

**STORM WATER
BEST MANAGEMENT PRACTICES
FOR CONSTRUCTION SITES**



QUICK REFERENCE BOOKLET



The City and County of Honolulu
Department of Environmental Services



ACKNOWLEDGEMENTS

This document was derived from the draft of the “Best Management Practices Manual for Construction Sites in Honolulu” which is based on the California Stormwater Quality Association (CASQA), *Storm water Best Management Practice Handbook - Construction*, 2003 and the current *Best Management Practices for Construction Sites in Honolulu*, 2011.

Acknowledgement is given to the CASQA for the use of the graphics in this document. The text has been significantly modified for brevity.

INTRODUCTION

1

This document is a quick reference booklet for the most commonly used Best Management Practices (BMPs) and does not replace the latest “Best Management Practices Manual for Construction Sites in Honolulu.”

The management of storm water on construction sites contribute to our water quality. By implementing BMPs we can prevent, reduce and eliminate water pollution.

The Revised Ordinances of Honolulu, Section 14-12.23(a), Environmental Quality Control-Violation states,

“It shall be unlawful for any person to discharge or cause to be discharged any pollutant into any drainage facility which causes a pollution problem in state waters, or causes a violation of any provision of the city NPDES (National Pollutant Discharge Elimination System) permit or the water quality standards of the State of Hawaii.”

The goal of the Environmental Protection Agency (EPA), the State of Hawaii Department of Health Clean Water Branch (DOH-CWB) and the City’s Department of Environmental Services (ENV) is to promote and protect the quality of the environment. These agencies conduct inspections and take enforcement actions on those who do not follow these laws. Know the laws and implement BMPs to be prepared for inspections and avoid enforcement action.



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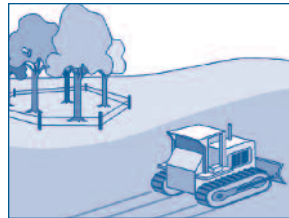
EROSION CONTROL

5

Protect disturbed soil areas from rainfall, flowing water or wind by preparing, protecting and stabilizing the soil surface

PRESERVATION OF
EXISTING VEGETATION

6



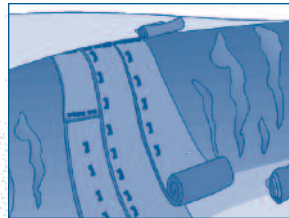
HYDRAULIC MULCH

7



GEOTEXTILES
AND MATS

8



SLOPE DRAINS

9



PRESERVATION OF EXISTING VEGETATION



Protect soil from erosion and take advantage of natural erosion prevention and sediment trapping by preserving and protecting existing vegetation

DO

- ✓ incorporate existing vegetation into the site design
- ✓ plan ahead with the owner/developer, contractor and design staff
- ✓ preserve areas officially designated for preservation and where no immediate construction activity will occur
- ✓ mark areas and provide sufficient setback to protect roots

DO NOT

- ✗ disturb land in sensitive areas of the site such as natural watercourses and steep slopes.
- ✗ permit disturbances within a marked preserved area
- ✗ conduct construction activity within the drip line of a tree

REMEMBER

- ☞ Limits of disturbance should remain clearly marked for the entire duration of construction
- ☞ Repair damages to any protected areas immediately



HYDRAULIC MULCH

7

Provide temporary protection of exposed soil by applying a mixture of shredded wood fiber or hydraulic material and a stabilizing adhesive with hydro-mulching equipment

DO USE

- ✓ as temporary protection until permanent stabilization is established
- ✓ on disturbed areas that will be re-disturbed following an extended period of inactivity

DO NOT

- ✗ over spray onto roads, sidewalks, channels and existing vegetation, etc.
- ✗ use paper-based hydraulic mulches alone for erosion control
- ✗ apply bonded fiber matrix immediately before, during or immediately after rainfall if the soil is saturated

REMEMBER

- ☞ Additional applications may be required to remain effective for an entire rainy season
- ☞ BMPs should be applied immediately to repair eroded areas
- ☞ Temporary mulched ground cover should be maintained when the soils are not being worked

GEOTEXTILES AND MATS

Reduce erosion from rainfall and hold soil in place by covering the soil surface with matting of natural material to absorb and hold moisture near the soil surface

DO USE

- ✓ on steep slopes and in concentrated channel flows
- ✓ for slopes where erosion potential is high
- ✓ where plants are slow to develop
- ✓ organic matting where re-seeding will occur
- ✓ plastic sheeting on very small areas for very short periods until alternative measures are installed

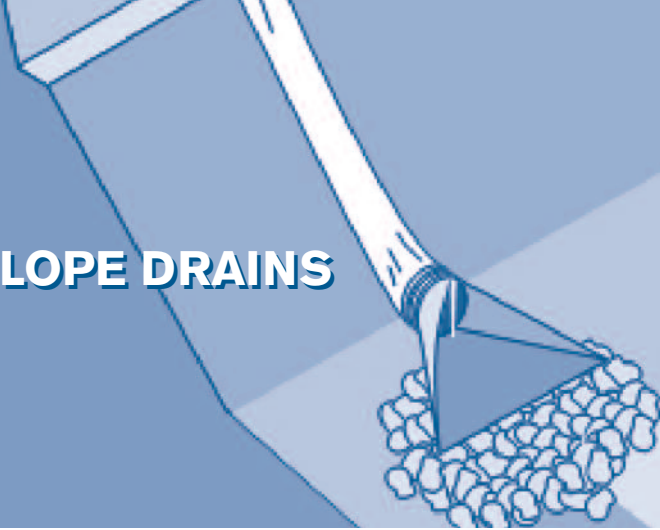
DO NOT USE

- ✗ in areas with heavy foot traffic
- ✗ on excessively rocky sites where mowing of vegetation may catch staples and netting

REMEMBER

- ☞ Install according to manufacturer's recommendations
- ☞ Choose matting based on size of area, side slopes, surface conditions and material availability
- ☞ Covers have maximum flow rates—consult manufacturer for proper selection
- ☞ Installation is critical and requires experienced contractors
- ☞ Inspect regularly and repair failures immediately

SLOPE DRAINS



Protect cut or fill slopes with slope drains to intercept and direct surface runoff into an earth dike, drainage ditch or other stabilized watercourse

DO USE

- ✓ in combination with a diversion control, such as, an earth dike or swale at the top of the slope
- ✓ where water can accumulate at top of cut and fill slopes
- ✓ as an emergency spillway for a sediment basin

DO NOT USE

- ✗ for large drainage areas per pipe on very steep slopes

REMEMBER

- ☞ Permanent structures can be used as construction BMPs but should meet or exceed the criteria for the temporary structure
- ☞ Installation is critical to effectively minimize potential gully erosion
- ☞ High flow velocities require dissipation devices at the outlet



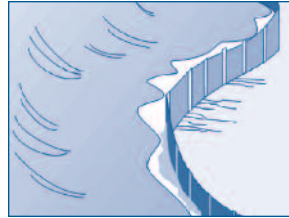
SEDIMENT CONTROL

11

Intercept, slow or detain storm water to allow sediment to settle and be trapped with filtering or settling methods

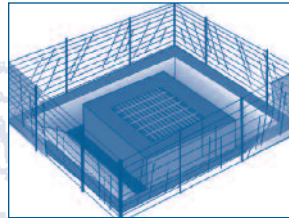
SILT FENCE

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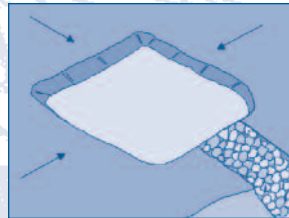
STORM DRAIN INLET PROTECTION

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SEDIMENT TRAP

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SEDIMENT BASIN

15





Intercept and trap sediment-laden storm water by detaining runoff behind a temporary silt fence

DO USE

- ✓ for sheet or overland flows
- ✓ as a perimeter control
- ✓ near streams and channels
- ✓ around temporary spoil areas and stockpiles
- ✓ in combination with erosion controls

DO NOT USE

- ✗ at locations of concentrated flow
- ✗ on slopes or across contour lines
- ✗ as mid-slope protection on steep slopes

REMEMBER

- ☞ Trench and key-in
- ☞ Maximum slope perpendicular to fence line should be 1:1
- ☞ Provide sufficient room for runoff to pond behind the fence
- ☞ Turn ends uphill to prevent storm water from flowing around
- ☞ Remove sediment that builds up behind the silt fence
- ☞ Minimize resulting ponding depth



STORM DRAIN INLET PROTECTION

Settle sediment in storm water before entering drain inlets by ponding the area around or upstream with temporary sediment filters or contained catchment areas

DO USE

- ✓ a filter fabric fence for drainage basins that are not steep and have low amount of sheet flows
- ✓ an excavated drop inlet sediment trap where relatively heavy flows are expected and overflow capability is needed
- ✓ gravel bag barriers on sloped paved streets upstream of inlets when flows may be high
- ✓ block and gravel filters for curb inlets in residential, commercial and industrial construction

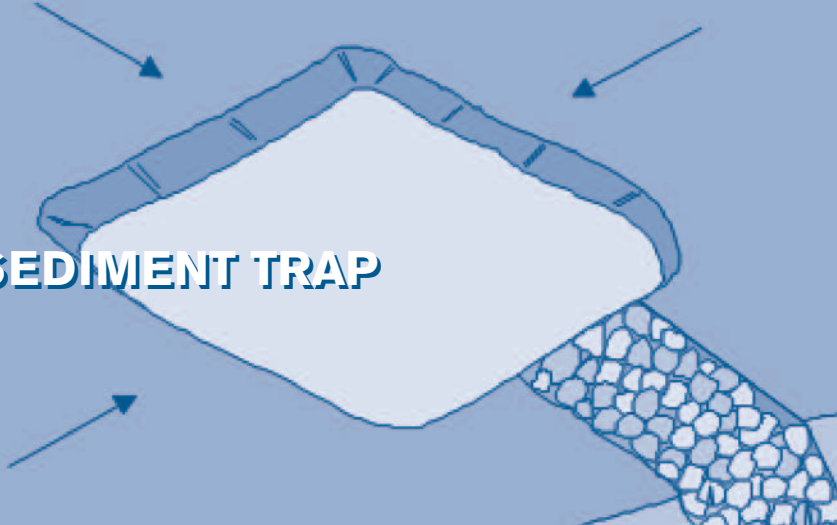
DO NOT

- ✗ allow ponding to encroach into portions of the roadway subject to traffic
- ✗ allow ponding to flood structures and property

REMEMBER

- ☞ Drainage area of the inlet should be less than one acre
- ☞ Grates and spaces around all inlets should be sealed
- ☞ Where needed, excavate sediment sumps side slopes around the inlet
- ☞ Implement other on-site sediment trapping techniques in addition to providing storm drain inlet protection

SEDIMENT TRAP



Collect and store sediment-laden storm water from sites in a small temporary ponding area with a gravel outlet

DO USE

- ✓ on small drainage areas
- ✓ to help remove coarse sediment from runoff
- ✓ at the perimeter of the site where sediment laden runoff is discharged off site
- ✓ as near as practical to areas producing the sediment
- ✓ at multiple locations around or upslope from storm drain inlet protection measures
- ✓ as supplemental control for protecting a waterbody or reducing sediment before entering a drainage system

DO NOT

- ✗ use for large drainage areas unless multiple sediment traps are constructed
- ✗ locate in water courses
- ✗ construct with steep slide slopes

REMEMBER

- ☞ Maintain until the site area is permanently protected against erosion
- ☞ Design life is approximately six months to one year and is a temporary measure
- ☞ Adhere to local ordinances regarding health and safety



SEDIMENT BASIN

15

Trap sediment before it leaves the construction site in a controlled storm water release structure across a drainage way or other suitable location

DO USE

- ✓ at outlets for large drainage areas
- ✓ on large projects with space to accommodate basin
- ✓ on projects during the rainy season
- ✓ where post-construction detention basins are anticipated
- ✓ together with dikes, temporary channels and pipes

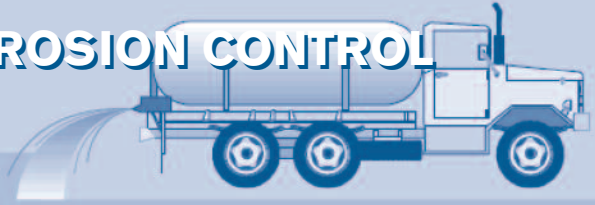
DO NOT USE

- ✗ beyond property limits
- ✗ where failure of the structure may result in loss of public roads or utilities

REMEMBER

- ☞ Construct before clearing and grading work begins
- ☞ Design life is 12 to 18 months and is a temporary measure
- ☞ Adhere to local ordinances regarding health and safety
- ☞ Provide fencing where safety is a concern

WIND EROSION CONTROL



Prevent dust problems by applying water or other dust control methods

DO USE

- ✓ on areas with unstabilized soils
- ✓ on unpaved roads
- ✓ on soils and debris storage piles
- ✓ watering daily or more often to be effective

DO NOT

- ✗ over water and cause erosion
- ✗ apply dust control on oil or oil-treated subgrade

REMEMBER

- ☞ All distribution equipment should be equipped with a shutoff switch
- ☞ At least one mobile unit should be available at all times
- ☞ Chemical stabilization should not create any adverse effects on storm water, plant life, or groundwater
- ☞ Minimize construction site traffic
- ☞ Prevent airborne dust

An illustration showing a truck on a road. A dark, rectangular stabilization pad is placed on the road surface in front of the truck. The background is a light blue gradient with a faint road and sky line.

TRACKING BMPs

Reduce the tracking of mud and dirt onto public roads by stabilizing and maintaining construction site exits

DO

- ✓ provide a pad of aggregate underlain with filter cloth at the site exit
- ✓ provide a tire wash area to remove sediment from tires and under vehicles at the site exit
- ✓ provide a sediment trap to collect wash water runoff at the tire wash area
- ✓ sweep and vacuum adjacent public streets regularly

DO NOT

- ✗ use kick brooms or sweeper attachments
- ✗ wash streets without drain inlet protection devices
- ✗ use chemical or solvents to wash down street

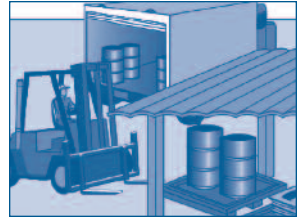
REMEMBER

- ☞ Sweep the street before washing
- ☞ Entrances and exits should be constructed on level ground to ensure runoff is contained on site
- ☞ Control the number of exits
- ☞ Replace gravel material when dust collects and surface voids are not visible

18 GOOD HOUSEKEEPING

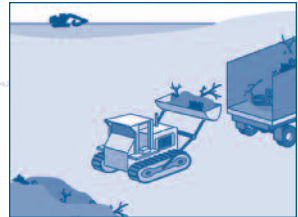
MATERIAL
MANAGEMENT

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WASTE MANAGEMENT

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STOCKPILE
MANAGEMENT

24

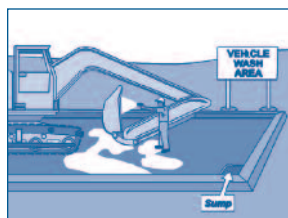


Prevent pollution from day-to-day operations by limiting or reducing potential pollutants with good housekeeping procedures and practices.

Prevent the release of solid, sanitary, concrete, hazardous and equipment wastes by implementing procedural and structural BMPs for handling, storing and disposing of wastes

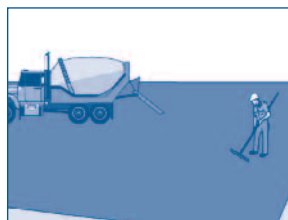
VEHICLE AND EQUIPMENT MANAGEMENT

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PAVING AND GRINDING OPERATIONS

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CONCRETE MANAGEMENT

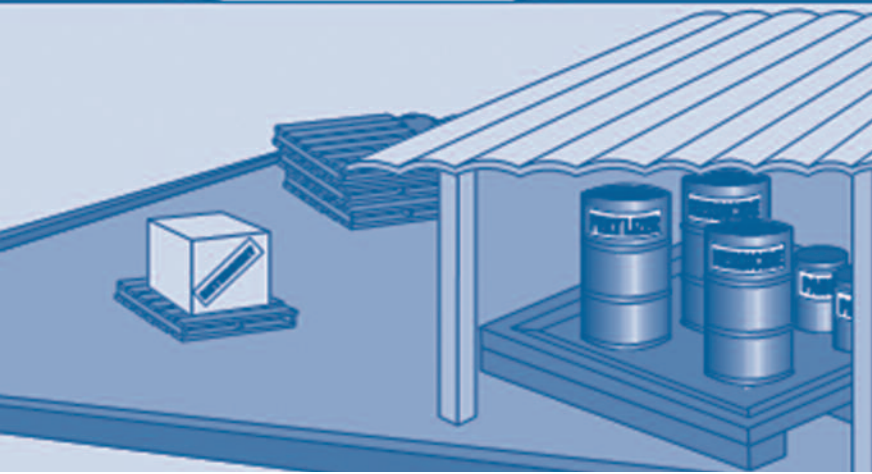
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Prevent, reduce or eliminate the discharge of pollutants by implementing standard procedures for the storage, delivery and use of construction materials

DO

- ✓ minimize the storage and use of hazardous materials on site
- ✓ designate areas for material delivery and storage
- ✓ locate materials and storage areas near construction entrances and away from water courses
- ✓ store materials in covered areas to prevent exposure to rainwater
- ✓ provide secondary containment
- ✓ keep an ample supply of spill cleanup materials near storage area
- ✓ maintain Material Safety Data Sheets (MSDS) for all stored materials at the project site
- ✓ read product labels for important safety and disposal information
- ✓ follow recommended usage instructions for fertilizers, herbicides and pesticides
- ✓ mix paint indoors or in a containment area
- ✓ use recycled and safer alternative building and construction products



DO NOT

- ✘ store chemicals, drums, or bagged materials directly on ground
- ✘ store incompatible materials, such as chlorine and ammonia, in the same area
- ✘ allow rainwater and spills to accumulate in material storage areas
- ✘ over-apply fertilizers, herbicides and pesticides
- ✘ clean paint brushes or rinse paint containers on the ground, street, gutter, storm drain or water course
- ✘ rinse paints and painting equipment into the storm drain

REMEMBER

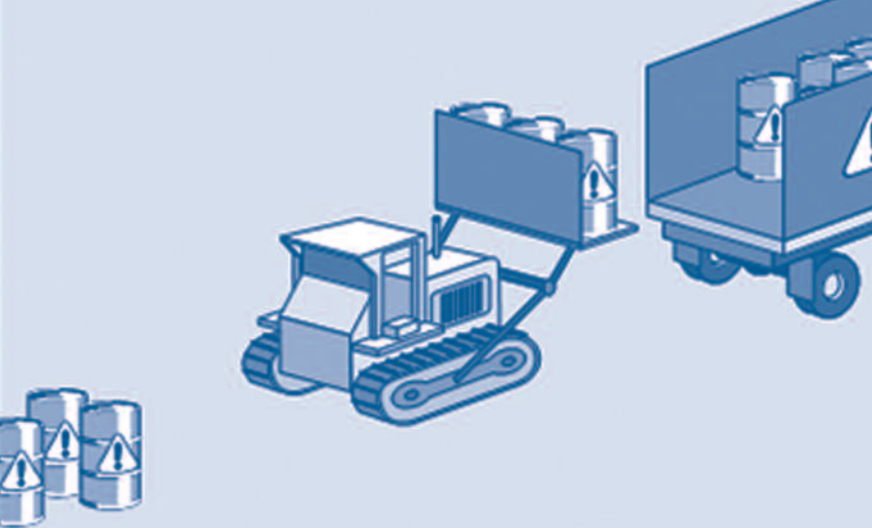
- ☞ Temporary storage areas should be maintained to prevent accumulation of rainwater, spills and leaks
- ☞ Storage sheds often must meet building and fire code requirements
- ☞ On-site inventory of stored materials should be updated regularly
- ☞ Conduct regular inspections
- ☞ Employees and subcontractors should be trained regularly on handling proper storage and delivery practices
- ☞ Proper storage instructions should be posted at all times



Prevent or reduce discharge of pollutants from solid waste and hazardous waste during construction and demolition

DO

- ✓ designate areas on site for waste collection
- ✓ locate solid waste storage areas an adequate distance away from drainage facilities and watercourses
- ✓ arrange for regular waste collection
- ✓ designate areas on site for hazardous waste storage
- ✓ separate containers for recyclable waste materials
- ✓ time the collection of waste and recyclable materials
- ✓ recycle and reuse construction and demolition waste whenever and wherever possible
- ✓ train subcontractors and employees on solid waste storage and disposal procedures
- ✓ contain construction waste in covered areas to prevent exposure to rainwater
- ✓ provide secondary containment and perimeter controls
- ✓ dispose of excess oil-based paints and sludge as hazardous waste
- ✓ read product labels for important safety and disposal information



DO NOT

- ✘ accept dumpsters from trash-hauling contractors that are not watertight
- ✘ allow runoff to come in contact with stored solid waste
- ✘ dispose of toxic liquid wastes (used oils, solvents, paints) and chemicals (acids, pesticides, additives, curing compounds) in dumpsters designated for construction debris
- ✘ dispose of latex paint, paint cans and painting equipment until thoroughly dry

REMEMBER

- ☛ Litter and debris removal from drainage grates, trash racks and ditch lines should be a priority
- ☛ Waste storage areas should be inspected regularly for signs of contamination
- ☛ Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler
- ☛ Dispose of unusable materials at the completion of a project—do not bring to a new project site
- ☛ Additional written material is available: *“Minimizing Construction & Demolition Waste”* State DOH, 2004 and *“A Contractor’s Waste Management Guide: Best Management Practices and Tools for Job Site Recycling and Waste Reduction in Hawaii,”* DBEDT

Reduce or eliminate air and storm water pollution by taking measures to mitigate the potential for erosion and sediment pollution from stockpiles

DO

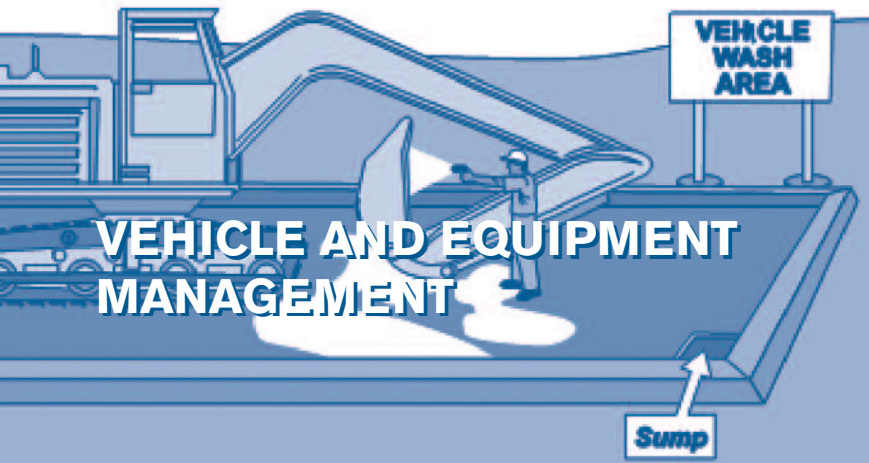
- ✓ locate stockpiles an adequate distance away from concentrated flows of storm water, water courses and inlets
- ✓ protect all stockpiles from storm water runoff with temporary perimeter sediment barriers
- ✓ cover, stabilize and protect stockpiles from rain events
- ✓ implement wind erosion control practices as appropriate

DO NOT

- ✗ locate stockpiles far from the site entrance
- ✗ locate at the edge of the property line
- ✗ locate stockpile close to water courses

REMEMBER

- ☞ Stockpiles are for temporary storage of material only
- ☞ Provisions should be made for permanent movement of stockpiled material
- ☞ Inspections should be conducted regularly
- ☞ Perimeter controls and covers should be repaired and/or replaced as needed



Prevent or reduce storm water pollution by performing cleaning, fueling and maintenance of construction vehicles at an off site facility or by implementing standard on site procedures

DO

- ✓ infiltrate vehicle wash water
- ✓ locate designated areas for washing, fueling and maintenance away from storm drain inlets and water courses
- ✓ enclose or cover fluids and materials in secondary containment
- ✓ keep an ample supply of spill cleanup materials near storage area
- ✓ train employees and subcontractors

DO NOT

- ✗ permit steam cleaning on site
- ✗ use diesel for vehicle and equipment cleaning
- ✗ place used oil in dumpster or pour into a storm drain
- ✗ bury used tires

REMEMBER

- ☞ Vehicle areas should be inspected for leaks and spills regularly
- ☞ Oil filters can be recycled

PAVING AND GRINDING OPERATIONS



Prevent or reduce the discharge of pollutants from paving, surfacing, resurfacing or saw-cutting operations by implementing pollution prevention measures

DO

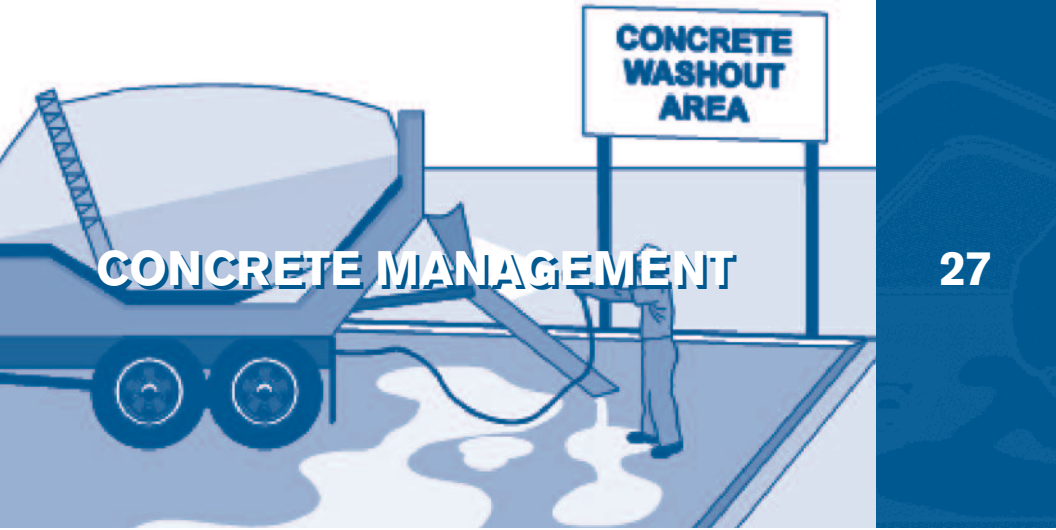
- ✓ cover or barricade storm drains and manholes during paving operations
- ✓ stockpile demolished roadway material away from drain inlets
- ✓ vacuum residue from grinding operations
- ✓ place drip pans or absorbent materials under paving equipment when not in use
- ✓ train employees and subcontractors in pollution prevention and reduction

DO NOT

- ✗ allow any pavement materials to enter the storm drain
- ✗ pave during the wet season or when rain is in the forecast
- ✗ use toxic substances, such as, diesels or solvents to coat asphalt transport trucks and asphalt spreading equipment

REMEMBER

- 🔧 Minimize leaks and drips from machinery by inspecting and maintaining regularly



CONCRETE MANAGEMENT

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Prevent or reduce the discharge of storm water pollutants during curing, finishing and disposal of concrete

DO

- ✓ protect drain inlets prior to applying curing compound and performing concrete finishing activities
- ✓ apply chemical curing compound close to concrete surface to avoid overspray
- ✓ direct cure water to collection areas for infiltration
- ✓ collect and dispose of water from high-pressure water blasting operations
- ✓ perform on-site concrete washout in designated areas
- ✓ construct and maintain temporary concrete washout facilities of adequate quantity and size
- ✓ train employees and subcontractors

DO NOT

- ✗ over spray curing compounds
- ✗ direct water from concrete work to inlets

REMEMBER

- ☞ Inspect cure containers and spraying equipment for leaks
- ☞ Washout facilities must be cleaned, or new facilities constructed to ensure continuous and uninterrupted use

28 MAINTENANCE AND INSPECTION

Perform regular maintenance

REMEMBER

- Remove sediment from barriers and sediment devices
- Replace/repair worn or damaged silt fence fabrics
- Replace or repair damaged structural controls
- Perform other control maintenance as defined by the BMP fact sheets
- Have your permits on site

Conduct inspections on a regular basis

- ✓ prior to forecast rain
- ✓ after rain events
- ✓ daily during extended rain events
- ✓ weekly during the rainy season
- ✓ weekly during dry periods

REMEMBER

- 📄 Document your inspections

**STORM WATER VIOLATIONS CAN RESULT
IN EPA, DOH-CWB AND ENV FINES UP TO
\$37,500/PER VIOLATION/PER DAY**

VISIT THE WEB-SITE:

WWW.CLEANWATERHONOLULU.COM

OR

CALL THE

CITY ENVIRONMENTAL CONCERN LINE

768-3300



E Mālama I Ka Wai Ola

Protect our waters...
FOR LIFE