



*MĀLAMA I KE AWA KAI
PROTECT OUR
HARBOR WATERS*

HDOT Harbors Construction and Post- Construction Training





Introduction: Environmental Protection

- To be good stewards of the environment.
 - For our own use.
 - For the local economy (e.g. tourism, fishing).
- To protect the environment.
 - Coral reefs are sensitive to pollution.
 - Endemic species (found only in Hawaii).





Introduction: Environmental Protection

November 2014: Department of
Transportation entered into a second
Consent Decree with DOJ/EPA/DOH



Consent Decree available on Harbors
website:

<http://hidot.hawaii.gov/harbors/files/2013/01/Consent-Decree.pdf>






Regulatory Background

- **Federal**
 - Clean Water Act
 - Code of Federal Regulations, Title 40, Part 122
- **State of Hawaii, Department of Health**
 - Hawaii Administrative Rules, HAR 11-54 and 11-55
 - Hawaii Revised Statutes, HRS 342 D
- **State of Hawaii, Department of Transportation, Harbors Division**
 - Honolulu Harbor permit no. **HI 03KB482**
 - Kalaheo Harbor permit no. **HI 03KB488**
 - Kahului Harbor permit no. **HI 14KE674**



MS4 Permit Requirements

- The Stormwater Management Plan (SWMP) details how HDOT Harbors will comply with the permit:
 - Public Outreach and Education
 - Public Involvement and Participation
 - Illicit Discharge Detection & Elimination
 - **Construction Site Runoff Control**
 - **Post-Construction Stormwater Management for New Development and Redevelopment**
 - Pollution Prevention / Good Housekeeping.
- 






Construction and Post-Construction Programs

- Both program manuals are available online at <http://hidot.hawaii.gov/harbors/malamaikeawakai/>



HDOT Harbors Construction and Post-Construction Programs – Documents and Forms

- 
- [Construction Site Runoff Control Program Manual](#)
 - [Post-Construction Stormwater Management in New Development and Redevelopment](#)
 - [Construction Site Design Review Checklist](#)
 - Notification Form for Project Site Disturbing Less Than One Acre
 - [To be used for Harbors Project](#)
 - [To be used for Tenant Improvement Project](#)
 - [Permanent Post-Construction Best Management Practice Plan Checklist](#)
 - [Permit for Connection to HDOT Harbors Division Small MS4](#)
 - [Permit to Discharge into HDOT Harbors Division Small MS4](#)
 - [Construction Best Management Practice Inspection Checklist](#)



Defining Construction

- Construction:
 - Activities that result in land disturbance, including, but not limited to clearing, grading, and excavation.
 - Construction support activities, including:
 - Stockpiles
 - Borrow areas
 - Staging areas





Defining Land Disturbance

- Land Disturbance:
 - Penetration, turning, or moving of soil.
 - Resurfacing of pavement where the ground is exposed.
 - Grubbing where equipment is used to uproot vegetation.
 - Does NOT include:
 - Grass or weed cutting.
 - Bush or tree trimming that leaves the soil intact.



Stormwater Discharges



- Stormwater can carry pollutants generated during outdoor activities to the nearest storm drains or waterways.
- Stormwater is usually **not** treated before it is discharged to the Municipal Separate Storm Sewer System (MS4) or the adjoining harbors.
- It is vital to control and manage potential source of pollutants **before** they enter the storm drainage system.





Definition of Illicit Discharge

- Non-stormwater discharge that poses a risk to the environment.



Only Rain in the Drain!



Common Pollutants

Vehicle Fluids



Aggregate



Littering



Chemicals



Sediment



Portable Toilet



Washouts





Potential Pollutant: Sediment

○ Erosion:

- Process by which the land surface is worn away by the action of water or wind.



○ Sedimentation:

- Movement and settling out of suspended soil particles.





Impacts from Construction Activities

Sedimentation

Un-stabilized Construction Site

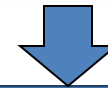


VS

Forested Land / Grassy Areas



Between **35-45 tons** of sediment
per acre each year.



Approximately **1 ton** of sediment
per acre each year.



Construction Impacts to Stormwater

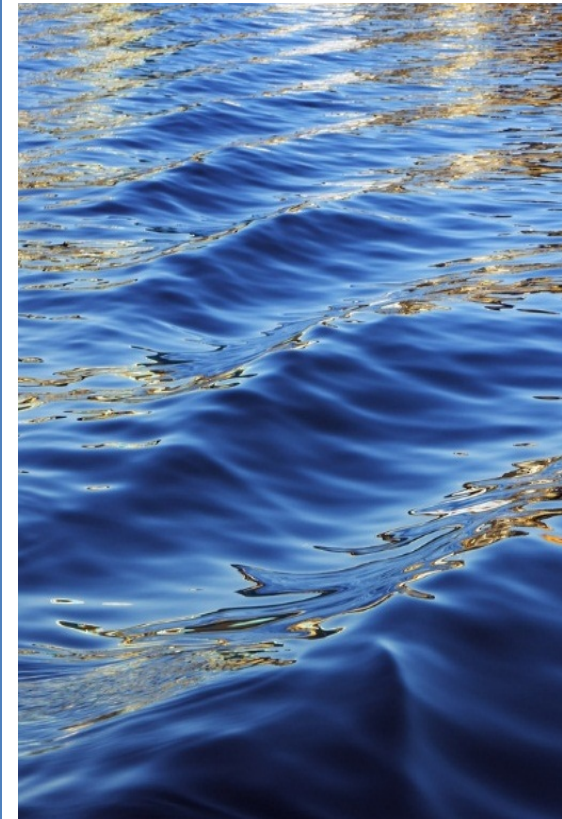
- Increase flooding
- Excess nutrients cause algae growth
- Sediment causes waters to become turbid which prevents sunlight from reaching vegetation while also reducing oxygen levels.
- Fish quality of life






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NPDES Program Requirements for Construction Activities






NPDES Construction Program Requirements

- Submit a Notice of Intent (NOI) Form C and develop a Stormwater Pollution Prevention Plan (SWPPP) **30** days prior to the start of activities.
 - Notify the HDOH **7** days prior to start.
 - Train personnel on BMPs.
 - Install, inspect, and repair BMPs as necessary.
 - Update SWPPP and maintain on-site.
 - Submit a Notice of Cessation when area has been stabilized.
- 



HAR 11-55 – App C

- Recordkeeping
 - SWPPP.
 - Record of changes to the SWPPP (complete in 7 days).
 - **Monthly compliance reports.**
 - BMP Inspection reports (within 48 hours).
 - Corrective action reports (start within 24 hours and finish with 7 days).
 - All documents must be signed by the owner or its duly authorized representative.
- 



HAR 11-55 – App C SWPPP Requirements

- SWPPP must include:
 - **Personnel on the stormwater team.**
 - Contractor and sub-contractor information.
 - Nature and sequence of construction activities.
 - Description of sources of non-stormwater.
 - Potential sources of stormwater pollution and measures to reduce or eliminate.
 - Description of buffer option implemented.
 - **Description of stabilization practices and post-construction BMPs.**
 - Inspection, maintenance, and corrective action procedures.
 - Training documentation.
 - NGPC and other permits.
 - Documentation of UIC well requirements, if applicable.



HAR 11-55 – App C

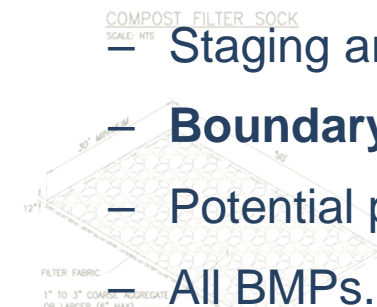
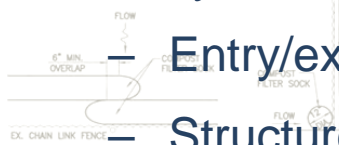
SWPPP Requirements

BEST MANAGEMENT PRACTICES (BMP)

1. INSTALL & MAINTAIN TEMPORARY STABILIZED ENTRANCE AT THE INGRESS AND EGRESS OF THE SITE.
2. INSTALL & MAINTAIN TEMPORARY SEDIMENT TRAP ALONG EXISTING OR PROPOSED DRAINAGE PATHS. AFTER CONSTRUCTION OPERATIONS, SEE DETAIL THIS SHEET.
3. INSTALL & MAINTAIN TEMPORARY FILTER SOCKS ALONG EXISTING FENCE LINE SURROUNDING THE PROJECT SITE. SEE DETAIL THIS SHEET.
4. PERIODICALLY, DURING AND AT THE END OF THE CONSTRUCTION PERIODS, THE EXISTING CATCH BASINS SURROUNDING THE PROJECT SITE SHALL BE CLEANED OUT. ALL DEBRIS FOUND IN THE CATCH BASINS SHALL BE REMOVED. DEBRIS INLETS ARE PROHIBITED.
5. BMP MEASURES SHALL BE IN PLACE PRIOR TO START OF CONSTRUCTION WORK.
6. THE BMP PLAN SHALL BE IMPLEMENTED BY THE CONTRACTOR AS A MINIMUM. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH ALL OTHERS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH ALL OTHERS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH ALL OTHERS.
7. THE FINAL LIFT OF EACH DAY'S WORK SHALL BE CONFINED TO THE EXISTING FILL MATERIAL.
8. GOOD HOUSEKEEPING SHALL BE UTILIZED TO ENSURE PROTECTION OF ROADWAYS FROM MUD, DIRT, AND DEBRIS.
9. THE CONTRACTOR SHALL ENSURE THAT ALL DEBRIS IS CLEANED OFF SO THAT DRILLING DEBRIS IS NOT ACCEPTED INTO THE STORM DRAIN SYSTEM OR ONTO THE ROADWAY.

- SWPPP must include a site map:
 - Locations of earth-disturbing activities.
 - Topography including slopes before and after grading.
 - Stockpiles locations.
 - Contaminated soils.
 - Direction of discharge to state waters and other drainage systems (Harbors small MS4).
 - Entry/exit points.
 - Structures and impervious surfaces.
 - Staging area.
 - Boundary lines of buffer areas.
 - Potential pollutant activities and storage areas.
 - All BMPs.

Blue flow arrows shown on this drawing



STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HARBORS DIVISION	
PIERS 12 & 15 IMPROVEMENTS HONOLULU HARBOR, OAHU	
PIER 12 BEST MANAGEMENT PRACTICES PLAN AND DETAILS	
SUBMITTED BY: [Signature] CHECKED BY: [Signature] DATE: OCTOBER 1, 2013 SCALE: 1" = 10'	APPROVED BY: [Signature] DATE: OCTOBER 1, 2013 SCALE: 1" = 10'
HMP 20907	





HAR 11-55 – App C

- Contractor Self-Inspection frequency:
 - For sites that are discharging to impaired waters:
 - At least once every 7 days; **AND**
 - Within 24 hours of a 0.25 inch rain event and prolonged rain events.
 - Keep a rain gauge on-site!
 - For sites that do NOT discharge to impaired waters (e.g. Kalaeloa Barbers Point Harbor):
 - At least once every 7 days; **OR**
 - Every 14 days with additional inspections conducted 24 hours of any rain event of 0.25 inches or more within a 24-hour period.
 - Keep a rain gauge on-site!
 - Conducted by a qualified person.



HAR 11-55 – App C



- **Corrective Actions:**
 - Only for actions to **stop or prevent** a violation of water quality (HAR 11-54).
 - Fix the problem immediately (start the same day).
 - Significant repairs – complete within 7 days.
- **Corrective Action Report:**
 - Within **24 hours**: condition identified, date, time, and how it was identified.
 - Within **7 days**: follow-up actions taken, summary of BMP modifications.





HAR 11-55 – App C



- Stabilization is required:
 - Immediately (by next day) whenever earth disturbing activities have ceased.
 - Temporarily ceased means no activities within **14 calendar days** or more.
 - Deadline for completion: ASAP but no later than **14 calendar days** after initiation.
 - Deadline for sites discharging to impaired waters: **7 calendar days** from the temporary or permanent cessation of earth disturbance.





HAR 11-55 – App C

- Types of initiation of stabilization:
 - Prepping the soil for vegetation or non-vegetation stabilization.
 - Applying mulch.
 - Seeding and planting.
 - Making the arrangements for stabilization.
- Criteria for stabilization:



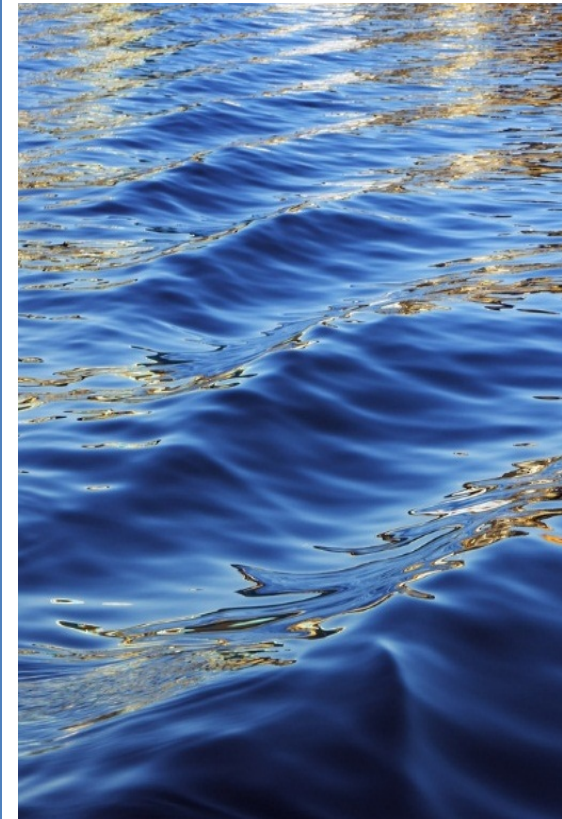
- Vegetation evenly distributed that provides **70%** or more of density that was previously there.
- Non-vegetative controls (e.g. pavement).





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HDOT Harbors Project Process





Harbors Project Process

Project Scoped (Determine Environmental Requirements)

Pre-Design Meeting (*Not a requirement for tenants.)

Permits, Construction, PSMP, and Post-Construction Checklists

Project Review

Contractor Self
Inspections

Initial Inspection

Regular Inspections

Final Inspection

Permanent BMPs


Long Term BMP O&M

Enforcement
Actions





Design Review

- Pre-Design Meeting.
 - Documentation:
 - Notification Form for Project Less Than One Acre with BMP plan.
 - OR
 - Construction Design Review Checklist.
 - Completed NPDES applications.
 - Construction BMP plan sheets and details.
 - Stormwater Pollution Prevention Plan.
- 



Exempted Projects

- Minor land disturbance on a single lot (e.g., minor landscaping activities).
- Post, pole, sign, and fencing installation.
- Utility repair work.
- Parking lot, driveway, and other paved surface repair.
- Other repair and maintenance activities.



Design Review Checklist



Hawaii Department of Transportation – Harbors Division



Construction Site Design Review Checklist

Project Description

Project Title:	
Project Job No:	Acreage of Site:
Name of Design Firm:	
Projected Construction Timeframe:	
Description of Project:	

Site Information

Construction Site Location:

Signature and Certifications

Designer: I certify that the design is complete, accurate, and addresses the items on this checklist to the best of my knowledge.

Print Name: Job Title:

Signature: Date:

Review: HDOT Harbors Project Manager and Environmental Section.

Harbors Project Manager Signature: Print Name:

Date:

Harbors Environmental Section Signature: Print Name:

Date:






Construction Review

- Project review after contract award and issuance of NTP letter:
 - Contractor completes Stormwater Pollution Prevention Plan and provides to the Harbors Project Manager (PM) or Project Engineer.
 - PM will submit to Environmental Section (HAR-EE).
 - HAR-EE will send their comments to the PM through memorandum.
 - Upon acceptance, Contractors will start the installation of the project-specific BMPs, which must be inspected prior to the start of any other work.
 - HAR-EE maintains an inventory of construction sites.





Review SWPPP

- If greater than or equal to 1 acre, determine whether BMPs adequately address potential pollutants and the requirements of HAR 11-55-C.
 - SWPPP should be based on expected amount, frequency, intensity, and duration of rain events in the area. (Typically: 2 yr, 24 hr storm).
 - Refer to the City and County of Honolulu, Storm Water BMP Manual for Construction.
- 



Construction Best Management Practice

- Practice or device used to mitigate the discharge of potential stormwater pollutants during Construction Phase.





Consent Decree Requirements

- Use the City and County of Honolulu Stormwater BMP Manual – Construction. When applicable, all projects should include:

Erosion Controls	Scheduling
	Preservation of Existing Vegetation
	Slope Protection
	Run-on Diversion
Sediment Controls	Silt Fence
	Storm Drain Inlet Protection
	Sand Bag Barrier
	Stabilized Construction Site Entrance/Exit
Non-Stormwater Management	Water Conservation Practices
	Dewatering Operations
Waste Management	Material Delivery and Storage
	Stockpile Management
	Spill Prevention and Control
	Solid Waste Management
	Concrete Waste Management
	Sanitary/Septic Waste Management





Consent Decree Requirements

- Sites Disturbing 1 Acre or More:

Erosion Controls	Hydraulic Mulch
	Hydroseeding
	Soil Binders
	Geotextiles and Mats
	Wood Mulching
	Slope Drains
Sediment Controls	Silt Fence
	Fiber Rolls
	Sediment Basin
	Gravel Bag Berm
	Street Sweeping and/ or Vacuum
	Sand Bag Barrier
	Storm Drain Inlet Protection
	Scheduling
	Check Dam





Consent Decree Requirements

- Sites Disturbing 1 Acre or More:

Additional Controls	Wind Erosion Controls
	Stabilized Construction Entrance/ Exit
	Stabilized Construction Roadway
	Entrance/ Exit Tire Wash
	Advanced Treatment Systems
Non-Stormwater Management	Water Conservation Practices
	Dewatering Operations (Groundwater dewatering only under National Pollutant Discharge Elimination System Permit No. (TBD))
	Vehicle and Equipment Washing
	Vehicle and Equipment Fueling
	Vehicle and Equipment Maintenance
Waste Management	Material Delivery and Storage
	Stockpile Management
	Spill Prevention and Control
	Solid Waste Management





Consent Decree Requirements

- Roadway Paving or Repair BMPs:

1.	Restrict paving and repaving activity to exclude periods of rainfall or predicted rainfall unless required by emergency conditions.
2.	Install gravel bags and filter fabric or other equivalent inlet protection at all susceptible <u>storm drain inlets</u> and at <u>manholes</u> to prevent spills of paving products and tack coat.
3.	Prevent the discharge of release agents including soybean oil, other oils, or diesel to the stormwater drainage system or receiving waters.
4.	Minimize non-stormwater runoff from water use for the roller and for evaporative cooling of the asphalt.
5.	Clean equipment over absorbent pads, drip pans, plastic sheeting or other material to capture all spillage and dispose of properly.
6.	Collect liquid waste in a container , with a secure lid, for transport to a maintenance facility to be reused, recycled or disposed of properly.





Consent Decree Requirements

- Roadway Paving or Repair BMPs:

7.	Collect solid waste by vacuuming or sweeping and securing in an appropriate container for transport to a maintenance facility to be reused, recycled or disposed of properly.
8.	Cover the “cold-mix” asphalt (i.e., pre-mixed aggregate and asphalt binder) with protective sheeting <u>during a rainstorm</u> .
9.	Cover loads with tarp before haul-off to a storage site, and do not overload trucks.
10.	Minimize airborne dust by using water spray or other approved dust suppressant during grinding.
11.	Avoid stockpiling soil, sand, sediment, asphalt material and asphalt grinding materials or rubble in or near stormwater drainage system or receiving waters.
12.	Protect stockpiles with a cover or sediment barriers during a rain .





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HDOT Harbors Construction Inspection Process





Harbors Stormwater BMP Inspections

- **Initial Inspection:**
 - Verify all BMPs are installed appropriately.
 - Deficiencies must be corrected prior to the start of other construction work.
- **Regular Inspection:**
 - October to March: Every two weeks.
 - April to September: Every two months.
 - Deficiencies must be corrected or enforcement will commence.
 - Inspector will provide the contractor with report in five (5) calendar days.





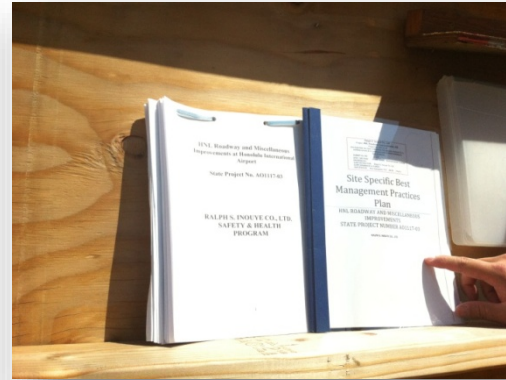
Harbors Stormwater BMP Inspections

- **Final Inspection:**
 - When all the following conditions are met:
 - Construction is completed.
 - Exposed soil has been stabilized.
 - Remaining activities have minimal impact on stormwater runoff.
 - Document the conditions are met in the *Additional Notes* portion of the report.
 - Ensure that permanent BMPs are properly installed, if applicable.
 - Deficiencies must be corrected prior to issuance of final payment.



Common Inspection Findings

BMP Plan was not available/updated.



- The BMP Plan is a living document.
 - The plan should be continually updated to reflect current site conditions.
 - Changes should be signed by certifying person or duly authorized representative.
 - The plan should be readily available to inspectors and workers on site.



Common Inspection Findings

Stabilized construction entrance clogged with fine sediment.

Vehicle tracking.




01/11/2013 09:14





Stabilized Construction Entrance (TR-1)

- Prevents tracking.
 - Grade to prevent runoff.
 - Use 3-6 in diameter stones.
 - Minimum 12 in depth.
 - A minimum area of 50 ft length and 30 ft width.
 - Remove aggregate if it is clogged with sediment.
 - Combine with tire washing and/or street sweeping.
- 

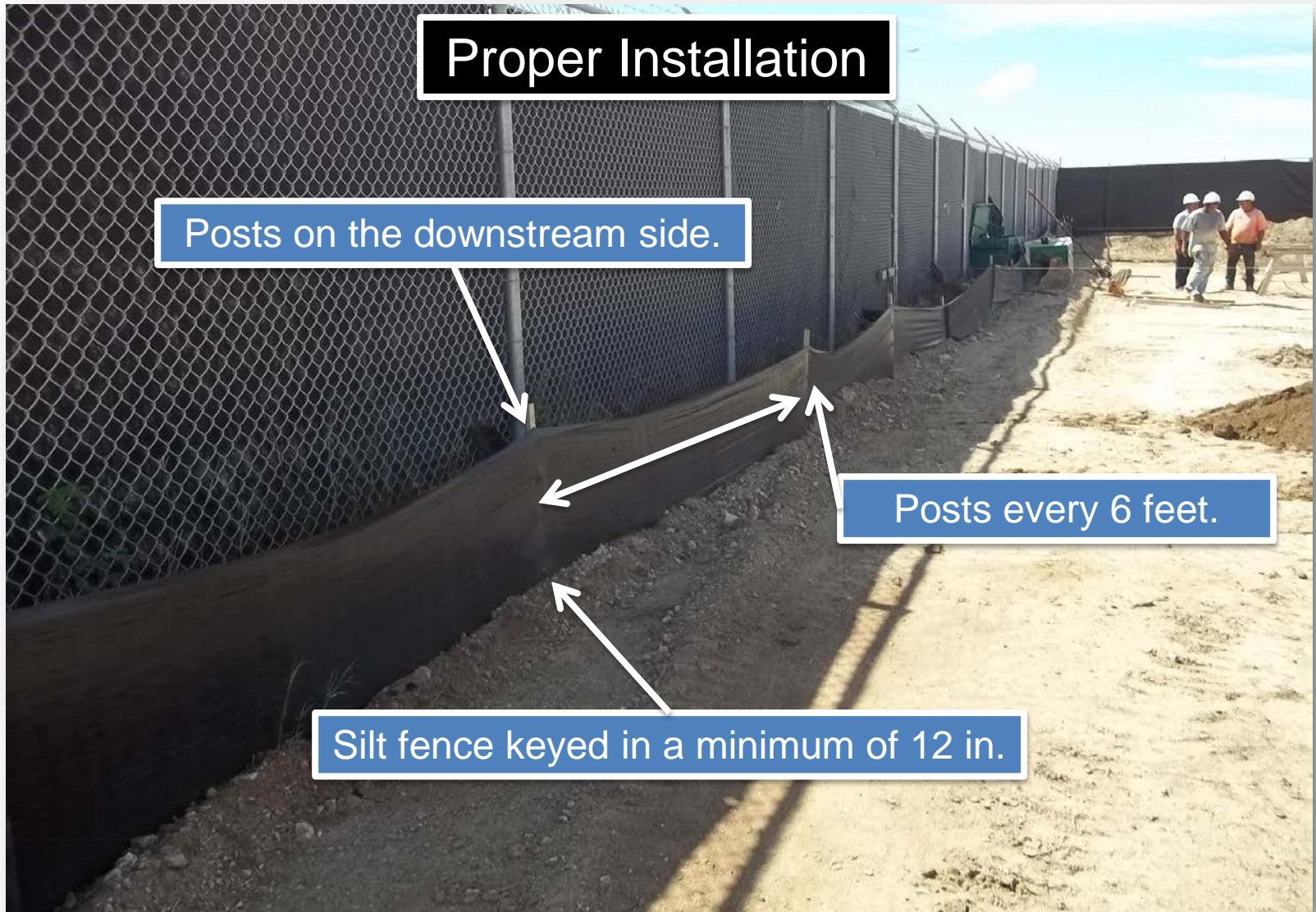


Common Inspection Findings

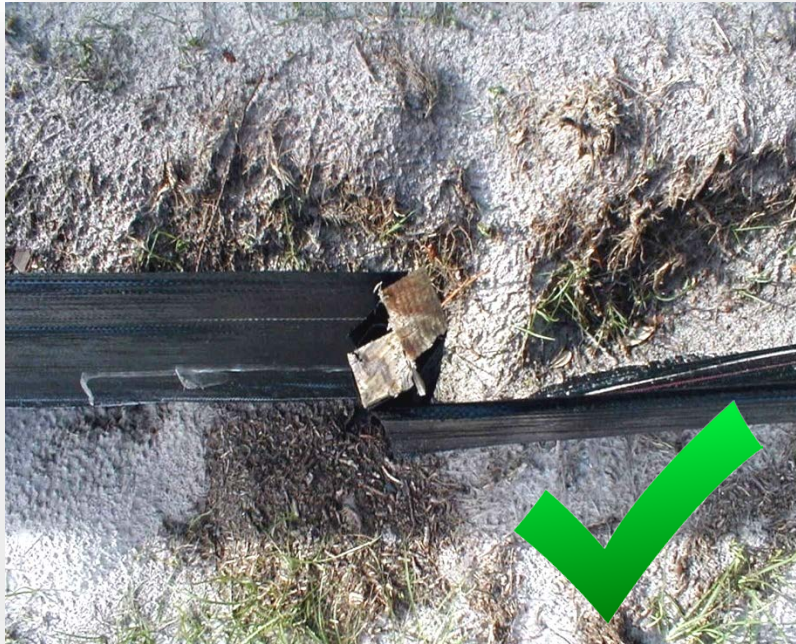
Silt fence not properly maintained.



Silt Fence (SE-1)



Silt Fence (SE-1)



Join segments by twisting or overlap by 6 inches.



Photo Source: City of Lincoln

End segments with a J-hook.

Maintenance is required when sediment accumulation is $\frac{1}{3}$ the height of the barrier.



Common Inspection Findings



Improper installation / maintenance of perimeter berms.



Common Inspection Findings

Improper installation of erosion control matting.



Common Inspection Findings

Drain inlet protection not properly maintained.



Remove sediment.

Replace torn filter fabric.

Position berms to form a barrier by overlapping them.



SE-10: Maintenance is required when sediment accumulation is $\frac{1}{3}$ the height of the barrier.



Common Inspection Findings

Improper management of saw cutting wastes.



Vacuuming fines without a filter.



Improper disposal of fines.



Wet saw cutting not vacuumed.



Common Inspection Findings

Improper concrete washout.

Kiddy pools degrade quickly due to corrosive wash water.



Cover / dispose when full.



Pits must be lined with a continuous sheet.



Common Inspection Findings

Leaking equipment and lack of spill response.



Spill Kits

- All contractors should have a spill kit available.
- Contents:
 - Absorbent materials.
 - Kitty litter, absorbent pad, berms, etc.
 - PPE such as gloves and goggles.
 - Bag or container for disposal.
 - Non-sparking tools for absorbent removal (broom and plastic dust pan).
- Ensure that spills are properly reported.



Common Inspection Findings

Uncontained stockpiles.



Stockpiles near drainage swales.



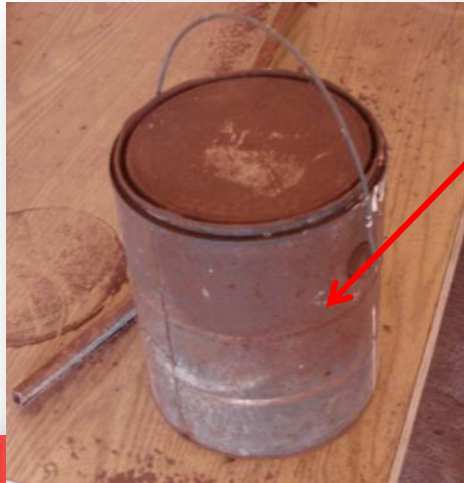
Inspection Findings

Improper disposal of paint.



Common Inspection Findings

Improper hazardous material management



No Label



No containment

Rusting causes
container breach



Common Inspection Findings



Improper solid waste management.



Solid Waste Management (WM-5)

- Remove debris from site.
- Place in watertight dumpster.
- Dispose of dumpster contents biweekly or more frequently as needed.
- Locate dumpster 50 ft from waterways.
- Segregate hazardous wastes from the recyclable items.





SWMP Enforcement

- Required when corrective actions are not immediately initiated by contractor.
- Conducted by Harbors Qualified Personnel with internal enforcement authority.
- Regulations that will be referenced:
 - SWMP.
 - Construction Contract.
 - HRS Title 15, Chapter 266.
 - HAR Title 19, Chapters 41 to 44.





EPA/HDOH Enforcement

- Administrative Penalties:
 - Class I Violation: Up to \$10,000 per violation (maximum \$25,000).
 - Class II Violation: Up to \$10,000 per day per violation (maximum of \$125,000).
- Criminal Penalties:
 - Negligent Violations: Up to \$2,500 - \$25,000 per day (1 yr prison).
 - Knowing Violation: Up to \$5,000 - \$50,000 per day (3 yrs prison).
 - Knowing Endangerment: \$250,000 (15 yrs prison) for an individual. \$1 million or an organization.
- False Statements: \$10,000 (6 months prison).





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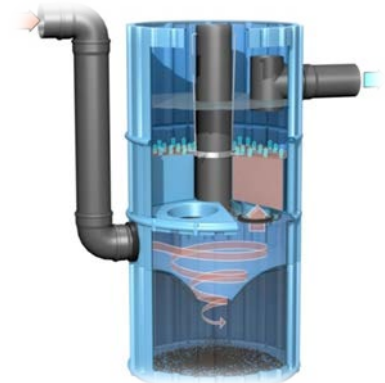
HDOT Harbors Post- Construction Process





Post-Construction BMPs

- A BMP that will remain in place following completion of construction to minimize the discharge of pollutants from routine operations on-site.
- Operation and Maintenance Plan required.





Post-Construction Considerations

- Projects of 1 acre or more **must** consider the inclusion of post-construction BMPs.
 - Exceptions:
 - Maintenance activities.
 - Reroofing.
 - Interior work.
 - Utility work.
 - Replacement of damaged pavement.
- Include in Design Review Submittal:
 - Post-Construction BMP Plan Checklist.
 - PSMP: Post-Construction Stormwater Mitigation Plan.





Post-Construction BMP Plan Checklist




Hawaii Department of Transportation – Harbors Division



Permanent Post-Construction Best Management Practice Plan Checklist

For a Harbors Project, please fill in this section	
Project Title:	
Project Location:	
Acreage of Site:	Harbors Project No.:
Name of Design Firm:	
Email:	Phone No.:

For a Tenant Improvement Project, please fill in this section	
Tenant Business Name:	Date:
Project Title:	
Project Location:	
Acreage of Site:	TMK No. (if any):





Post-Construction Stormwater Mitigation Plan (PSMP)



- Applicable to anticipated activities on the site AFTER construction is completed.
- Contents:
 - Narrative of project.
 - Site map.
 - Description of potential pollutants.
 - Drainage study and conditions of concern.
 - Post-Construction BMPs.
 - Maintenance requirements.



PSMP – Potential Pollutants

Priority Project Categories	General Pollutant Categories								
	Sediment	Trash & Debris	Metals	Organic Compounds	Nutrients	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Commercial Development > 1 acre	P ¹	P	P	P ²	P ¹	P ⁵	P	P ³	P ⁵
(Heavy) Industry Development	P	P	P	P		P	P		
Automotive Repair Shops		P	P	P ^{4,5}			P		
Restaurants		P				P	P	P	P ¹
Parking Lots	P ¹	P	P		P ¹	P ¹	P		P ¹
Fueling Facility		P	P	P		P	P		
Driveways	P	P	P	P ⁴	P ¹	P ⁵	P		P ¹

P = potential pollutant.

Refer to Section 3.1 of Post-Construction Stormwater Management Manual.



PSMP – BMP Selection

- Select from these categories:
 - **Low Impact Development (LID)**
 - Goal — Keep the stormwater on-site and treat it as a resource instead of a waste.
 - Example — Conserve vegetated areas.
 - **Source Control**
 - Goal — Keep potential pollutants from coming into contact with stormwater runoff.
 - Example — Cover a maintenance area.
 - **Treatment Control**
 - Goal — Remove pollutants from stormwater runoff.
 - Example — Hydrodynamic separators.



Order of Preference





PSMP – BMP Selection (cont.)

- Refer to City and County of Honolulu resources.
 - BMP Manual for Construction.
(http://cleanwaterhonolulu.com/storm/learning_center/BMP_manual_2011-11.pdf)
 - BMP Guide
 - Rules Relating to Storm Drainage Standards.
(http://www.cleanwaterhonolulu.com/storm/notices/2013_sds/index.html)
- Required capacities:
 - Volume based BMPs must capture 1 or 1.5 inches of stormwater.
 - Flow based BMPs must capture/treat rainfall intensity of 0.4 inches per hour.





Common Permanent BMPs

- Conserve Natural Areas, Soils, and Vegetation:
 - Conduct construction activities such that disturbance to existing vegetated areas is minimized, in particular trees.
 - Refer to CCH Storm Water BMP Guide, pg 4.



Ideal Implementation:

- In areas where there is existing vegetation





Common Permanent BMPs

- Vegetated Swale:
 - Broad earthen channel vegetated with erosion resistant and flood tolerant grasses.
 - Runoff is typically conveyed through channel, which allows for infiltration and treatment.
 - Refer to CCH Storm Water BMP Guide.



Ideal Implementation:

- Along streets and parking lots.





Common Permanent BMPs

- Permeable Pavement
 - Paved surfaces that infiltrate, treat, and/or store rainwater where it falls.
 - Refer to CCH Storm Water BMP Guide.

Ideal
Implementation:

- Driveways and parking lots.
- Areas where flooding is a problem.



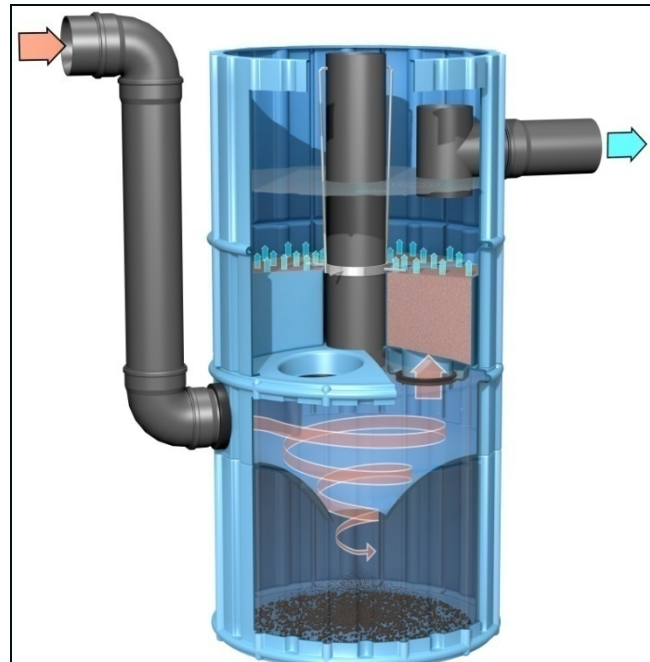


Common Permanent BMPs

- Hydrodynamic Separators.
 - Flow through structures with a settling or separation unit to remove sediments and other pollutants.
 - Refer to CCH Storm Water BMP Guide.

Ideal Implementation:

- Areas where materials to be removed from runoff are heavy particulates – which can be settled – or floatables – which can be captured, rather than solids with poor settleability or dissolved pollutants.

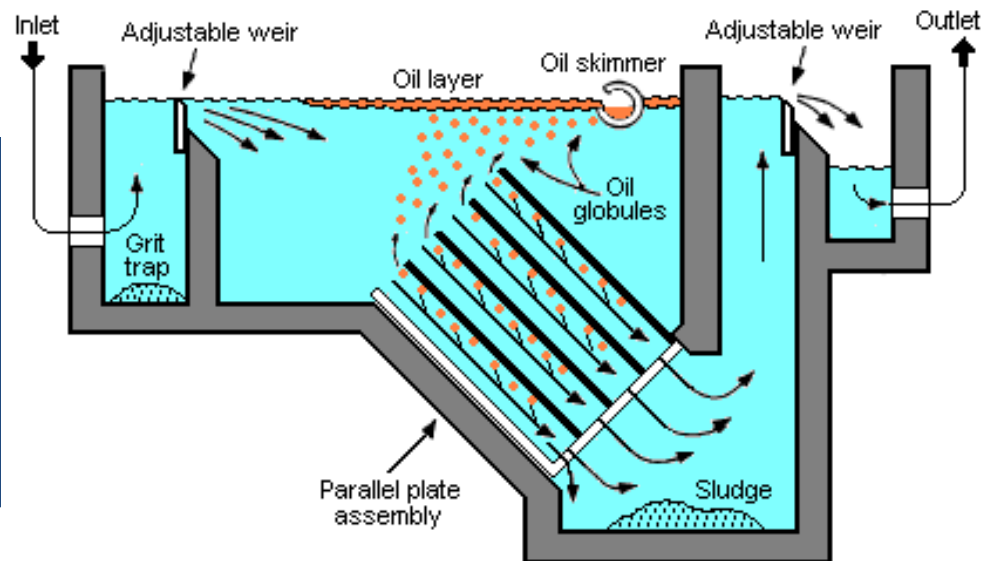


Preferred Permanent BMPs

- Oil Water Separators
 - Separates oil from water before discharge.
 - Refer to CCH Storm Water BMP Guide, Vehicle Cleaning.


Ideal Implementation:

- Areas where vehicle repairs or washing take place.





Take-Away

- **All projects must be reviewed** prior to start.
 - Projects over 1 acre must include post-construction BMPs.
 - **Inspections are an important tool** to catch problems before they result in regulatory enforcement.
 - **Main goal is to ensure that pollutants are not contaminating receiving waters or MS4.**
 - Best if potential pollutants can be kept on-site!
 - It is cheaper to implement BMPs than pay the regulatory fine.
 - **Be familiar with construction documents, Harbor's SWMP programs, City and County of Honolulu BMP manual, and BMP Guide.**
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Questions



- Harbors Website:
<http://hidot.hawaii.gov/harbors/malamaikeawakai/>
- Harbors Contacts:
 - Stormwater Reporting Hotline: 587-1962
 - Environmental Section: Joy Zhang, P.E.
587-1960, ying.j.zhang@hawaii.gov.

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PROTECT OUR HARBOR WATERS

