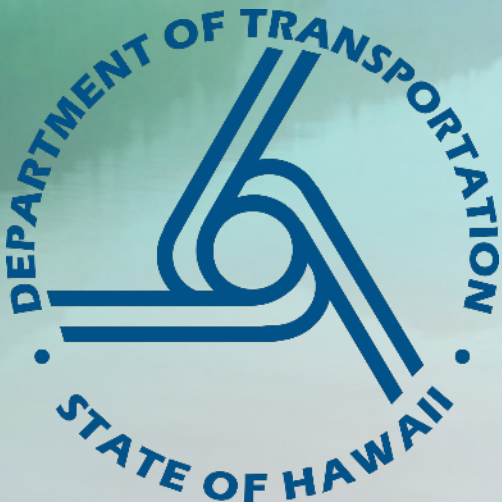


The BMP Score Card – A look at BMP problems in 2021



**PROTECT
OUR WATER**

MĀLAMA I KA WAI

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



Speaker

Claudia Akroyd, CHST, CISEC
BOWERS + KUBOTA CONSULTING

Project Inspector

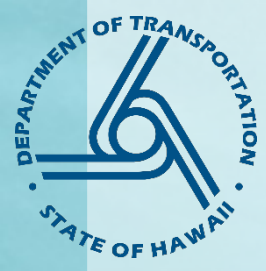
Responsible for conducting independent inspections of DOT-HWYS Contract Construction projects in accordance with DOT-HWYS National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit on Oahu



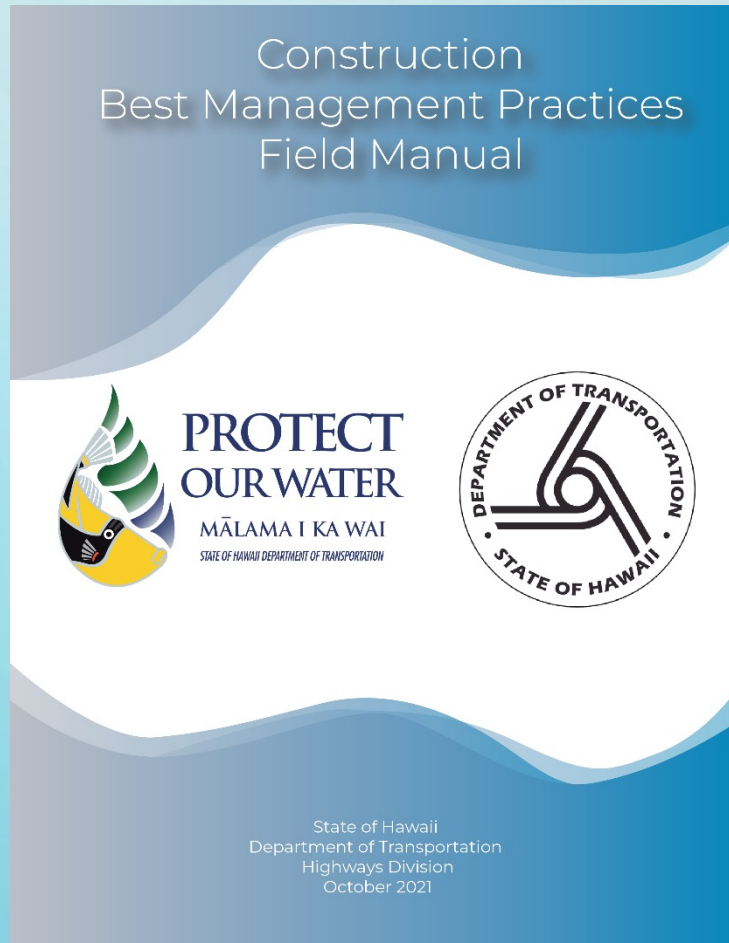
**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



New Revised BMP Manual



Went into effect October 1, 2021 for all projects

Available for download

- stormwaterhawaii.com
- Resources
- Contractor & Consultants
- Contractors
- Look for Manual listing with (Oct 2021) after the title.



**PROTECT
OUR WATER**
MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



What will be covered

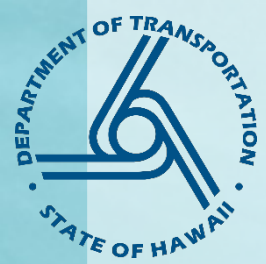
- **The top BMP deficiencies cited in 2021**
- **Most common reasons the BMP was cited as deficient**
- **What is the fix**



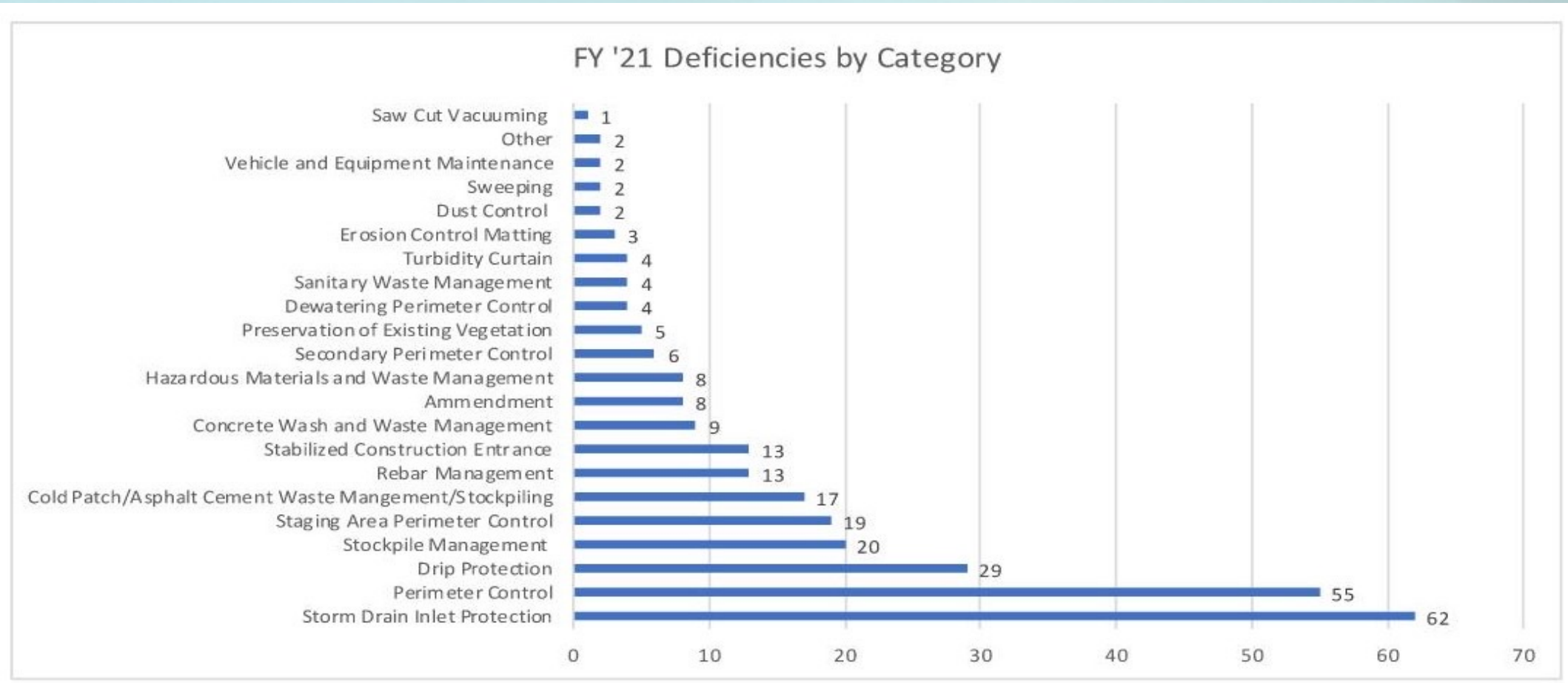
**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



2021 Deficiencies noted as of 8/1/21 – 7 months



PROTECT
OUR WATER
ĀLAMA I KA WAI

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



2021 Deficiencies noted as of 8/1/21 – 7 months

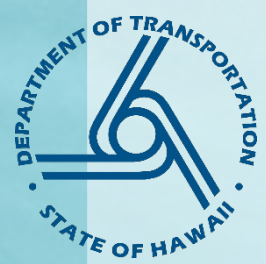
Type of Control	Total Deficiencies
Storm Drain Inlet Protection	62
Perimeter Control	55
Drip Protection	29
Stockpile Management	20
Staging Area Perimeter Control	19
Cold Patch/Asphalt Cement Waste Mangement/Stockpiling	17
Rebar Management	13
Stabilized Construction Entrance	13
Concrete Wash and Waste Management	9
Ammendment	8
Hazardous Materials and Waste Management	8
Secondary Perimeter Control	6
Preservation of Existing Vegetation	5
Dewatering Perimeter Control	4
Sanitary Waste Management	4
Turbidity Curtain	4
Erosion Control Matting	3
Dust Control	2
Sweeping	2
Vehicle and Equipment Maintenance	2
Other	2
Saw Cut Vacuuming	1
	288



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



Deficiencies to be Discussed

Type of Control	Total Deficiencies
Storm Drain Inlet Protection	62
Perimeter Control	55
Drip Protection	29
Stockpile Management	20
Staging Area Perimeter Control With Perimeter Control	19
Cold Patch/Asphalt Cement Waste Mangement/Stockpiling	17
Rebar Management	13
Stabilized Construction Entrance	13
Concrete Wash and Waste Management	9
Ammendment	8
Hazardous Materials and Waste Management	8
Secondary Perimeter Control With Perimeter Control	6
Preservation of Existing Vegetation	5
Dewatering Perimeter Control	4
Sanitary Waste Management	4
Turbidity Curtain	4
Erosion Control Matting	3
Dust Control	2
Sweeping	2
Vehicle and Equipment Maintenance	2
Other	2
Saw Cut Vacuuming	1
	288



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



Source of Count

3rd Party Inspection Reports

(January – July 2021)

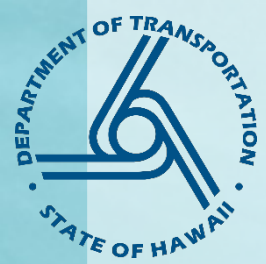
Many of the deficiencies found are very minor and would have taken 5 minutes to fix.



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



Pre- Inspection Tips



Walk the site – check the BMPs

Best done day before inspection



Fix the simple stuff



Bigger stuff – have a crew start the repairs.

Report if repaired during inspection – circle back with inspector



Lay on a standby repair crew during inspection

Report if repaired during inspection – circle back with inspector



Good intentions go a long way with any inspector



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



Storm Drain Inlet Protection (62)

Missing or not reinstalled after storm event

Falling In

Damaged

Improperly installed

Proper installation or suggested fixes



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Missing

Gravel bag missing – presumed stolen – still a deficiency



Gravel bag in place – less than 5 minutes to replace



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Not reinstalled following rain

Water starting to pond – area prone to flooding – inlet protection was pulled



Forgot to reinstall following rain – 5 minutes to reinstall – protection usually staged nearby



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Falling into Drain



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Damaged



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Improperly Installed



5/22/2012 10:38:05 AM



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



Gravel Filled Bags

- Don't fill to capacity – will pop like a balloon when run over
- Specifications for snake bags say 75% - gives room to shift inside
- Choose sturdy bags – may cost more but will last longer
- Have spares on site to switch out prior to inspection



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Dandy Curbs



Insufficient rock at ends of dandy bag

- Specs say 50% clean rock
- Photo dandy curb has 50%
- Problem is rock shifts
- Recommend 75% and check often to redistribute rock



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Curb Inlet Guard



- Must use gravel not sand per spec
- Don't pack the snake bag or gravel bag full – will break when run over
- Fill bag only 75% per spec – room to shift when run over
- Bag at each end and each overlap



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Curb Inlet Dam

Device too short



Installation per Specifications



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Grated Drain Inlet (GDI)



- Frame of inlet does not always hold fabric
- Must ensure no gaps in coverage
- Wedge fabric to sides of box
- Allow 6" minimum, excess fabric to extend past grate on all sides



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Alternative to Fabric under Grate

Ultra Drain Guard

In action during heavy rain



PROTECT
OUR WATER



MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Protection Falling into drain



- Biosocks move and will be pushed into inlet
- Commercially available clips can be used
- Do not use boards or signposts – will allow water to run behind biosock or through post holes



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Warning !



Prevention of sediment going into drains remains a requirement regardless of directive to pull inlet protection.



Perimeter control is required to be sufficient to prevent sediment from reaching inlet



Inlet protection is last resort for a project



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



Perimeter Control (55/19/6)

Common or easy to fix

Biosock vs. silt fence

What happens when there is insufficient perimeter control

Perimeter control vs. stock/spoil pile

Staging Area Perimeter Control (19)

Secondary perimeter protection – Buffer zones (6)



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Common or Easy to Fix Problems



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Biosock Directional Lap

Break in between biosocks
allows sediment to run through



Upslope biosock inside lower –
kicks sediment back into site



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Zip Ties Are Your Friend

Tie up the end of the broken biosock



Repair small damaged areas in biosock or reattach silt fence to upright



TECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Biosock Vs. Silt Fence

Biosocks float and move during initial rain fall until saturated



Silt fence will hold tremendously more sediment especially if reinforced



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

What happens with insufficient perimeter control



No perimeter control upslope on the sides of the swale

Hydro mulch has some control properties but not much

Directive to pull inlet protection does not relieve project from responsibility for any discharge of sediment

Provide perimeter control up slope – inlet protection is last resort



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Staging Area Perimeter Control vs. Stock/Spoil Pile Control

No separate perimeter control –
Sediment can leave the site



Perimeter control must be
separated from all other controls



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Staging Area Perimeter Control is not a rack for construction materials



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



Secondary Perimeter Protection – Buffer Zones

HAR 11-55, Appendix C, Paragraph 5.1.2.1 : Requires to provide natural buffer zones and sediment control when a state water is located within 50 feet of the project's earth disturbance.

When an undisturbed natural buffer zone of 50 feet is not possible then double sediment control (e.g., double perimeter control) will be provided spaced a minimum of 5 feet apart.

There are exemptions for linear construction projects such as roads spelled out in the template in Section 7.2.9 – Buffer Documentation. NOT AUTOMATIC

Some linear project will require buffer zones or secondary perimeter protection – checking the exemption box doesn't mean it's not required



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



Hawaii Revised Statutes Definition of Shoreline

Hawaii Revised Statutes TITLE 13. PLANNING AND ECONOMIC DEVELOPMENT
205A. Coastal Zone Management defines "shoreline" as "the upper reaches of the wash of the waves, other than storm and seismic waves, at high tide during the season of the year in which the highest wash of the waves occurs, usually evidenced by the edge of vegetation growth, or the upper limit of debris left by the wash of the waves."

NOTE: This definition includes King Tides



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Example of Secondary Protection in Lieu of Natural Buffer Zone

Leeward Bikeway: Philippine Sea Rd to Waipahu Depot St

Construct a 8-10 foot-wide bikeway within an existing right of way

Will also include reconstruction of two existing bridges

Total length of the construction area is 3.2 miles

Portion runs by the Pouhala Marsh



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Natural 50-foot Buffer Zone



Must be
undisturbed

Must still install
sediment control



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

No Natural 50 Feet Buffer Zone

BMPs starting to be installed



Secondary protection in place 5 feet from first



2021. 8.24 9:38

PROTECT
OUR WATER



MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



Drip Protection (29)

If it has a motor that uses gas or has hydraulic fluid it needs drip protection

Required under all idle or stationary equipment such as cranes

Drip protection is either drip pad or pan

Drip pads consist of barrier layer (such as plastic) and an absorbent layer over plastic.

Plastic needs to be one continuous sheet with no overlaps where fluids can leak through

Berm needs to be placed around lower side of any drip pad

Drip protection under paving equipment must include hopper and roller assembly



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



Common Problems

No drip pad/pan

No absorbent fabric or fabric is torn

Insufficient or torn plastic

Damaged biosocks used as downslope berm



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Evolution of a Drip Pad



Open to water

Elapsed time start to finish
was less than 15 minutes



Plastic and berm
being installed

11/ 4/2017 13:35



Fabric being installed

11/ 4/2017 13:37



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Drip Pad Required Rather Than Pan



No absorbent fabric
and open bucket of
hydraulic fluid – flitrex
siltsoxx not staked
down



- Small remote-controlled equipment
- Paving equipment

Drip pad required under
paver hopper and roller
assembly – With rain you get
an oil slick



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Drip Pad



Without the plastic,
fabric just filters oil



- Plastic needs to extend to edge of fabric – preferred extend past end
- Impervious steel plate does not make a drip pad

Leak running off
steel plate



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Mobile and Fixed Drip Pad

Scroll type configuration can move with equipment – can construct to any size



Recommend berm be placed under plastic to create pooling effect should there be a leak



PROTECT
OUR WATER



MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Size Matters

Make sure the pan catches the drip –
May need additional protection under
pan



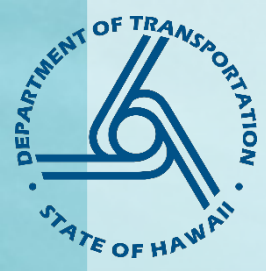
Not commercially available BMP – too
small or you really need to be lucky to
hit pan



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



Stockpile Management (20)

Requirements

Easy to fix problems

Examples of other problems found



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



Requirements



Reduce the potential for air and water pollution originating from stock and spoil piles

Cover with 10 mil plastic and provide protection around the entire stock/spoil pile

Make sure the plastic cannot be blown off

If pile is too large to cover, alternative methods are available such as hydro mulch with tackifier.

Perimeter protection of the area is NOT stock/spoil pile protection



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Easy to Fix Problems



Torn cover/Gap in perimeter



Cover weighted with product covering



Covered with fabric not plastic



Not completely covered



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Nearly All Piles Can Be Covered

View is of one-half of the pile



Extreme piles can be hydro mulched with tackifiers



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

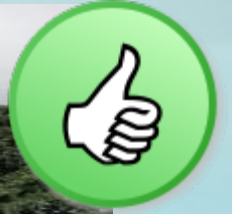
www.stormwaterhawaii.com

Stock/Spoil Pile Control vs. Staging Area Perimeter Control

No separate perimeter control –
Sediment can leave the site



Perimeter control must be
separated from all other controls



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



Cold Patch/Asphalt Cement Waste Management/Stockpiling (17)

Petroleum based products

- Treat runoff as hazardous
- Prevent contact with bare ground or other spoils
- To store waste or stockpiles place on impervious material/cover against contact with rainwater, provide perimeter control



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

No Contact with the Ground

The ground is now contaminated with petroleum

Place on impervious material, cover and install perimeter protection



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Waste Asphalt or Cold Patch

Do not mix with other spoils

Almost got it – Plastic under fabric is impervious but it's not covered or have perimeter control



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Rebar Management

- Per Appendix C, HAR 11-55; prevent contact with rainwater – recommend cover with plastic or temporary roof
- Considered a point source of pollutants
- Protection needed for rebar, creosote poles and galvanized steel
- Racking off the ground and covering prevents contact from rainwater

Racked and covered with viaduct “roof”



Covered not racked – laying in water



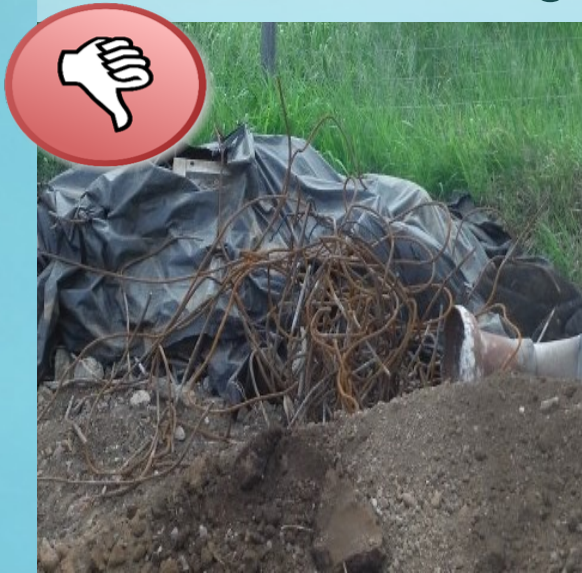
**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Rebar (13)

- Rack off the ground and cover
- Don't forget scrap rebar
- Don't forget rebar cages



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Easy to Fix Problems

Cover with plastic not fabric –
Fabric allows rain to penetrate



Don't forget to pick up scrap
rebar



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Stabilized Construction Entrances (13)

Include Stabilized Construction Entrance at all points that exit onto paved roads. (Per Section 209- DOT Specifications)



Exits directly from pad to
asphalt



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

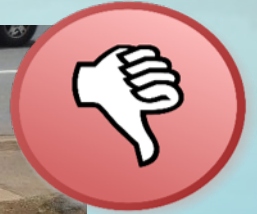
www.stormwaterhawaii.com

Traditional Rock Entrance

Good rock size, depth of rock,
size of entrance



Being overwhelmed with fines -
tracking



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Alternative Entrance Types – GEOTERRA Grid

Can pick up and use at next site

Grid cells need to be cleaned to be effective



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Alternative Entrance Types – Track out Plates

Can use separately or in conjunction with another type of entrance

Need to keep clean or get tracking – easy to fix



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

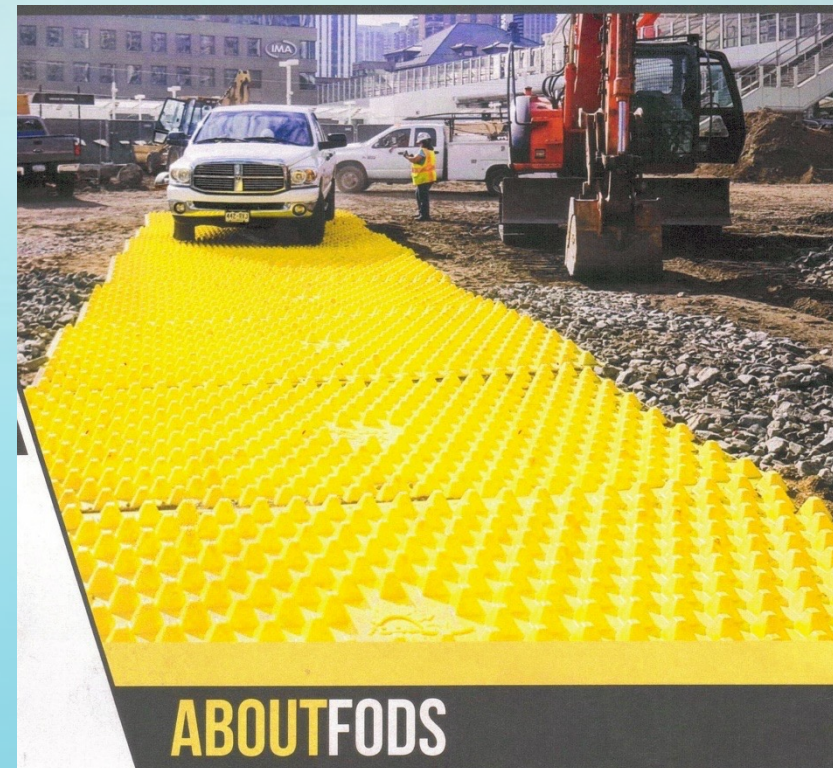
Other Alternatives

Mud Mats – when damaged must replace



Damaged beyond repair

FODS – Available on island but have not seen them used



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



Concrete Washout and Waste Management

Concern is for products containing cement

Washwater must be contained in impervious washout

Store cement-based material under cover to prevent contact with rainwater

Waste concrete shall not be allowed to harden on the ground – removed while wet

Placing concrete in water environment/tremie pours and drill shafts any water displaced that was in contact cement-based material must be collected for disposal and not allowed to percolate into the ground.



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Standard Inground Washout



Washout has holes
in plastic

- Must have one continuous sheet of at least 10 mil plastic
- **NO** holes
- No overlaps



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Sufficient Capacity – Fill to only 75%



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Recommend Secondary Containment – No contamination and easy cleanup

Even commercial washouts can leak



Contractor made washouts often leak when plastic punctured by rock



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com

Clean Up Waste Concrete When Wet

Covering with plastic doesn't make it right



Almost got it – Need bigger board or big sheet of plastic – Don't allow runoff



PROTECT
OUR WATER

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com



Questions?



**PROTECT
OUR WATER**

MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

www.stormwaterhawaii.com