



PURPOSE:

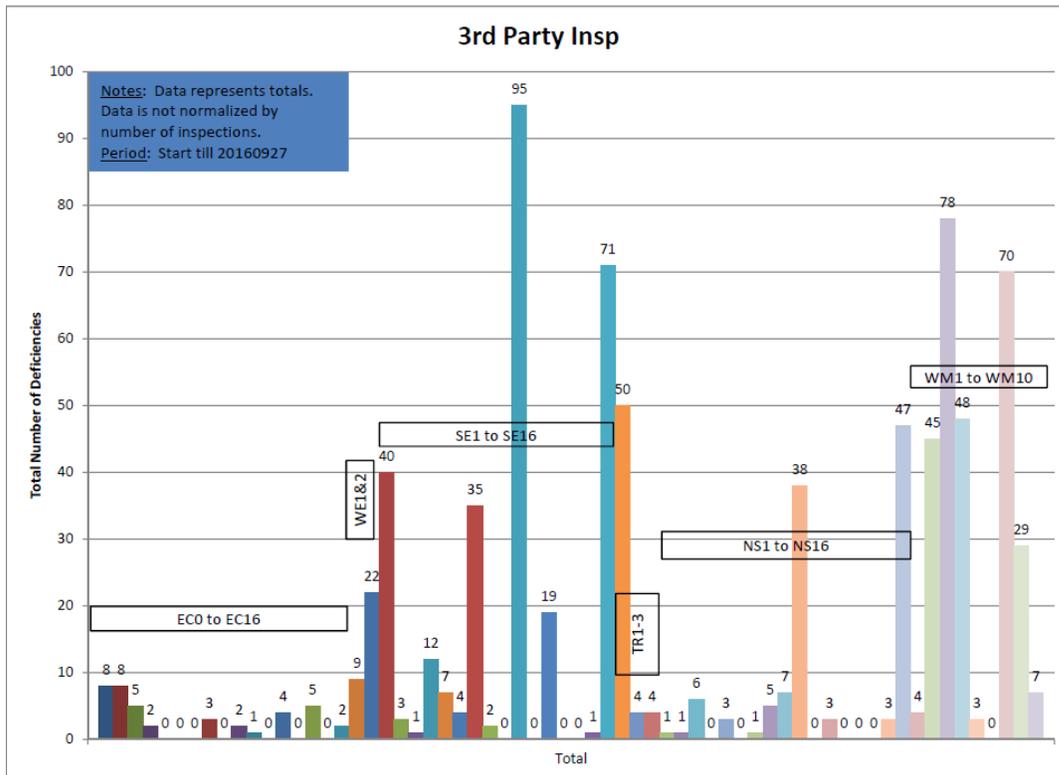
The purpose of this training module is to provide the contractor with an option to use this training instead of developing his own training. There is no requirement to use this training.

EPA's 2013 audit found "The City has not leveraged its existing datasets to help assess program effectiveness or to inform program implementation. The City should evaluate its existing data and make or suggest programmatic changes in an effort to maximize program resources."

The basic components of an effective program include education, inspection, and enforcement. By providing prioritized training, the City addresses (a) leveraging its datasets and (b) attempts to measure how effective its inspection programs are.

KEY POINTS

- This is the cycle which involves using inspection data from the City's implementation of 3rd party inspections. 3rd party inspections are placed into a database called CloudCompli and data is exported into excel for analysis. Topic content was based upon the top 11 deficiencies determined from this analysis.
- The City 3rd Party Inspection Data Represents:
 - 426 inspections;
 - From 2/2/2016 to 9/23/2016;
 - 69 contractors; and
 - 127 City projects



- For FY17 training the City will focus on the top 11 BMP deficiencies and develop contractor training sheets that can be used in a monthly stormwater training conducted by the contractor.

SEDIMENT CONTROL

- SE-1 Silt Fence
- SE-6 Gravel Bag Berm
- SE-10 Storm Drain Inlet Protection
- SE-16 Compost Socks and Berms

TRACKING CONTROL

- TR-1 Stabilized Construction Entrance/Exit

NON-STORM WATER MANAGEMENT

- NS-10 Vehicle and Equipment Maintenance

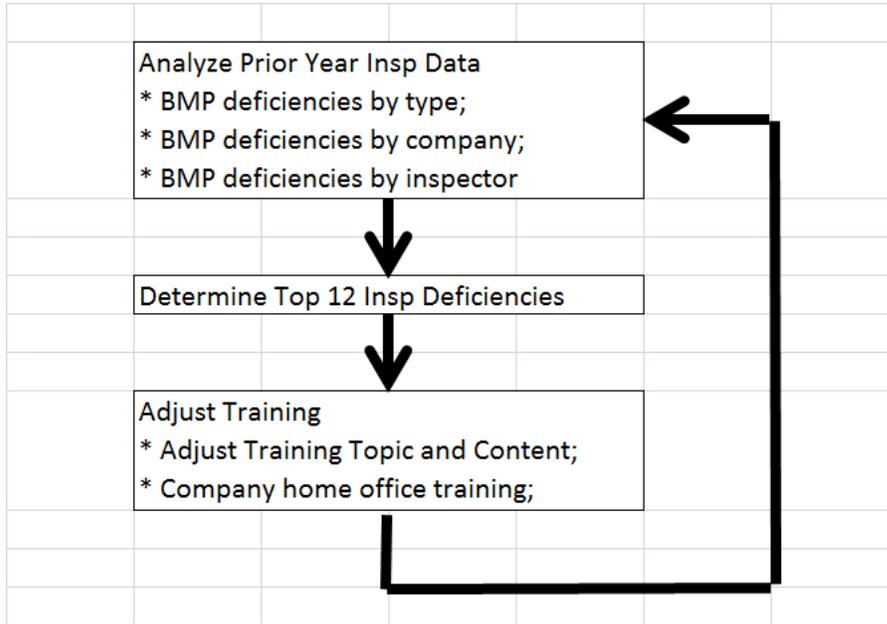
WASTE MANAGEMENT

- WM-1 Material Delivery and Storage
- WM-3 Stockpile Management
- WM-4 Spill Prevention & Control
- WM-5 Solid Waste Management
- WM-8 Concrete Waste Management



LEVERAGING DATA

The City will follow the process described below to leverage the data that it is collecting. The top 11 deficiencies that will be selected with the 12th being this introduction sheet. The intent is for the contractor to provide this training to his staff on a monthly basis similar to the more frequent safety training. This may also satisfy the contractors NPDES permit requirement for providing and documenting training.



FUTURE TRAINING

If you would like to be notified when the next version of this training comes available, please take our survey and place your name on our email list. The survey can be taken at the following website.

Silt Fence

Sediment Control (SE-1)



Location

- Perimeter
- Exposed and erodible slopes; small cleared areas
- Streams and channels
- Temporary stockpiles and spoil areas

Limitations

- Not in concentrated flow areas (in streams, channels, drain inlets)
- Not where ponding > 1.5' may occur and where ponding may cause flooding
- Max. slope length: 200'
- Not below slopes subject to creeping, slumping, or moving areas
- Not for diverting flow
- Follow level contour

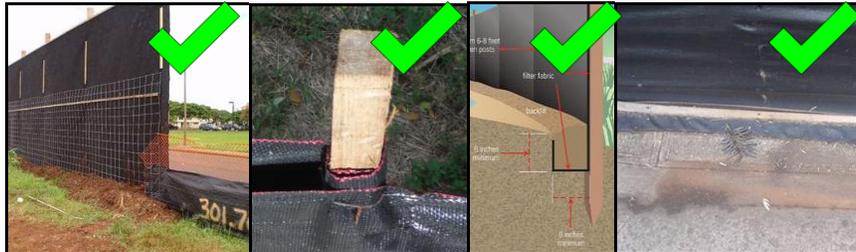
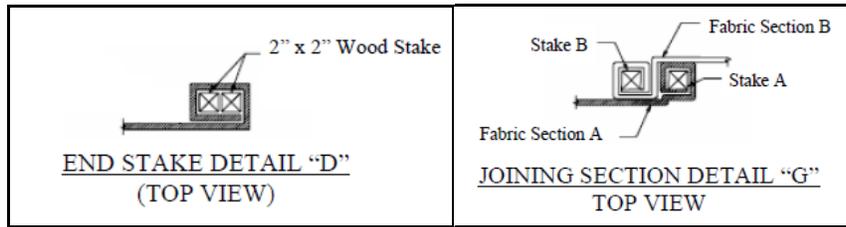
Implementation

- Max. slope perpendicular to fence: 1:1 (Horizontal: Vertical)
- Leave horizontal space for runoff to pond behind fence (3+ ft., if possible)
- Turn ends of fence uphill to contain runoff
- Leave undisturbed area immediately downhill from fence, if possible
- Use commercial quality posts, appropriate filter fabric, $\geq 1.75''$ long and 15+ gauge staples for posts, and 9+ gauge wire for fastening posts together

Installation

- Dig 6" deep by 6" wide trench; fold fabric into trench on uphill side of fence
- Drive posts into downhill side of fence fabric
- Posts: $\leq 6'$ apart, 12-18" below trench
- Make sure fabric is on side of fence facing slope!
- Secure fabric to posts
- Fence ends: wrap fabric around two posts one full turn; secure with 4 staples or wire
- Extra strength: secure plastic or wire mesh support between fabric and posts
- To link fences together, wrap fabric around each fence end; join posts and roll them together; secure tops with wire
- Backfill trenches with compacted material

Silt Fence



Along perimeter Fabric wrapped around post Trenched in ground Fasten fabric to concrete using slats and nails

Maintenance and Removal

- Remove sediment when at 1/3 height of fence
- Replace when worn, torn, or damaged
- Retrench or replace if not properly anchored in ground
- Remove silt fence once slope surface is permanently stabilized

Inspection

- Inspect prior to, during, and after rain events
- Inspect weekly during the rainy season



Sediment > 1/3 H fences not joined

Ponding behind fence Water depth exceeds fence height

Fence should be located next to curb

2016

Street Sweeping & Vacuuming

Sediment Control (SE-07)



Location

- The roadway gutter is part of the City's storm drain system. Therefore any project dirt or sediment should not have made its way to the storm drain system.
- If possible located project exits far from City storm drain catch basin or inlets.

Limitations

- Sweeping and vacuuming may not be effective when the sediment is wet or when tracked soil is caked.
- The caked soil may need to be scraped off.

Implementation

- When possible designate a separate entrance & exit to the project site. Provide signage.
- Sweep or vacuum (self-propelled, walk behind, shop-vac) on a daily basis.
- Do not use "kick broom" attachments mounted to a backhoe. This tends to spread dirt rather than remove it. Use a street sweeper with a vacuum.



Soil tracking onto City street



Soil tracking beyond project entrance



Sweep surface when tracking occurs.



On roads use a sweeper w/ vacuum

Maintenance and Removal

- Persistent staining of the road surface should not have occurred if upstream BMPs were effective.
- Maintain or replace upstream BMPs.
- Provide additional upstream BMPs.

Inspection

- Inspect road daily for sediment tracking.
- If tracking observed, inspect tracking control entrance (TR-1).

Inlet Protection

Sediment Control (SE-10)



Location

- Storm drain inlets receiving sediment-laden runoff

Limitations

- Drainage area < 1 acre
- Requires adequate area for ponding without intruding on roadways with traffic
- Requires two types of BMPs to protect inlet

Implementation & Installation

- Need to identify appropriate inlet protection design based on:
 - o Location and extent of ponding
 - o Possibility of runoff diversions
- 5 common inlet protection devices:
 - 1) **Filter Fabric/Silt Fence:**
 - For drainage basin < 5% slope with sheet flow < 0.5 cfs
 - Grading complete, soil/seed stabilization pending; Not for paved areas
 - Installation
 - 6" wide x 6" deep trench
 - Place stakes or capped rebars \geq 3 ft. apart, drive 18 in. into ground
 - Stakes/rebars should be \geq 48 in.
 - Lay fabric upside of trench then up stakes; Max fence height: 24 in.
 - Secure with heavy-duty wire staples or wire \geq 1 in. length
 - Internally brace vertical stakes to anticipate flow
 - 2) **Excavated Drop Inlet Sediment Trap:**
 - Installation
 - Clear area of vegetation; grade
 - Excavate area around the inlet to trap sediment
 - Concentrated flow: 2:1 (L:W) shape, length oriented toward flow
 - 3) **Gravel/Sand Bag:**
 - Use upstream of inlets on gently sloping paved streets
 - Sheet/concentrated flow > 0.5 cfs
 - Short-term use, not for roads open to traffic
 - Installation
 - Use geotextile fabric bag (not burlap) with 0.75" rock or 0.25" pea gravel
 - Leave room upstream for water to pond
 - Use several layers of sand bags; overlap, pack tightly
 - Leave gap of one bag on top to serve as spillway
 - Ensure storm water does not overtop curb
 - High clay/silt areas: use filter fabric/gravel as additional filter

Inlet Protection



4) Block and Gravel Filters:

- Barrier using concrete blocks and gravel
- Flow > 0.5 cfs
- Not for use within vehicle and pedestrian traffic areas
- Installation
 - Surround storm drain with cinder blocks
 - Cover all cinderblock openings with filter fabric or wire mesh
 - Surround the cinder block barrier that is facing away from the storm drain with gravel or filter sock
 - If necessary, place 2"x4" wood beams through block openings for extra support

5) Temporary Geotextile Insert (proprietary):

- Refer to manufacturer instructions

Inspection and Maintenance

- Before/after forecasted rain; during extended rain events; weekly during rainy season
- Flash flood warnings/advisories: perform maintenance on all site BMPs; remove inlet protection; reinstall when warnings/advisories are over
- Replace silt fence when clogged, torn, or degraded; stakes secure and in good shape
- Gravel filters: Clean or replace if gravel becomes clogged with sediment
- Inspect gravel bags and replace as needed; ensure bags are properly placed
- Remove sediment when at 1/3 barrier height

Removal

- Remove inlet protection once area is stabilized; clean and regrade; clean storm drain



Block and gravel filter



Inlet protected by two BMPs



Gravel bags covering inlet; improper sediment control



Improper sediment control



Inlet protected by two BMPs



Improper sediment control

Compost Socks

Sediment Control (SE-16)



Location

- Along slope contour; spacing varies with grade
- Along perimeter of project
- As a check dam
- Around drain inlets and temporary stockpiles

Limitations

- Difficult to move once wet
- Socks need to be staked and braced, when applicable

Installation

- Does not require trenching due to its weight
- Minimum overlap varies from 6" to 18", as recommended by manufacturer
- Stake as recommended by manufacturer

Maintenance and Removal

- Remove sediment when at $\frac{1}{2}$ the effective height
- Remove and replace if damaged or flattened
- Dispose of per manufacturers recommendations

Inspection

- Check for proper overlap distance of sock
- Check for full contact in overlap distance
- Check for gaps between surface and bottom of sock



Above images from <http://www.filtrex.com/sediment-control/>



No overlap

Missing sock

Grade higher than sock

Stabilized Const. Entrance

Tracking Control (TR-1)



Location

- Construction entrance/exit points that connect to public roads
- Roads within construction site

Limitations

- Periodic repair and stone replacement
- Should be used in conjunction with street sweeping on adjacent public right-of-ways
- Turnout or doublewide exit is required to avoid having vehicles enter through wash area
- Do not use wash station where it might make public right-of-way dangerously slick

Installation

- Construct on level ground
- Entrance way should have length of at least 50 ft. and width of at least 30 ft.
- Install geotextile fabric to at least 12 in. depth, or as recommended by engineer
- Select 3-6 in. diameter stones and place over fabric
- Alternatively, use cattle grate or rubble strip
- Installing wash racks in the stabilized area will help remove additional sediment
- Installing a wash station will reduce tracking outside of the construction site; Route wash station runoff through a sediment trapping device

Maintenance and Removal

- Sweep or vacuum from road surface daily. More frequent if sediment visible
- Remove stones if construction entrance/exit becomes clogged; replace with new stones
- Keep all temporary road ditches clear
- Even out stones when surface voids appear
- Remove gravel and filter fabric at completion of project

Inspection

- Inspect weekly during rainy season and at two-week intervals in the non-rainy season
- Inspect roads adjacent to the site daily
- Inspect wash racks and sediment traps; remove sediment buildup



Use a stabilized construction site entrance



Tire wash stations and racks also remove sediment

Vehicle & Equip Maintenance

Non-Storm Water Management (NS-10)



Location

- Locate maintenance away from drain inlets, catch basins, swales, and other drainage features. Locate at least 50 feet away from drainage features. Protect from storm water run on.
- Locate on an impervious surface or provide a plastic pad or sheet
- Locate spill kit adjacent to proposed maintenance area.

Limitations

- It is preferable to have maintenance done off site and at the company's base yard. If this option is not available located maintenance area as described above.

Implementation

- Place drip pans beneath vehicles and equipment if idle for more than 1 hour.
- Have on-site a spill kit.
- Train employees and subcontractors in proper maintenance and spill cleanup.
- All fuel trucks and fuel service companies are required to have spill kits on the trucks and have trained drivers capable of responding to a spill.



No drip pan provided



No drip pan provided

2016

Vehicle & Equip Maintenance



Absorbent pad over plastic
Boom on downstream side



Custom made drip pan

Maintenance and Removal

- Repair oil and fluid leaks immediately.
- Maintain waste fluid containers in a leak proof container with lids on.
- See WM-4 Spill Prevention & Control with regards to storing waste oil containers.
-

Inspection

- Inspect vehicles and equipment for leaks daily and keep inspection records on site.
-



Suitable Applications

This fact sheet can apply to the delivery and storage of the following materials:

- Pesticides and herbicides
- Fertilizers
- Petroleum products
- Asphalt and concrete products
- Hazardous chemicals such as paints, glues, solvents, and curing compounds

Limitations

- When space permits it is desirable for indoor storage.

Implementation

- Locate storage **away** from vehicular traffic, drainage ways, catch basins, and drain inlets. Surround with earth berm or approved containment device.
- Ensure MSDS or SDS sheets are provided for each material that you bring onto the project site.
- A summary of the chemical inventory should be included as the first sheet of the MSDS or SDS binder. Maintain a complete and up-to-date MSDS or SDS binder.
- Provide signage for workers to understand which material is to be stored at what location.
- Keep chemicals in their original containers.
- Label containers, which **do NOT** have labels and identify the contents being stored.
- **DO NOT** store chemicals, drums, or bagged materials directly on the ground. Place these items on pallets and secondary containment if it is a liquid.
- Arrange for employees trained in spill response to be present during the delivery and storage of hazardous or dangerous materials or liquid chemicals

Material Storage Areas and Practices

- Liquid, petroleum products listed in 40 CFR Parts 110, 117 or 302 should be stored in approved containers and drums and should not be overfilled.
- Temporary secondary containment volume = [rain from a 25-year storm event] + [(10% of the aggregated volume) OR (100% of the largest container), whichever is greater].
- The temporary containment should be impervious to the materials stored for for a contact time of at least 72-hours.
- Provide sufficient space in storage area to allow spill cleanup.
- Do not store incompatible materials (for example, bleach and ammonia, powder bleach and muriatic acid) in the same storage facility.
- Bagged and boxed materials should be stored on pallets and covered during non-working hours and during rainfall events.
- Store materials indoor when feasible.
- At each storage facility, provide cover throughout the rainy season, during non-working hours, prior to, and during rain events.

Material Delivery Practices

- Arrange for employees trained in spill response to be present during the delivery and storage of hazardous or dangerous materials or liquid chemicals
- Keep an accurate and up-to-date inventory of material delivered and stored on site.

Training

- Provide training for employees and subcontractors on the proper material delivery and storage practices.
- Ensure the site safety officer has training on spill response and cleanup procedures.



Organized storage at project site
Liquids over secondary containment



Organized storage at project site
Liquids over secondary containment



No secondary containment



Containers not stored on pallets
No secondary containment for liquids

Inspection and Maintenance

- Inspect and verify that BMPs are in place before delivery and storage activities begin.
- Add this location to your BMP plan (BMP map).
- Add this location to your inspection checklist. Inspect weekly during the rainy season. Inspect every 2-weeks during the dry season.
- Inspect for rainfall accumulation in the temporary containment, remove sheen and floating product with spill kit materials prior to draining water.
- Inspect for nearby spill kit and determine if there are adequate supplies. If no, resupply kit.
- Inspect that the storage area is clean and well organized.
- Inspect and repair perimeter controls, containment structures, covers, liners as needed.

Stockpiles

Stockpile Management (WM-3)

Location

- Min. 50 ft. away from concentrated flows of storm water, drainage courses, and drain inlets

Implementation

- Cover, grass, or provide other stabilization measures
- Provide adequate setback distance
- Greater than 15 ft. height requires 8-ft. wide benching
- Manage stockpiles of contaminated soil (WM-7)
- Non-active soil stockpiles; Non-active cement and aggregate stockpiles
 - o Rainy season: cover or protect with soil stabilization measures; temporary perimeter sediment barrier at all times
 - o Non-rainy season: cover or use temporary perimeter sediment barrier before onset of rain
- "Cold mix" stockpiles; Pressure treated wood with chromate copper arsenate or ammoniacal copper zinc arsenate stockpiles
 - o Rainy season: place on and cover with plastic or comparable material at all times
 - o Non-rainy season: place on and cover with plastic or comparable material prior to onset of rain

Erosion Control

- Keep runoff away from stockpiles through use of dikes or other diversions
- Control storm water runoff using a temporary perimeter sediment barrier (berm, dike, fiber rolls, silt fences, sandbags, gravel bags)
- Apply wind erosion control practices (watering, mulching, etc.)



Covered stockpile



Not set back; No BMPs



Geotextile with weights

Secondary Containment



Waste Management & Materials Pollution Control (WM-1)

Location

- Surrounding tanks/storage containers of materials that pose threat to environment
- Locate away from vehicular traffic

Limitations

- Must be liquid-tight container impervious to stored material
- Limited by space

Implementation

- Methods
 - o Dikes, berms
 - o Surrounding tanks, storage containers
 - o Troughs, plastic pool for non-reactive materials
- Containment should provide sufficient volume to contain precipitation from 25-year storm plus 10% of total volume of all containers or plus 100% of the largest container (whichever greater)
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access

Maintenance and Removal

- Repair or replace as needed to maintain proper function
- Use absorbents to remove sheen from water before draining

Inspection

- Inspect weekly during rainy season and two-week intervals during non-rainy season
- Keep areas clean, well-organized
- Spigot located within containment



Materials stored above catchment tank;
Canopy

Use of berm

Sufficient volume



No secondary containment

Insufficient secondary
containment

Lack of secondary
containment

Solid Waste Management

Waste Management (WM-5)



Location

- Solid waste collection areas should be located a minimum of 50 feet away from catch basins, drain inlets, swales and other drainage features.
- Locate away from project site areas prone to flooding or ponding.
- Segregate hazardous material from non-hazardous material.

Implementation

- Inform trash hauling service that you will only accept watertight dumpsters.
- Provide containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Plan for additional containers and more frequent pickups during the demolition phase of construction.
- Do not dispose of petroleum (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) in dumpsters designated for Construction Debris.
- Use berms or other temporary diversion to keep storm water from coming into contact with solid waste.

Education

- Educate and train employees and subcontractors on identifying hazardous waste and solid waste.
- Educate and train employees and subcontractors on solid waste storage and disposal procedures.
- Incorporate this training sheet into your periodic training.
- For additional information see the State DOH, Office of Solid Waste Management has developed a guide, "Minimizing Construction and Demolition Waste," especially for contractors, architects, builders, and design professionals.
- For additional tips, see the State Department of Business and Economic Development Clean Hawaii Center for "A Contractor's Waste Management Management Practices and Tools for Job Site Recycling and Waste Reduction in Hawaii."

2016

Solid Waste Management



Multiple containers with signs directing segregation.



Plastic sheet covering container

Maintenance and Removal

- Arrange for waste collection to prevent containers from overflowing.
- Collect site trash daily, especially during rain and windy conditions.

Inspection

- Inspect dumpsters for leaks and waste areas when you inspect your other BMPs.
- Inspect construction waste area and recycling areas for signs of contamination.



No segregation and storage of waste
Petroleum stains on soil



No segregation and storage of waste

Concrete Wash

Concrete Waste Management (WM-8)



Significance

- Concrete washout water is harmful to the environment and human health
 - o Contains toxic metals
 - o Caustic and corrosive
 - o pH ~12

Limitations

- Concrete washout water must be fully contained and disposed of
- Do not place washout facility within 50 ft. of storm drains, open ditches, or water bodies

Methods

- Collect concrete washout in solid leak proof containers
 - o Plastic washout pit
 - Use plastic lining free of holes/tears
 - Evaporate or vacuum off washwater
 - Break up remaining solids and remove
 - Repair or replace damaged lining
 - o Metal washout container
 - Portable and reusable
 - Ramp can be used to wash out concrete pump truck hopper
 - May contain rain cover, treatment unit, and filter system
- Gravel/rock should be used for approach to washout facility
- Concrete washout materials can be recycled/reused

Inspection

- Inspect daily and after heavy rain for damage
- At 75% capacity, switch to new washout container
- Before rain, lower liquid level or cover container



Washout not contained

Overflow from container

Plastic washout pit, no spillage

