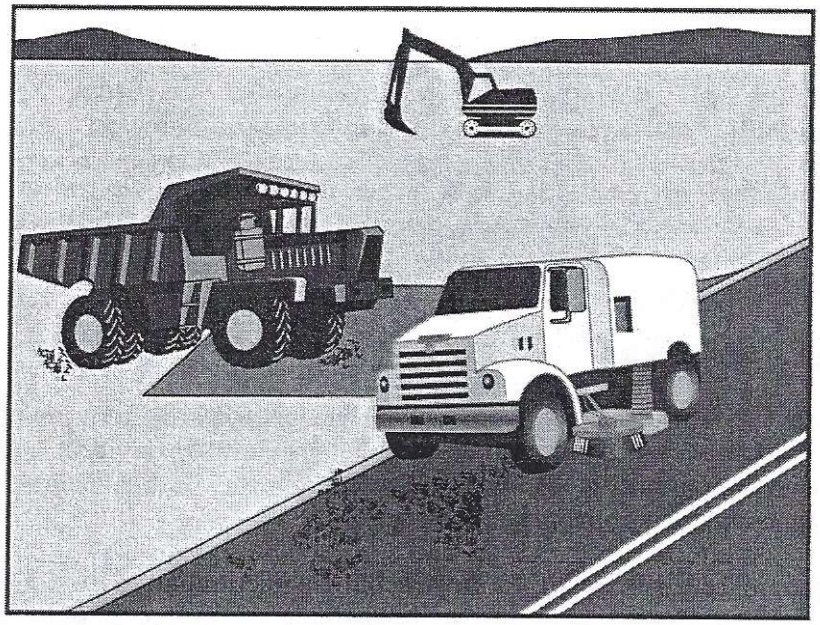
Protection of Active Stockpiles

- All stockpiles should be covered and protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of "cold mix" should be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Maintenance & Inspection

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, and weekly throughout the life of the Project.
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly. Ensure stockpiles are covered at all times and that the covers are properly secured or weighted down.

Street Sweeping and Vacuuming SE-7



Objectives

EC	Erosion Control	
SE	Sediment Control	!KI
TR	Tracking Control	O
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

O **Primary Objective**

!KI **Secondary Objective**

Targeted Constituents

- Sediment
- Nutrients
- Trash
- Metals
- Bacteria
- Oil and Grease
- Organics

Potential Alternatives

None

Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways, and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused, and perhaps save money.
- Inspect potential sediment tracking locations daily.
- Visible sediment tracking should be swept or vacuumed on a daily basis.

SE-7 Street Sweeping and Vacuuming

- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.
- If not mixed with debris or trash, consider incorporating the removed sediment back into the project

Costs

Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from $s8/hour (3 yd3 hopper) to $88/hour (9 yd3 hopper), plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

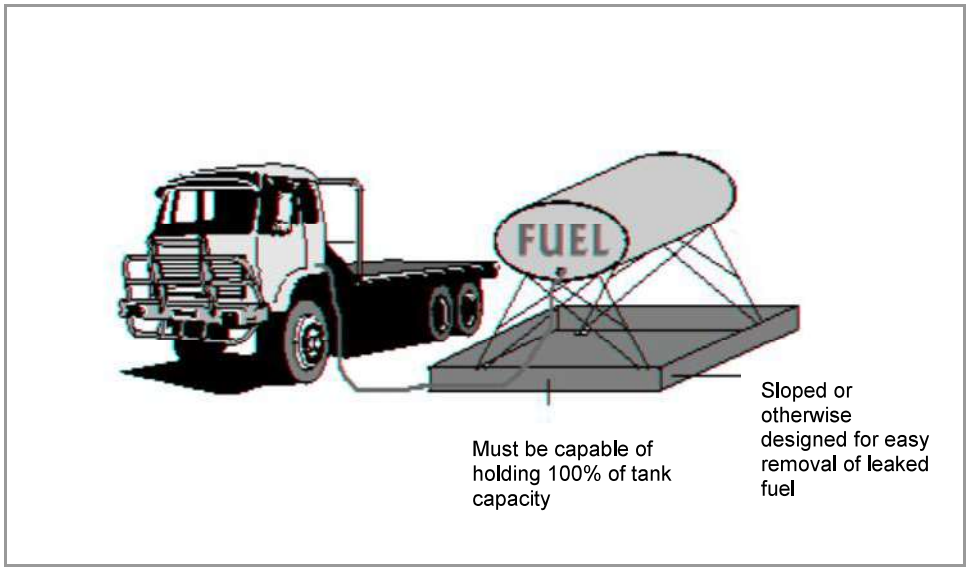
Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- When actively in use, points of ingress and egress must be inspected daily.
- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Labor Surcharge and Equipment Rental Rates, State of California Department of Transportation (Caltrans), April 1, 2002 - March 31, 2003.



DESCRIPTION:
Prevent fuel spills and leaks, and reduce their impacts to storm water by using off-site facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors.

INSTALLATION/APPLICATION:
- Use off-site fueling stations as much as possible. Fueling vehicles and equipment outdoors or in areas where fuel may spill/leak onto paved surfaces or into drainage pathways can pollute storm water. If you fuel a large number of vehicles or pieces of equipment, consider using an off-site fueling station. These areas are better equipped to handle fuel and spills properly. Performing this work off-site can also be economical by eliminating the need for a separate fueling area at your site.
- If fueling must occur on-site, use designated areas, located away from drainage courses, to prevent the runon of storm water and the runoff of spills. Discourage topping-off of fuel tanks.
- Always use secondary containment, such as a drain pan or drop cloth, when fueling to catch spills/leaks. Place a stockpile of spill cleanup materials where it will be readily accessible. Use adsorbent materials on small spills rather than hosing down or burying the spill. Remove the adsorbent materials promptly and dispose of properly.
- Carry out all Federal and State requirements regarding stationary above ground storage tanks. (40 CF Sub. J) Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and perhaps forklifts, most vehicles should be able to travel to a designated area with little lost time. Train employees and subcontractors in proper fueling and cleanup procedures.

LIMITATIONS:
Sending vehicles/equipment off-site should be done in conjunction with Stabilized Construction Entrance.

MAINTENANCE:
- Keep ample supplies of spill cleanup materials on-site.
- Inspect fueling areas and storage tanks on a regular schedule.

Waste Management

Definition — Provide designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Purpose — Prevent or reduce the discharge of pollutants to stormwater from solid, leachable, or construction waste.

Conditions Where the Practice Applies

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction.
- Packaging materials including wood, paper, and plastic.
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces, and masonry products.
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes.
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, Styrofoam and other materials used to transport and package construction materials.
- Planting wastes, including vegetative material, plant containers, and packaging materials.

Specifications: Design and Installation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Provide an adequate number of containers to prevent loss of wastes when it is windy.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Arrange for regular waste collection. Do not allow containers to overflow.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Trash receptacles should be provided in the Contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the Project.

Sources include EPA, SWRCB, Caltrans, CASQA,
University of California, Santa Barbara

- Stormwater run-on should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be, where possible, located at least 50 feet from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.

Education

- Have the Contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste. Hazardous waste must not be disposed of in dumpsters.
- Educate employees and subcontractors on solid waste storage and disposal procedures. Include bagging of blowable trash.
- Hold regular meetings to discuss and reinforce disposal procedures.
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials whenever possible.

Collection, Storage, and Disposal

- Littering on the Project site is prohibited.
- To prevent clogging of the stormwater drainage system, litter and debris removal from drain gates, trash racks, and ditch lines should be a priority.
- Trash receptacles from work areas within the construction limits of the Project site should be collected, regardless of whether the litter was generated by the Contractor, the public, or others. Collected litter and debris shall not be placed in or next to storm drain inlets, stormwater drainage systems, watercourses, or near the site perimeter.
- Full dumpsters should be removed from the Project site and the contents should be disposed of properly by trash hauling contractor.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Dispose of planting waste in dumpsters.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are NOT disposed of in dumpsters designated for construction debris.
- Make sure that demolition materials containing hazardous wastes are NOT disposed of in dumpsters designated for construction debris.
- For disposal of hazardous waste, have hazardous waste hauled to an appropriate disposal and/or recycling facility.
- Salvage or recycle useful vegetation debris, packaging and surplus building materials when

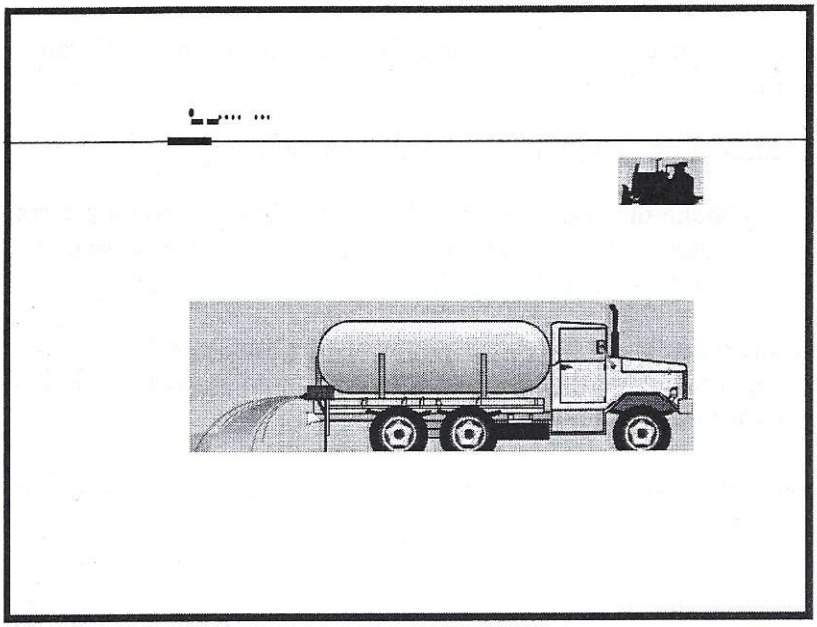
practical. For example, trees and shrubs from land clearing can be used as a brush barrier or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

- Collect site trash daily and dispose in the dumpster, throughout the life of the Project, especially during the rainy and windy conditions.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.
- Remove solid waste promptly since erosion and sediment control devices tend to collect litter.
- Bag any waste that can leak out of the dumpster.
- Bag all blowable trash so that it is contained within the dumpster.
- Arrange for regular waste collection.

Maintenance & Inspection

- Inspect and verify that activity based BMPs are in place prior to the commencement of associated activities.
- Inspect BMPs daily during extended rain events, after rain events, and weekly throughout the life of the Project.
- Inspect construction waste area regularly.
- Monitor employees, subcontractors, and visitors and ensure no littering.
- Check erosion and sediment controls for the accumulation of trash or debris.
- Inspect dumpsters to be sure that blowable trash is bagged.
- Inspect the dumpsters for leaks or signs of liquid waste in the dumpsters.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling Contractor.
- Clean up immediately if a container does spill.

WE-1 Wind Erosion Control



Objectives		
EC	Erosion Control	
SE	Sediment Control	!K!
TC	Tracking Control	
WE	Wind Erosion Control	O
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
O **Primary Objective**
!K! **Secondary Objective**

Description and Purpose

Wind erosion or dust control consists of applying water or other dust palliatives as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

Suitable Applications

Wind erosion control BMPs are suitable during the following construction activities:

- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Sediment tracking onto paved roads
- Soils and debris storage piles
- Batch drop from front-end loaders
- Areas with unstabilized soil
- Final grading/site stabilization

Limitations

- Watering prevents dust only for a short period and should be applied daily (or more often) to be effective.
- Over watering may cause erosion.

Targeted Constituents

Sediment
Nutrients
Trash
Metals
Bacteria
Oil and Grease
Organics

Potential Alternatives

None

- Oil or oil-treated subgrade should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.
- Effectiveness depends on soil, temperature, humidity, and wind velocity.
- Chemically treated sub grades may make the soil water repellant, interfering with long-term infiltration and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- Asphalt, as a mulch tack or chemical mulch, requires a 24-hour curing time to avoid adherence to equipment, worker shoes, etc. Application should be limited because asphalt surfacing may eventually migrate into the drainage system.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.

Implementation

General

California's Mediterranean climate, with short wet seasons and long hot dry seasons, allows the soils to thoroughly dry out. During these dry seasons, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment.

Dust control, as a BMP, is a practice that is already in place for many construction activities. Los Angeles, the North Coast, and Sacramento, among others, have enacted dust control ordinances for construction activities that cause dust to be transported beyond the construction project property line.

Recently, the State Air Resources Control Board has, under the authority of the Clean Air Act, started to address air quality in relation to inhalable particulate matter less than 10 microns (PM-10). Approximately 90 percent of these small particles are considered to be dust. Existing dust control regulations by local agencies, municipal departments, public works depaitment, and public health departments are in place in some regions within California.

Many local agencies require dust control in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. The following are measures that local agencies may have already implemented as requirements for dust control from contractors:

- Construction and Grading Permits: Require provisions for dust control plans.
- Opacity Emission Limits: Enforce compliance with California air pollution control laws.
- Increase Overall Enforcement Activities: Priority given to cases involving citizen complaints.
- Maintain Field Application Records: Require records of dust control measures from contractor;
- Stormwater Pollution Prevention Plan: (SWPPP): Integrate dust control measures into SWPPP.

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table shows dust control practices that can be applied to site conditions that cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures would include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph, and controlling the number and activity of vehicles on a site at any given time.

SITE CONDITION	DUST CONTROl PRAC TCES								
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Silt Fences	Temporary Gravel Construction Entrances/Equipmen Wash Down	Haul Truck Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	X	X	X	X	X				X
Disturbed Areas Subject to Traffic			X	X	X		X		X
Materal Stock Pile Stabilization			X	X		X			X
Demolition			X				X	X	
Clearing/ Excavation			X	X		X			X
Truck Traffic on Unpavel Roads			X	X	X		X	X	
Mud/Dirt Cany Out					X		X		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (EC-1, Scheduling).
- Quickly stabilize exposed soils using vegetation, mulching, spray-on adhesives, calcium chloride, sprinkling, and stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Direct most construction traffic to stabilized roadways within the project site.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.

- If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality Control Board requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER - DO NOT DRINK"
- Materials applied as temporary soil stabilizers and soil binders also generally provide wind erosion control benefits.
- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for wet suppression or chemical stabilization of exposed soils.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and vehicle wash down areas.
- Stabilize inactive construction sites using vegetation or chemical stabilization methods.
- Limit the amount of areas disturbed by clearing and earth moving operations by scheduling these activities in phases.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater.

Costs

Installation costs for water and chemical dust suppression are low, but annual costs may be quite high since these measures are effective for only a few hours to a few days.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Check areas protected to ensure coverage.
- Most dust control measures require frequent, often daily, or multiple times per day attention.

References

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

California Air Pollution Control Laws, California Air Resources Board, 1992.

Caltrans, Standard Specifications, Sections 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative".

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 199i.

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