



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

# Cost Effective Erosion and Sediment Control Design

November 2020

Richard Price P.E.



EA Engineering,  
Science, and  
Technology, Inc., PBC



PROTECT  
OUR  
WATER

MĀLAMA I KA WAI  
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

# AGENDA

- Introductions
- Construction Stormwater Pollution Prevention Plan (SWPPP) Background
- Erosion and Sediment Control (ESC) Design
- SWPPP
- Closing/Questions





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

# INTRODUCTION: ABOUT ME

- Who am I?
- What is my background?
- What is my stormwater background?

Richard Price, P.E., LEED AP, ENV SP, CSM, CISEC, QISP

[rprice@eaest.com](mailto:rprice@eaest.com)





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

# INTRODUCTION: ABOUT YOU

- Who are you?
- What is your stormwater background?
- What do you want to learn from this class?

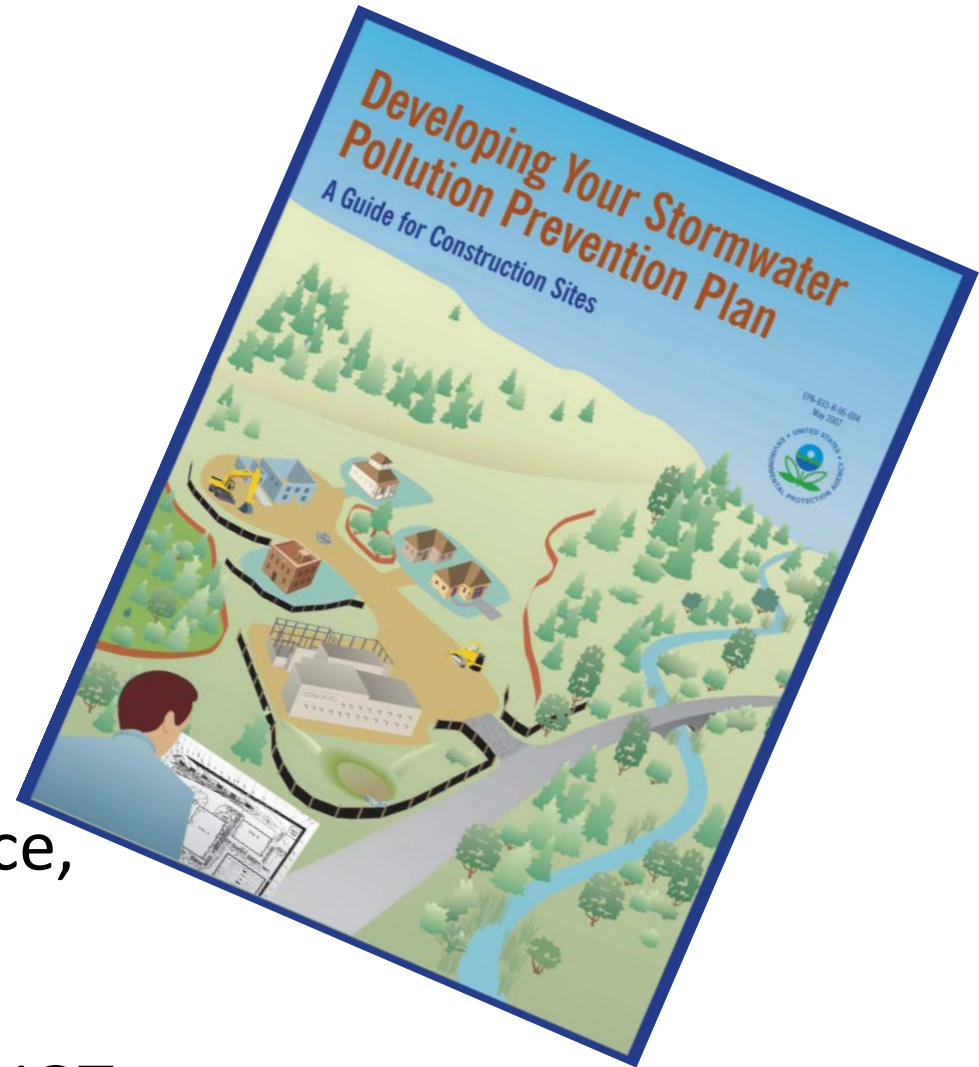




PROTECT  
OUR  
WATER  
MĀLAMA I KA WAI  
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

# Developing Your Stormwater Pollution Prevention Plan

- Getting Started
- SWPPP Development
- Selecting BMPs
- Implementation
- Inspection, Maintenance, and Recordkeeping
- Final Stabilization and NOT
- [Stormwaterhawaii.com](http://Stormwaterhawaii.com)





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

# AGENDA

- Introductions
- **Construction Stormwater Pollution Prevention Plan (SWPPP) Background**
- Erosion and Sediment Control (ESC) Design
- SWPPP
- Closing/Questions





# SWPPP BACKGROUND



## What is a SWPPP?

- Plan to **Prevent Stormwater Pollution**
- Signed by a company executive
- Identifies activities and conditions that could cause water pollution
- Details the steps to prevent the discharge of unpermitted pollution

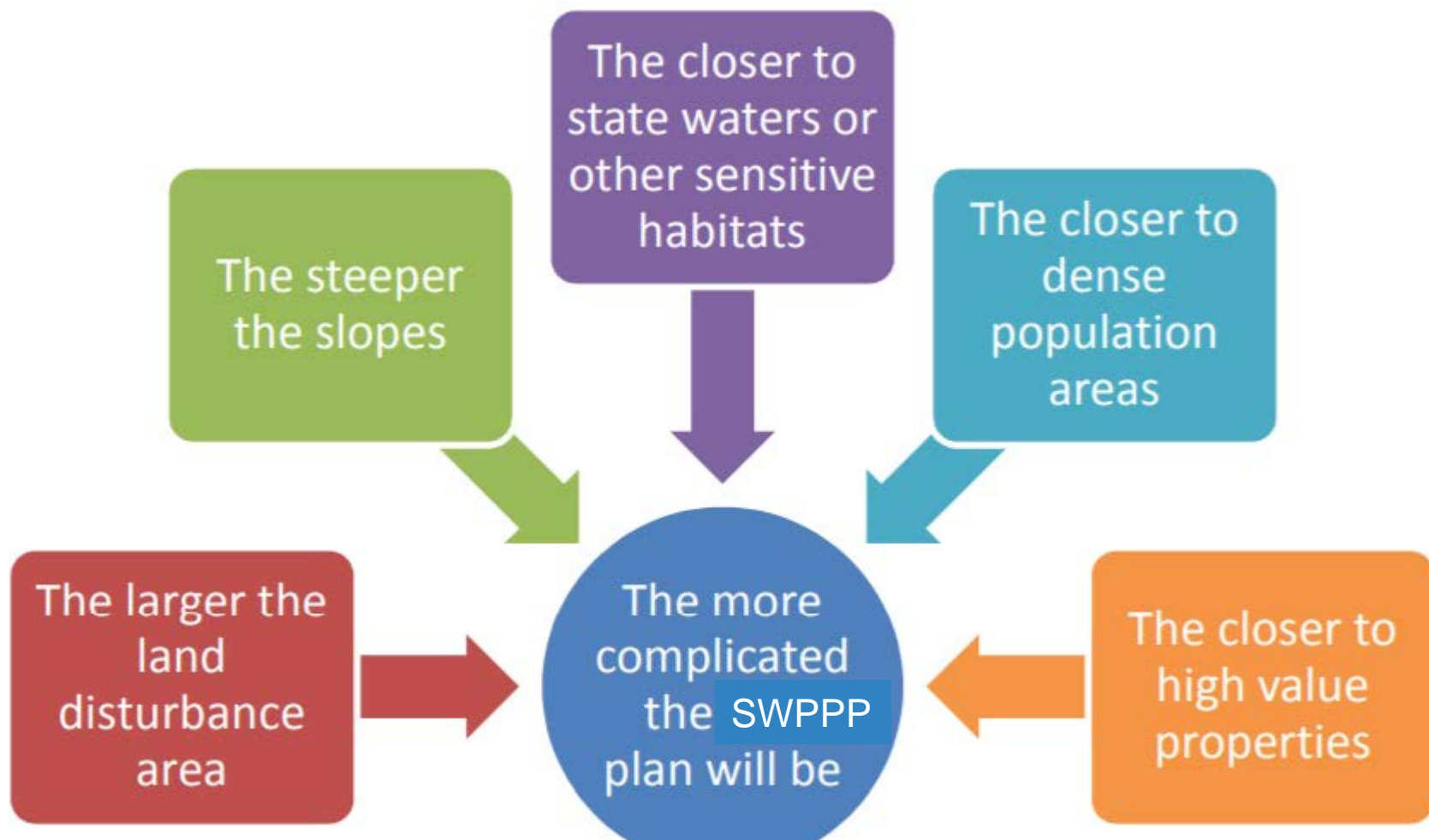




PROTECT  
OUR  
WATER  
MĀLAMA I KA WAI  
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

# SWPPP BACKGROUND

## What is Adequate SWPPP for Your Project?





# SWPPP BACKGROUND

## THE GHOST OF CONSTRUCTION PAST

- Silt Fence
- Silt Fence
- Silt Fence



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



# SWPPP BACKGROUND

## THE GHOST OF CONSTRUCTION PRESENT

- Approved SWPPP
- Variety of BMPs Available
- Great Improvement... but...



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



# SWPPP BACKGROUND

## THE GHOST OF CONSTRUCTION FUTURE

- Erosion and Sediment Control Plan Part of Sealed Design and Bid Documents
- Prescribed BMPs
- Maybe Better?!? ...but no flexibility



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





PROTECT  
OUR  
WATER

MĀLAMA I KA WAI  
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

# AGENDA

- Introductions
- Construction Stormwater Pollution Prevention Plan (SWPPP) Background
- **Erosion and Sediment Control (ESC) Design**
- SWPPP
- Closing/Questions



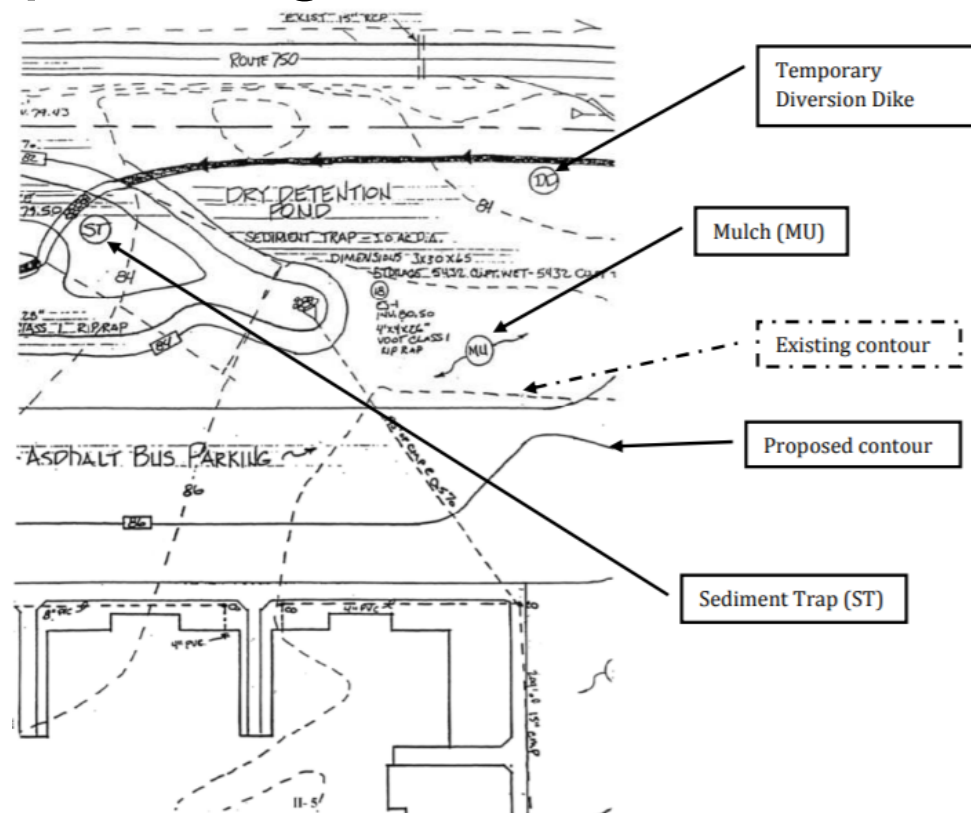




PROTECT  
OUR  
WATER  
MĀLAMA I KA WAI  
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

# ESC PLANS

- Set Guidelines, Expectations, and Timing
- Construction Sequencing
- Dual Use BMPs



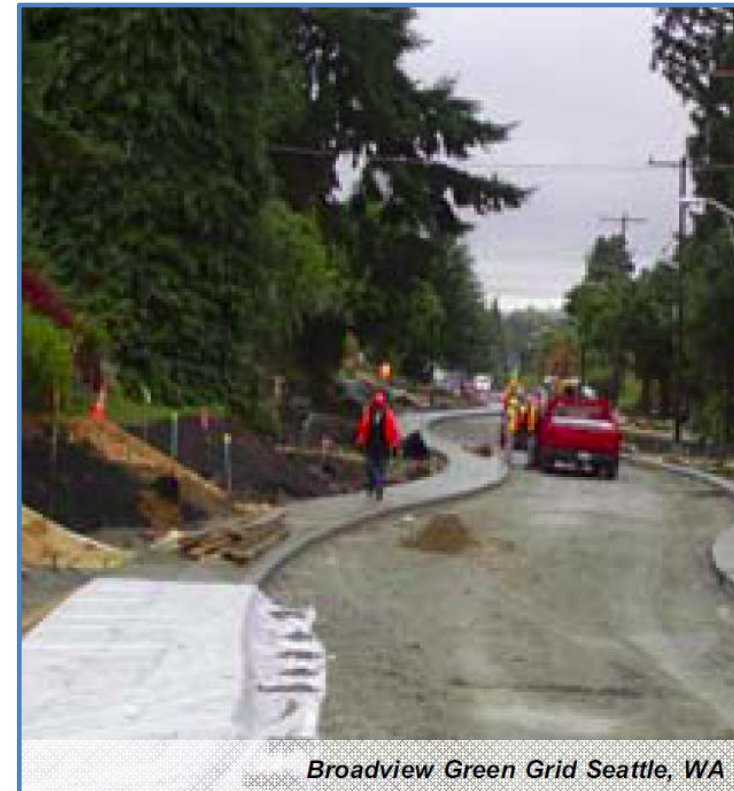


PROTECT  
OUR  
WATER  
MĀLAMA I KA WAI  
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

# Constructability Review/ Contractor Means and Methods

Engineers Always Know Best!

- Review ESC as Well:
  - Construction Sequencing
  - ESC Plans
  - Dual Use BMPs



Broadview Green Grid Seattle, WA







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

# Pre-Bid Meeting/ Contractor Means and Methods

- Include Designer, Contractors, Field Engineer, Inspectors
- Make sure everyone understands what you are building—***and their role!***





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

# AGENDA

- Introductions
- Construction Stormwater Pollution Prevention Plan (SWPPP) Background
- Erosion and Sediment Control (ESC) Design
- **SWPPP**
- Closing/Questions



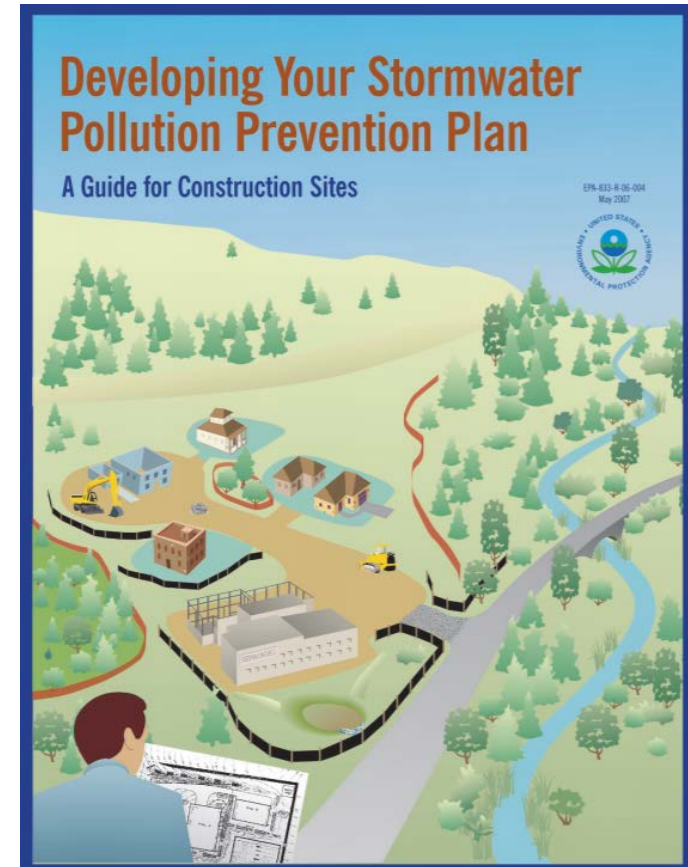
# SWPPP DEVELOPMENT



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

## What is Your Plan?

- Comply with Regulations
- Permit Approval
- Speed up NTP
- Save Money?!?



# SWPPP DEVELOPMENT

## ESC Principle 1: Minimize disturbed area and protect natural features and soil

- Reduced LOD
- Laydown Area(s)
- Stream/Drainage Buffers
- Save Money?!?



PROTECT  
OUR  
WATER

MĀLAMA I KA WAI  
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION



# SWPPP DEVELOPMENT

## ESC Principle 2: Phase construction Activity

- Follow Progression of Work
- Minimize Active Disturbance
- Reduced Risk
- BMP Selection
- Save Money?!?



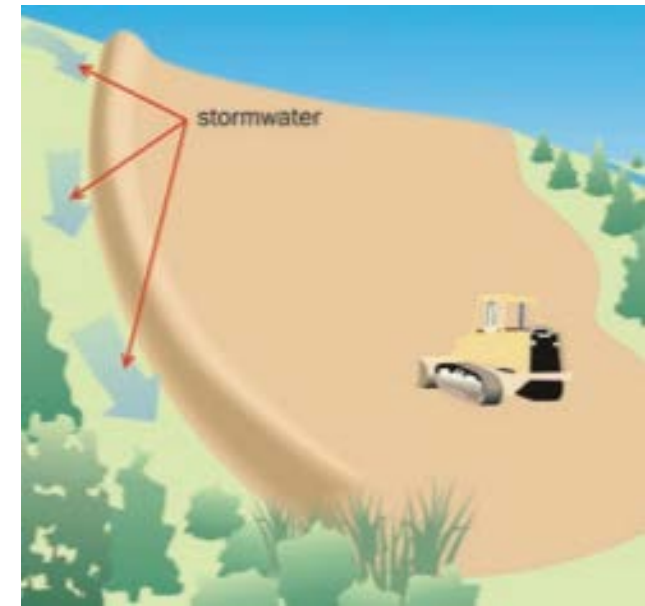
PROTECT  
OUR  
WATER  
MĀLAMA I KA WAI  
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION



# SWPPP DEVELOPMENT

## ESC Principle 3: Control stormwater flowing onto and through your project

- Diversion Ditches or Berms
- Minimize the SW You Manage
- Again, Phased Construction
- Save Money?!?



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



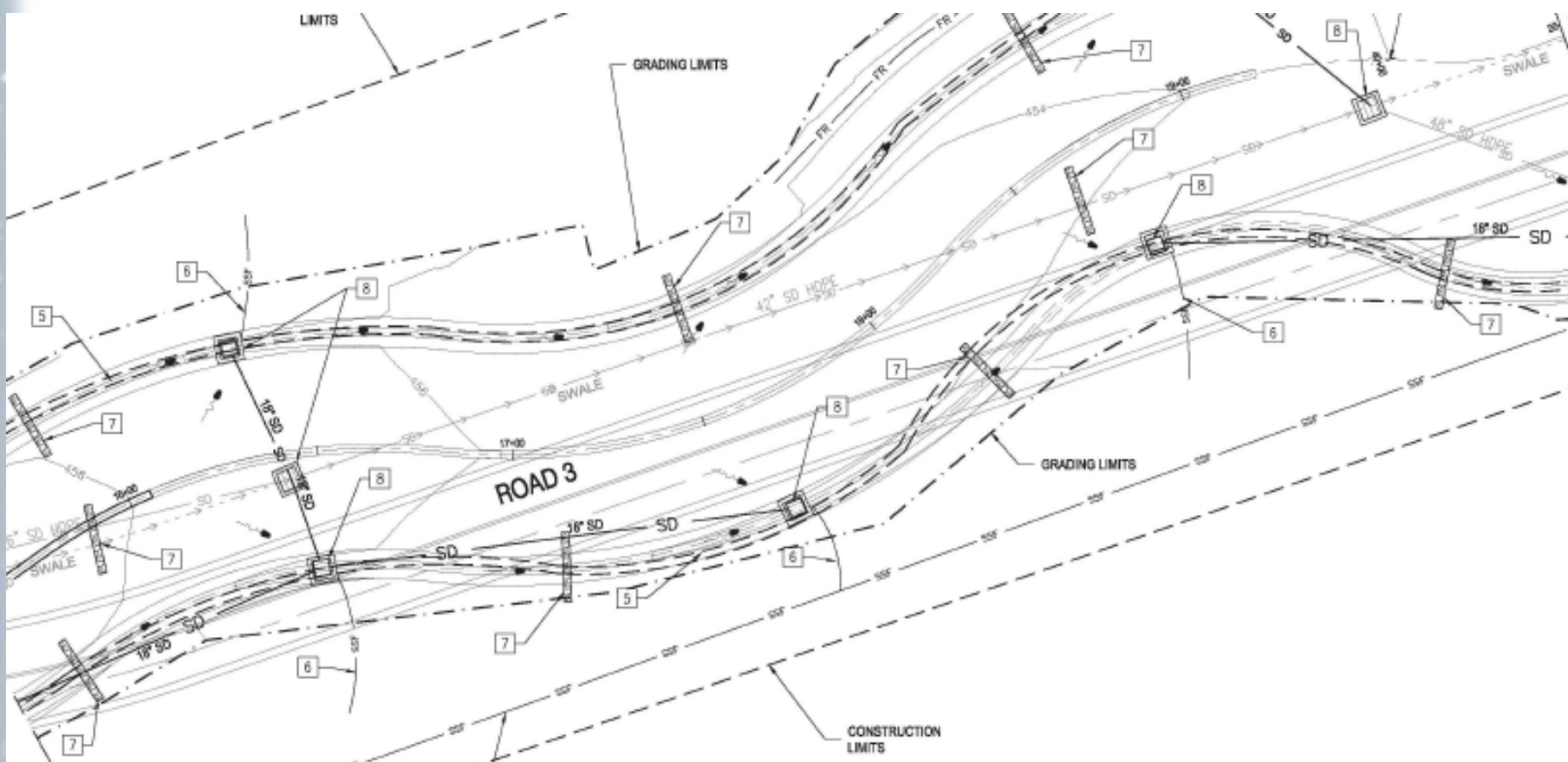




PROTECT  
OUR  
WATER  
MĀLAMA I KA WAI  
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

# SWPPP DEVELOPMENT

## ESC Principle 3: EXAMPLE



- Save Money?!?

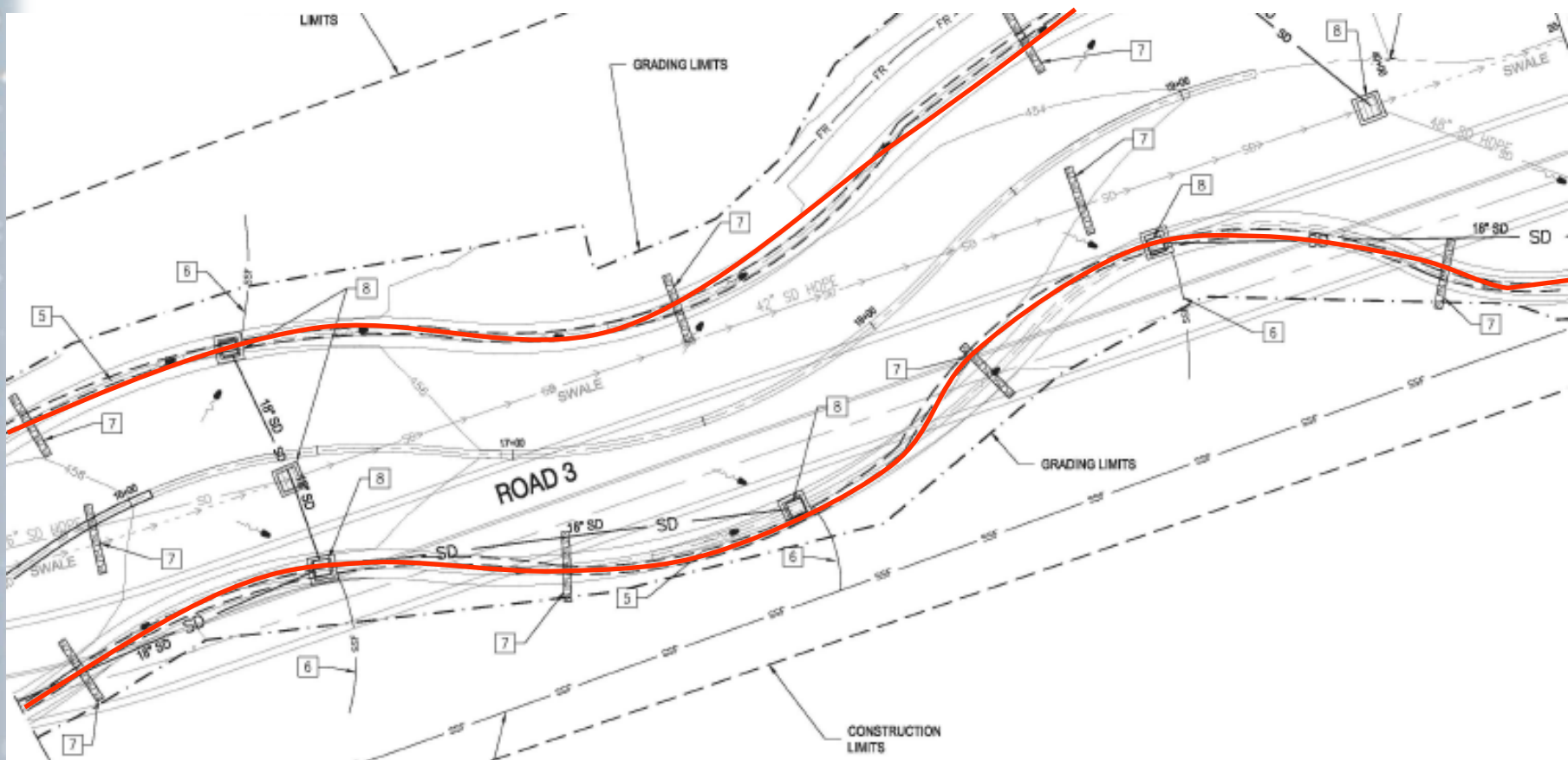




PROTECT  
OUR  
WATER  
MĀLAMA I KA WAI  
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

# SWPPP DEVELOPMENT

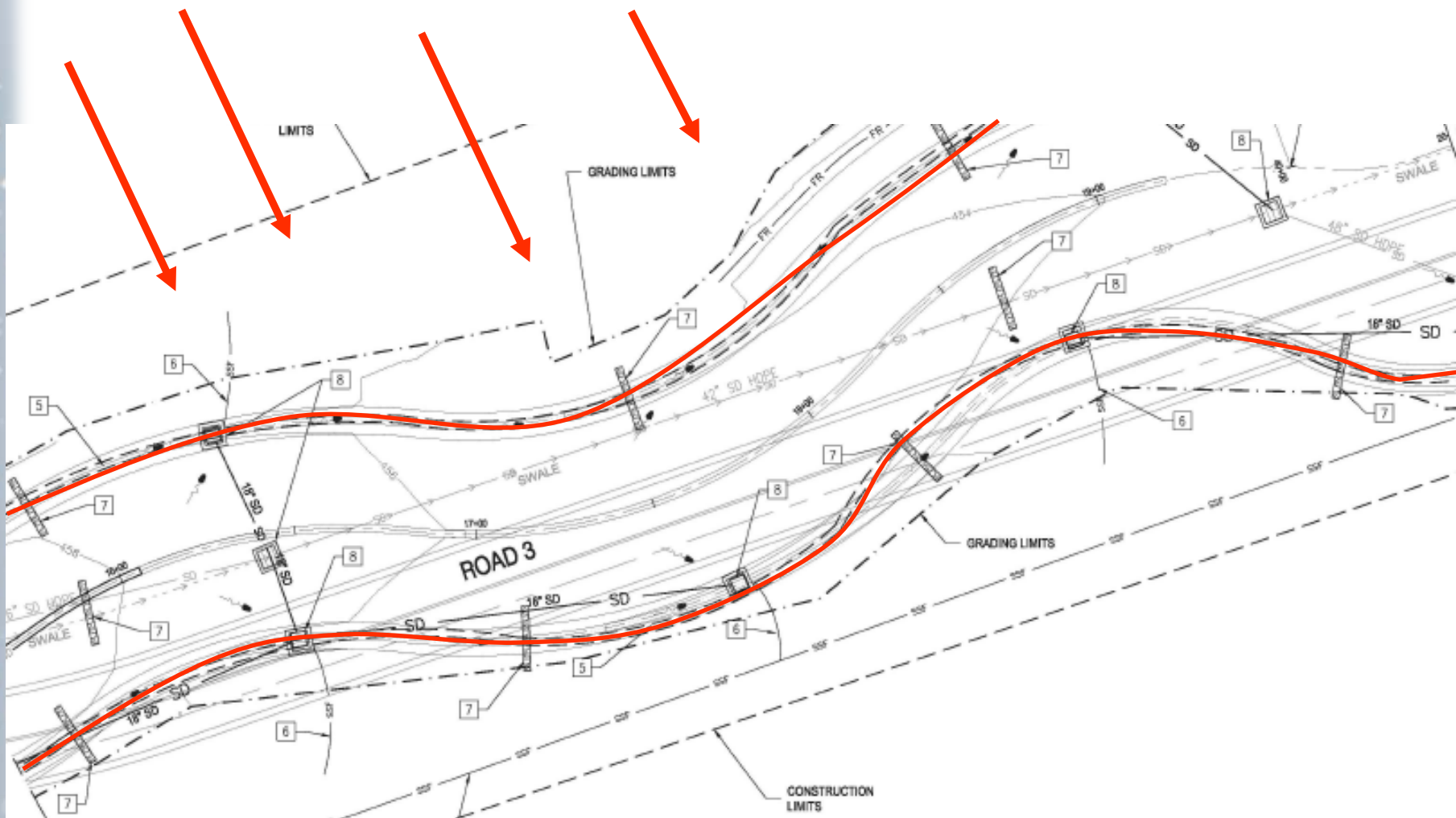
## ESC Principle 3: EXAMPLE





# SWPPP DEVELOPMENT

## ESC Principle 3: EXAMPLE



- Save Money?!?

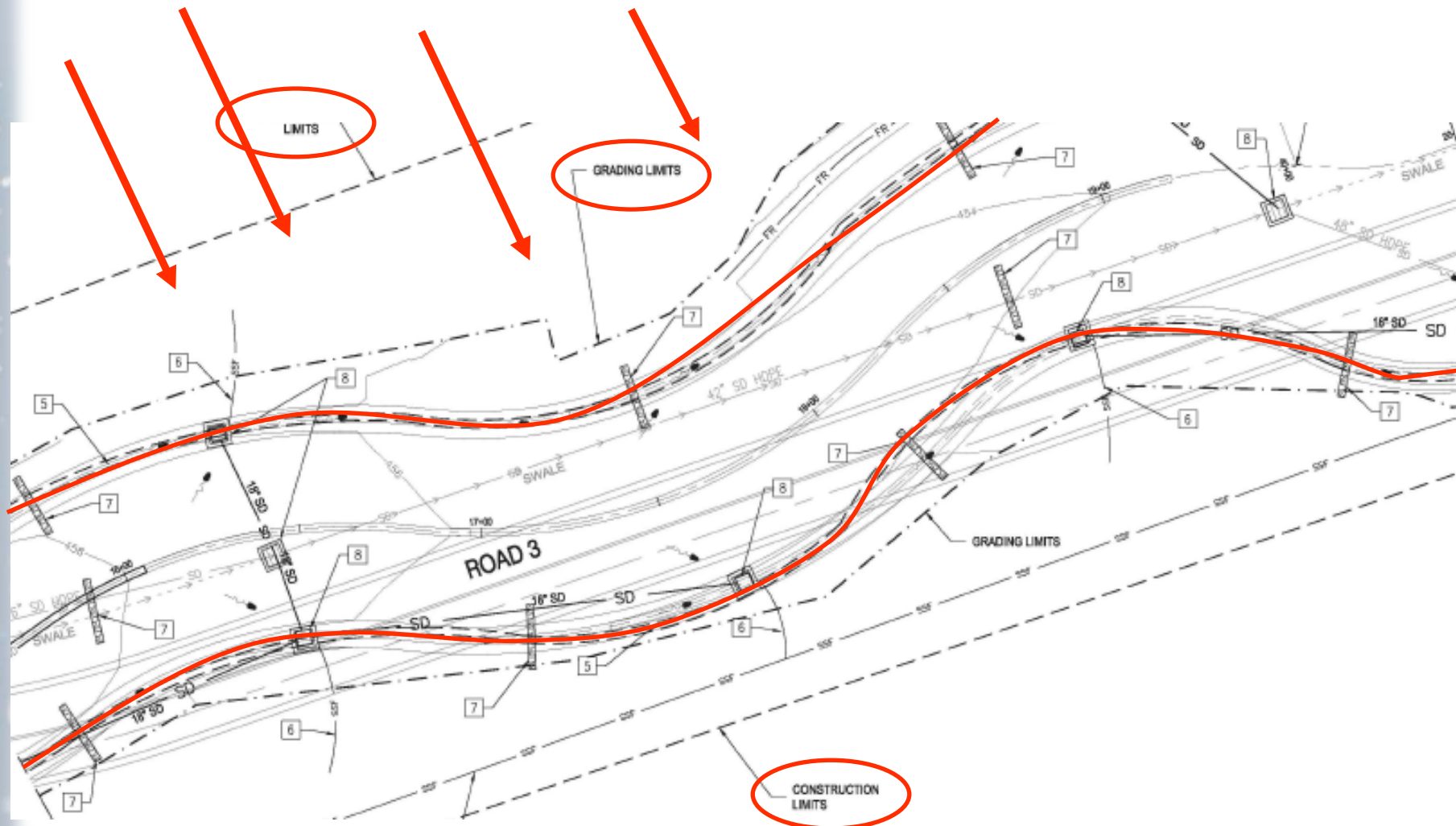




PROTECT  
OUR  
WATER  
MĀLAMA I KA WAI  
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

# SWPPP DEVELOPMENT

## ESC Principle 3: EXAMPLE



- Save Money?!?





# SWPPP DEVELOPMENT

## ESC Principle 4: Stabilize soils promptly

- Again, Project Phasing
- Part of Housekeeping
- Final Stabilization ASAP!
- Save Money?!?



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



# SWPPP DEVELOPMENT

## ESC Principle 5: Protect slopes

- Steeper, Longer Slopes = Complex ESC
- Again, Project Planning and Phasing
- BMP Selection: Matting?
- Final Stabilization ASAP!
- Save Money?!?



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

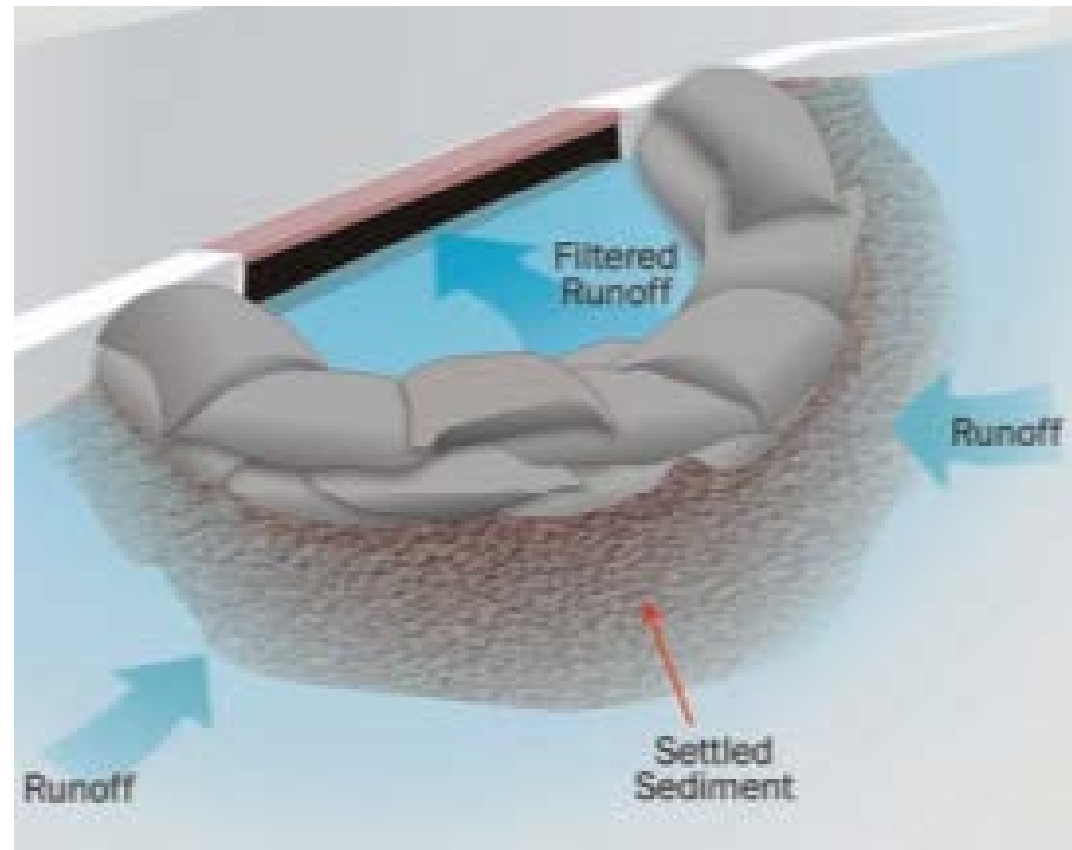




# SWPPP DEVELOPMENT

## ESC Principle 6: Protect storm drain inlets

- BMP Selection
- Maintenance
- Save Money?!?



PROTECT  
OUR  
WATER

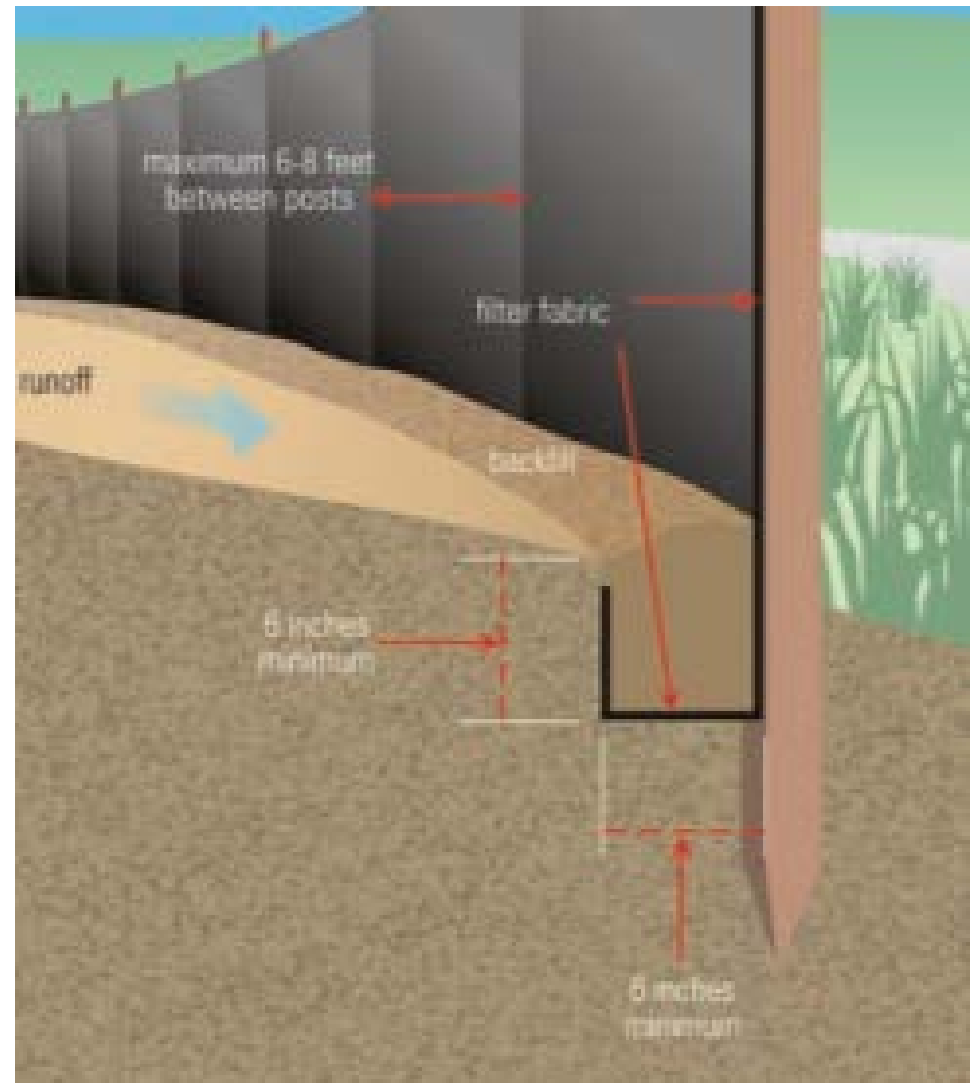
MĀLAMA I KA WAI  
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION



# SWPPP DEVELOPMENT

## ESC Principle 7: Establish perimeter Controls

- Silt Fence
- Silt Fence
- ????
- Save Money?!?



PROTECT  
OUR  
WATER

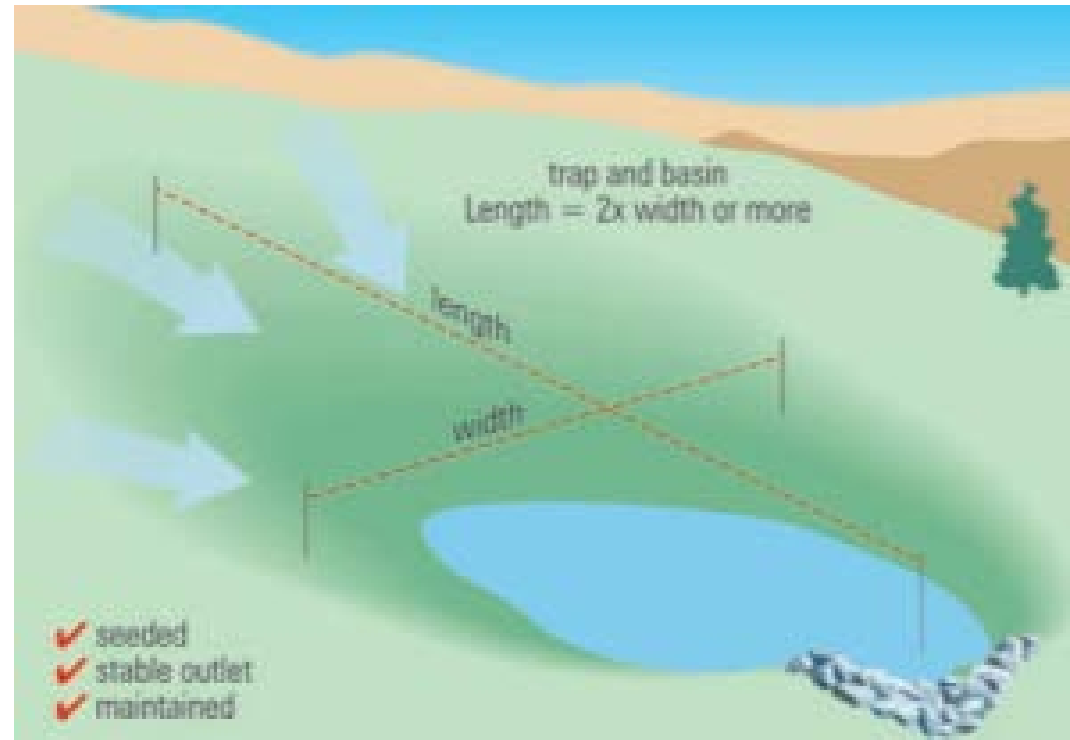
MĀLAMA I KA WAI  
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION



# SWPPP DEVELOPMENT

## ESC Principle 8: Retain sediment on-site and control dewatering practices

- Sediment Traps/Basins
- Dual Use BMPs
- Space ???
- Save Money?!?



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



# SWPPP DEVELOPMENT



PROTECT  
OUR  
WATER

MĀLAMA I KA WAI  
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

## ESC Principle 9: Establish stabilized construction exits

- Phasing/Site Layout
- Wheel Wash?
- Space ???
- Save Money?!?



# SWPPP DEVELOPMENT



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

## ESC Principle 10: Inspect and maintain Controls

- Maintenance
- Maintenance
- Maintenance
- Save Money?!?



# SWPPP DEVELOPMENT

## Other Controls

### Erosion Control:

- Surface roughening, trackwalking,
- Soil bioengineering techniques (e.g., live staking, fascines, brush wattles)
- Composting/Soil Amendments
- Sodding

### Sediment Control:

- Gravel bag barrier
- Compost berm
- Baffles or skimmers in sediment basins to increase effectiveness
- Level spreaders
- Energy dissipaters
- Check dams



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







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

# SWPPP IMPLEMENTATION

- Training
- Responsibility: Subcontractor Flow-down
- Implement SWPPP Before Construction
- Inspections
- Corrective Actions
- Is Your SWPPP Working for You?





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

# FINAL STABILIZATION AND PERMIT TERMINATION

- Final Stabilization
  - Damn Grass!
  - What is 70%?
- Site Cleanup and BMP Removal
- Documentation and Record Retention
- Did Your SWPPP Work for You?

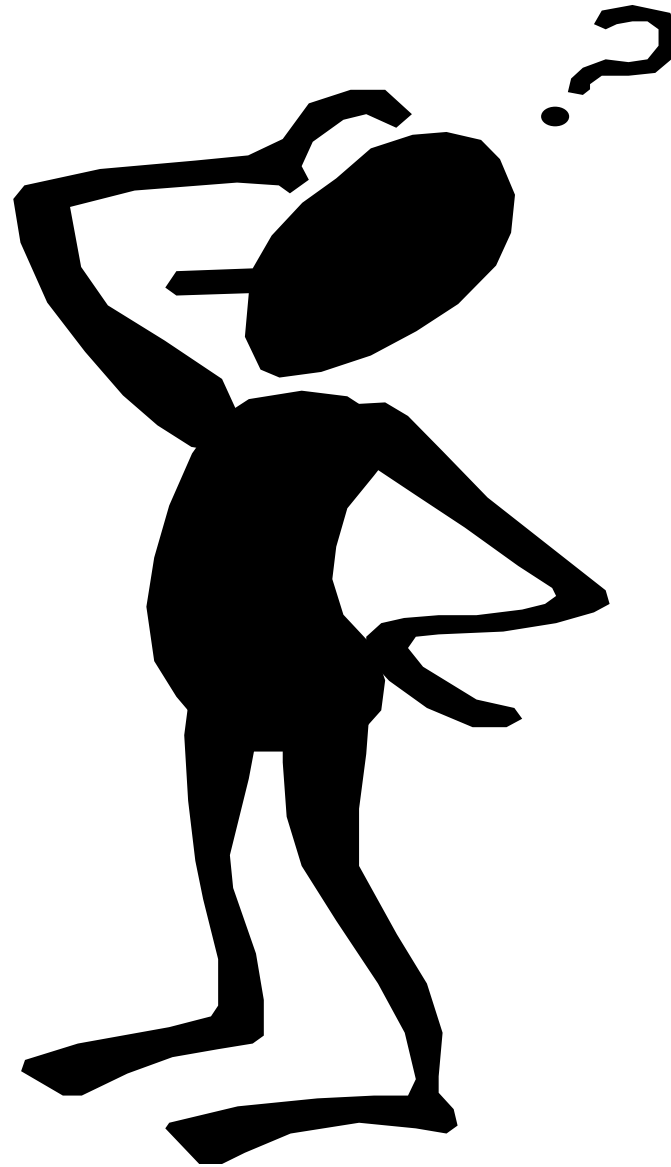




PROTECT  
OUR  
WATER

MĀLAMA I KA WAI  
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

# A QUESTION FOR EACH OF YOU...





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

# WHAT CREATIVE IDEAS WILL YOU COME UP WITH IN THE YEARS AHEAD?

- Reduce water pollution that originates in construction projects
- Integrate ESC into project design, planning, and implementation
- Save \$\$\$ and do a better job to leave a minimal footprint on the beauty of Hawaii







PROTECT  
OUR  
WATER

MĀLAMA I KA WAI  
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

# MAHALO!







## POTENTIAL Q&A

“We can’t dictate the contractor’s means and methods... can we?”

- Why not?
- The contractor works for us, right?
- We have different interests.
- We have expertise where they don’t.





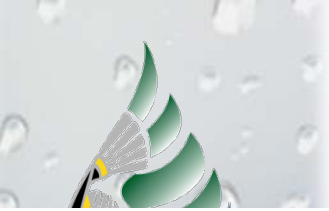
# “Didn’t that slow production?”

---

## Contractor:

- “We may have been shut down for a day after a rain, not a week.”
- “Unless the rain was falling, we were working.”





# “If you don’t mind me askin’, how much did she set you back?”

---

Significant direct contract cost increases  
Not considering savings due to  
improvements in -

- Safety
- Reduction in traffic delays
- Production
- Headache

