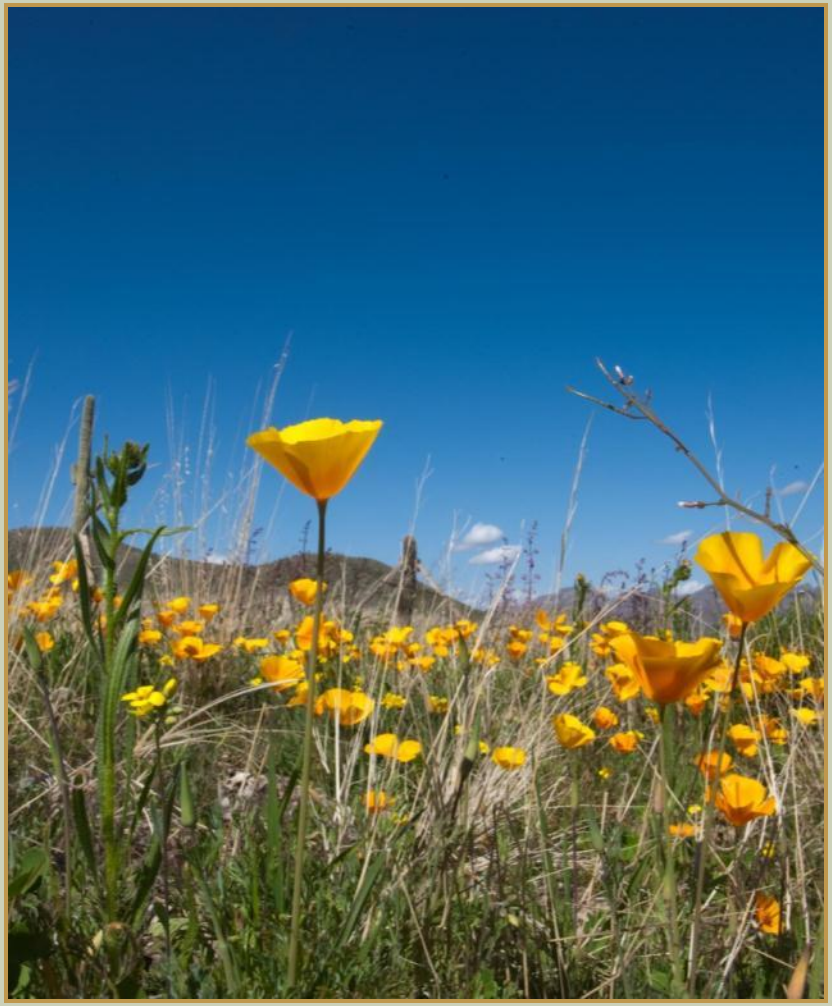
2: Project Planning & Design Guide

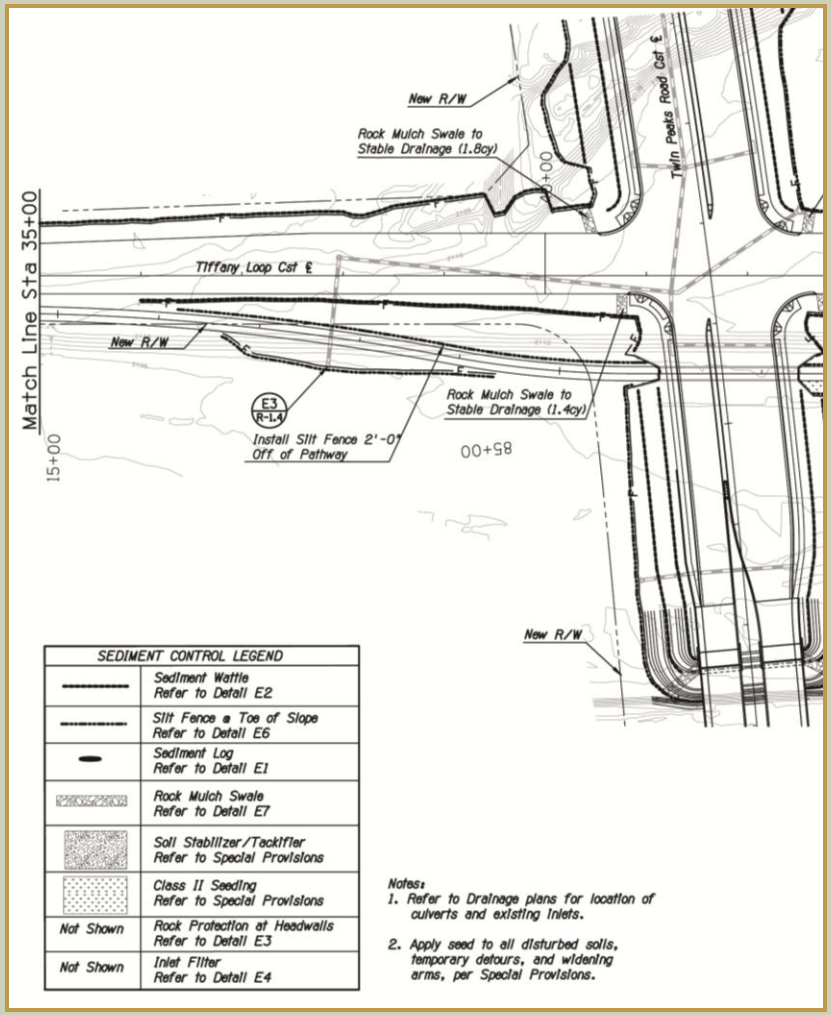
INTRODUCTION

- Use this Chapter together with Chapter 5 (Best Management Practices) to identify and select project appropriate BMPs.
- Effective erosion and pollution control is ongoing through project establishment and maintenance.
- Low Impact Design (LID) strategies can help meet stormwater management goals.



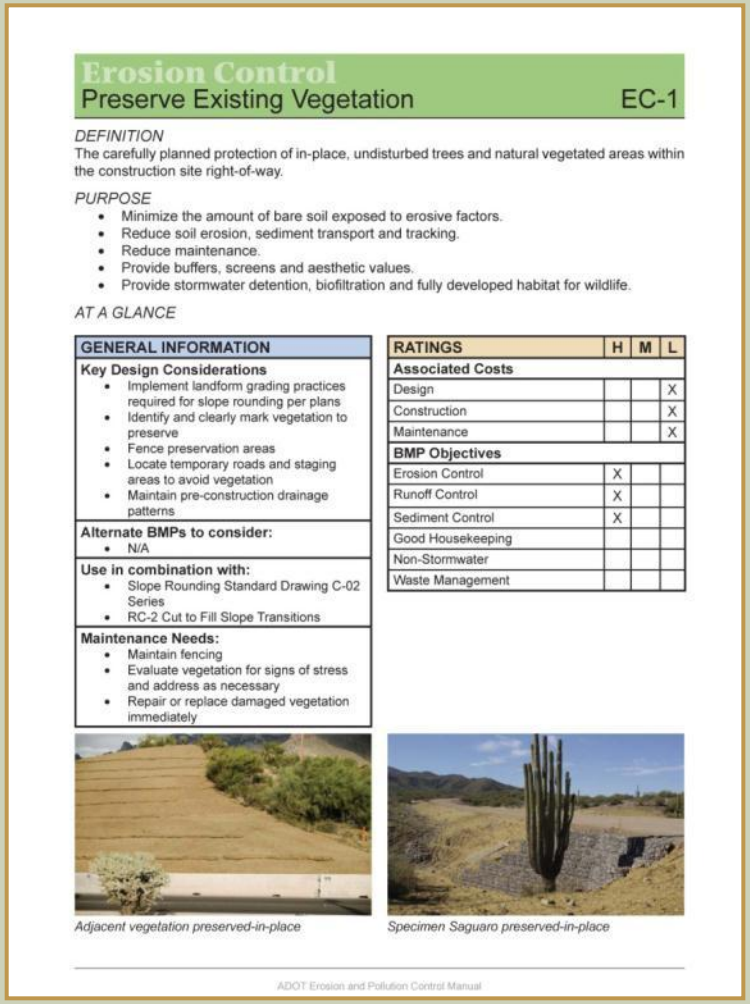
PROJECT PLANNING & DESIGN

- During the design process, the Engineer and Landscape Architect work together to minimize project impacts to water quality.
- Erosion and Pollution Control Plans and Details are developed. The plans:
  - Provide general direction and specific BMP expectations to the Contractor.
  - Guide the Contractor in developing a Stormwater Pollution Prevention Plan (SWPPP) with actual methods of construction, project phasing, and access requirements.



BEST MANAGEMENT PRACTICES

- A BMP is an Operational Activity or Physical Control that reduces the discharge of pollutants and minimizes potential impacts upon receiving waters.
  - Construction BMP: Temporary measures to control stormwater quality during the construction process, including landscape establishment.
  - Post-Construction BMP: Permanent measures to manage stormwater quality during and after project construction (refer to the *ADOT Post-Construction Best Management Practices Manual).*



Erosion Control
Preserve Existing Vegetation EC-1

DEFINITION
The carefully planned protection of in-place, undisturbed trees and natural vegetated areas within the construction site right-of-way.

PURPOSE
- Minimize the amount of bare soil exposed to erosive factors.
- Reduce soil erosion, sediment transport and tracking.
- Reduce maintenance.
- Provide buffers, screens and aesthetic values.
- Provide stormwater detention, biofiltration and fully developed habitat for wildlife.

AT A GLANCE

GENERAL INFORMATION

Key Design Considerations
- Implement landform grading practices required for slope rounding per plans
- Identify and clearly mark vegetation to preserve
- Fence preservation areas
- Locate temporary roads and staging areas to avoid vegetation
- Maintain pre-construction drainage patterns

Alternate BMPs to consider:
- N/A

Use in combination with:
- Slope Rounding Standard Drawing C-02 Series
- RC-2 Cut to Fill Slope Transitions

Maintenance Needs:
- Maintain fencing
- Evaluate vegetation for signs of stress and address as necessary
- Repair or replace damaged vegetation immediately

RATINGS	H	M	L
Associated Costs			
Design			X
Construction			X
Maintenance			X
BMP Objectives			
Erosion Control	X		
Runoff Control	X		
Sediment Control	X		
Good Housekeeping			
Non-Stormwater			
Waste Management			

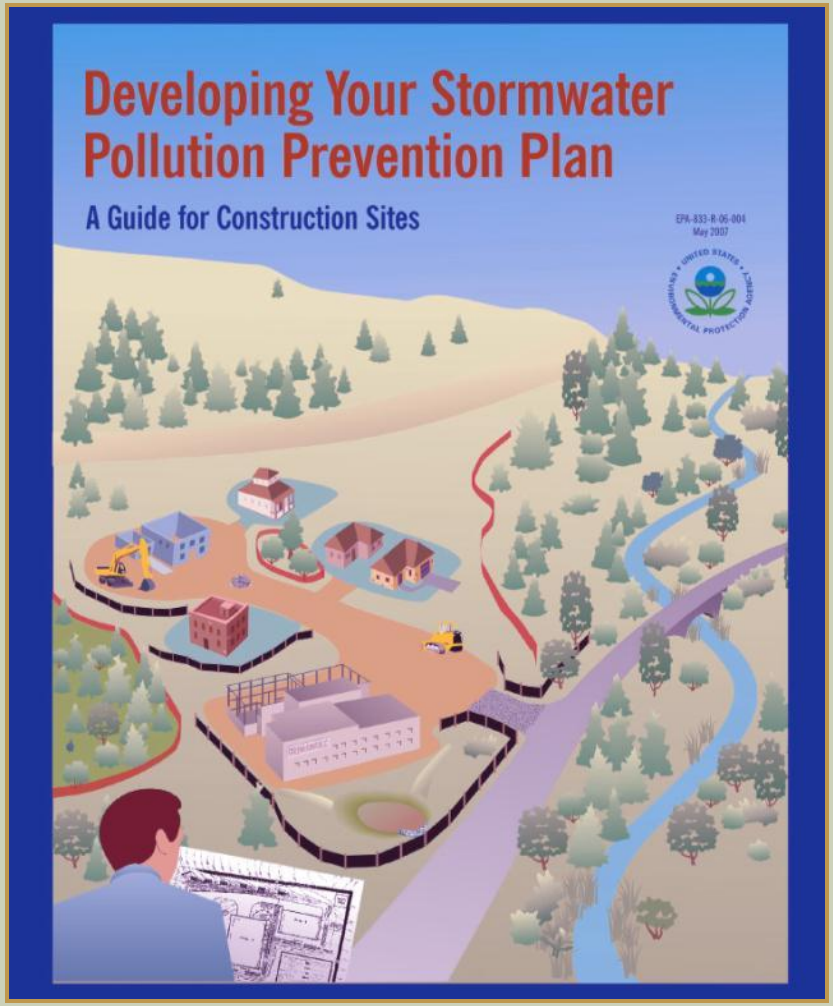
Adjacent vegetation preserved-in-place

Specimen Saguaro preserved-in-place

ADOT Erosion and Pollution Control Manual

EROSION & SEDIMENT CONTROL & GOOD HOUSEKEEPING PRINCIPLES

- These principles are the foundation for successful erosion and pollution control on all ADOT projects. The principles:
  - Were developed by the EPA, and are outlined in their document, *Developing Your Stormwater Pollution Prevention Plan.*
  - Drive planning, design, construction and maintenance of erosion and pollution control measures.
- All BMPs support these key principles.



EROSION & SEDIMENT CONTROL & GOOD HOUSEKEEPING PRINCIPLES

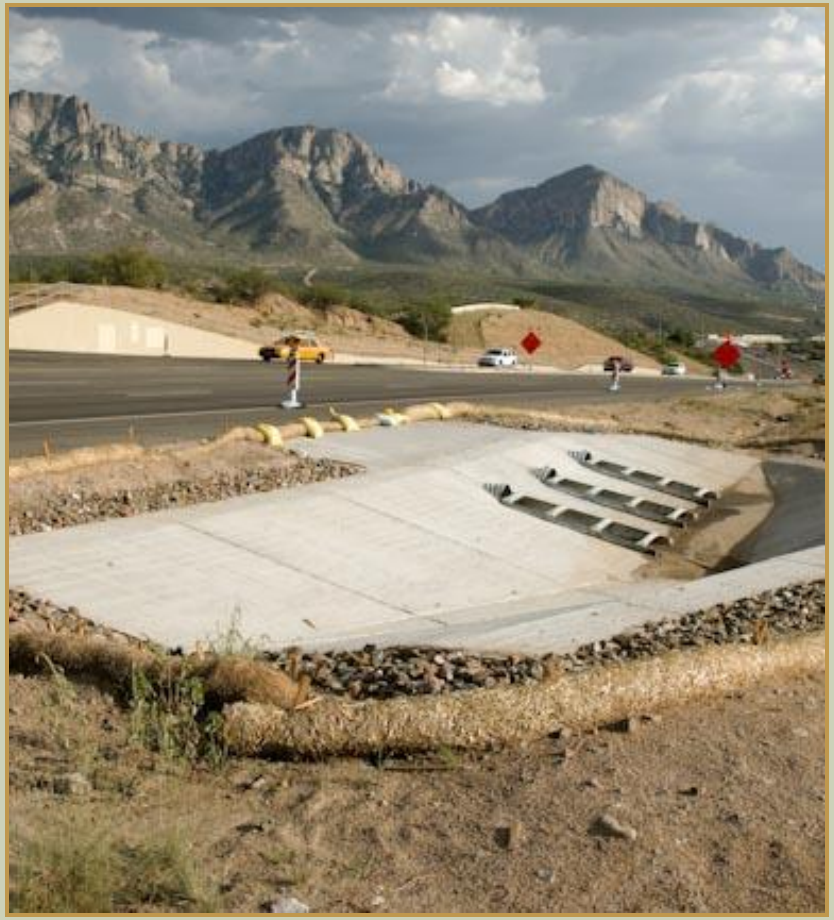
EROSION CONTROL PRINCIPLES (1st Line of Defense)

- Minimize disturbed area and protect natural features and soil. *(BMP- Preserve Existing Vegetation)*
- Phase construction activity. *(BMP- Construction Sequencing)*
- Control stormwater flowing onto and through the project. *(BMP- Earth Dikes/Drainage Swales and Lined Ditches)*
- Stabilize soils promptly. *(BMPs- Seeding, Mulch Cover, Soil Binders)*
- Protect slopes. *(BMPs- Geotextiles/Erosion Control Blankets, Crown Ditch, Slope Drains)*

EROSION & SEDIMENT CONTROL & GOOD HOUSEKEEPING PRINCIPLES

SEDIMENT CONTROL PRINCIPLES (2nd Line of Defense)

- Protect storm drain inlets. *(BMP- Storm Drain Inlet Protection)*
- Establish perimeter controls. *(BMPs- Silt Fence, Sediment Logs)*
- Retain sediment on-site and control dewatering practices. *(BMPs- Sediment Trap, Sediment Basin, Dewatering Operations)*
- Establish stabilized construction access. *(BMP- Stabilized Construction Entrance/Exit)*
- Inspect and maintain controls. *(BMP- Inspection and Maintenance)*



EROSION & SEDIMENT CONTROL & GOOD HOUSEKEEPING PRINCIPLES

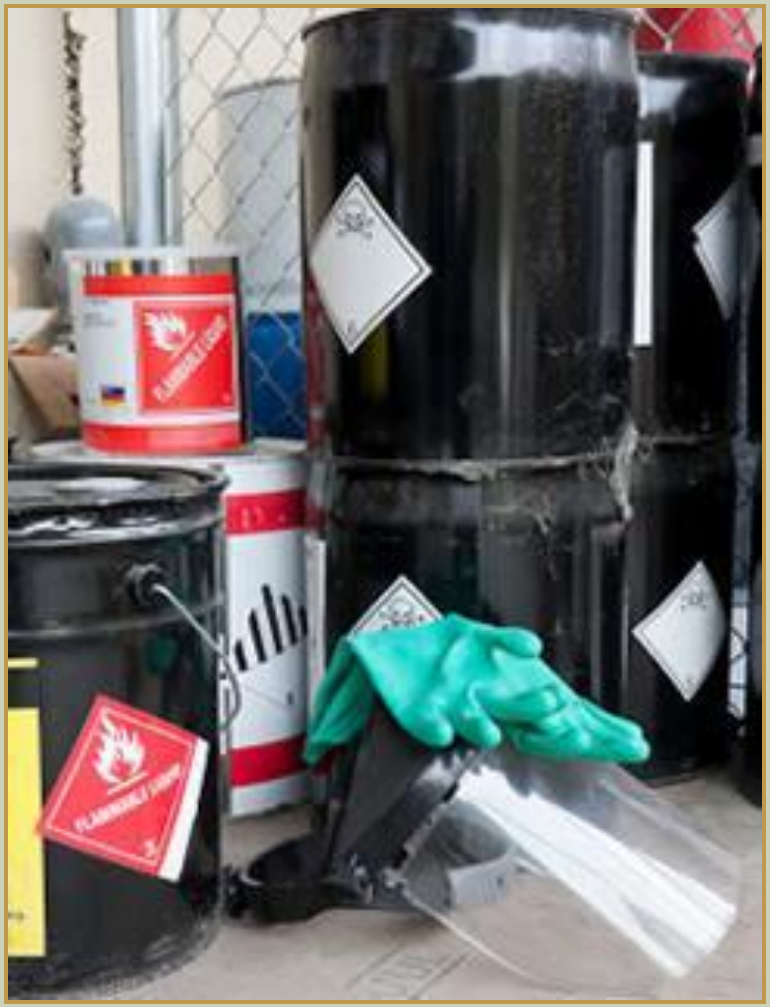
GOOD HOUSEKEEPING PRINCIPLES

- Provide for waste management. *(BMPs- Storm Drain Inlet Protection, Hazardous Waste Management)*
- Establish proper material handling and staging areas. *(BMPs- Material Delivery and Storage, Material Use)*
- Designate paint and concrete washout areas. *(BMPs- Hazardous Waste Management, Concrete Waste Management)*

EROSION & SEDIMENT CONTROL & GOOD HOUSEKEEPING PRINCIPLES

GOOD HOUSEKEEPING PRINCIPLES, cont.

- Establish proper equipment / vehicle fueling and maintenance.
  (BMPs- Vehicle and Equipment Fueling, Vehicle and Equipment Maintenance)
- Control equipment/vehicle washing and allowable non-stormwater discharges.
  (BMP- Vehicle and Equipment Cleaning)
- Develop a spill prevention and response plan.
  (BMP- Spill Prevention and Control)



APPLYING THE PRINCIPLES

- A successful project is the result of effective planning and cooperation amongst many team members during planning, design, construction and maintenance.
- Refer to the Manual for suggested roles of planners, designers and contractors on selecting and/or developing erosion, pollution and good housekeeping control measures that support each principle.
- The ultimate goal is to prevent stormwater pollution!

APPLYING THE PRINCIPLES

Erosion Control Principle #1:

Minimize disturbed area and protect natural features and soil.

- Limiting disturbed areas to those only required for construction projects, and preservation of natural vegetation beyond the limits of slope rounding and warping are two, cost-saving erosion control methods (BMPs).
  - Design to balance cut and fill and to reduce the length and steepness of slopes and the extent of grading.

APPLYING THE PRINCIPLES

Erosion Control Principle #2:
<u>Phase construction activity.</u>

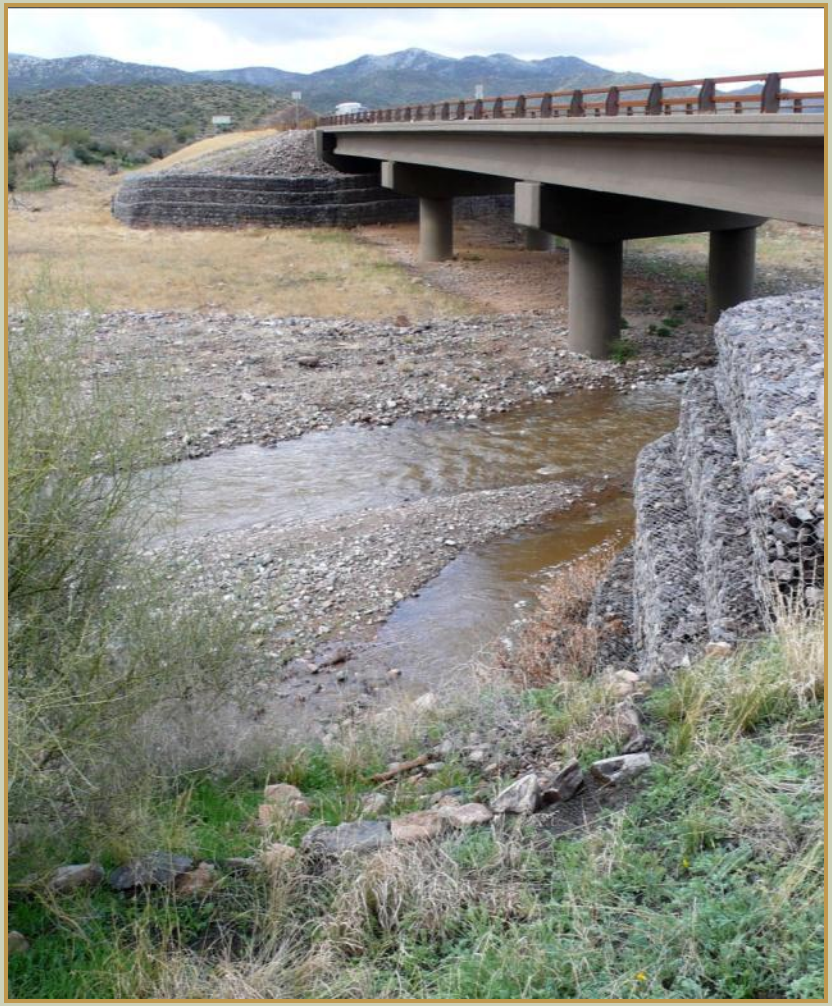
- Use construction scheduling or sequencing to minimize the amount of soil that is exposed at any one time. Well-planned and defined construction schedules contribute to successful erosion and sediment control as measures are taken to limit exposed soil and duration without ground cover.

APPLYING THE PRINCIPLES

Erosion Control Principle #3:

Control stormwater flowing onto and through the project.

- Diversion of and slowing of flows from upstream locations onto and through the project site can assist significantly in preventing or reducing erosion.



APPLYING THE PRINCIPLES

Erosion Control Principle #4:
<u>Stabilize soils promptly.</u>

- Minimize erosion by stabilizing exposed soils where grading activities have temporarily stopped or are complete. Select construction and/or post-construction BMPs to achieve temporary or permanent stabilization depending on specific project conditions.

APPLYING THE PRINCIPLES

Erosion Control Principle #5:
Protect slopes.

- Use combinations of BMPs for the most effective control of slope erosion.
  - Minimize stormwater flow onto slopes with diversion techniques.
  - Supplement protection with wattles and/or compost filter socks installed on contours.
  - Preserve vegetation in place.
  - Use erosion control blankets (with ADOT approval) to protect slopes from direct rainfall.

APPLYING THE PRINCIPLES

Sediment Control Principle #6:
<u>Protect storm drain inlets.</u>

- Storm drain inlet protection both within and outside the project area is an ongoing sediment control measure through project completion.
  - Maintenance of inlet protection BMPs is critical to successful sediment control.
  - Never use storm inlet protection as a primary BMP.
  - Storm drain inlet protection retention or removal must be addressed in the SWPPP.

APPLYING THE PRINCIPLES

Sediment Control Principle #7:
<u>Establish perimeter controls.</u>

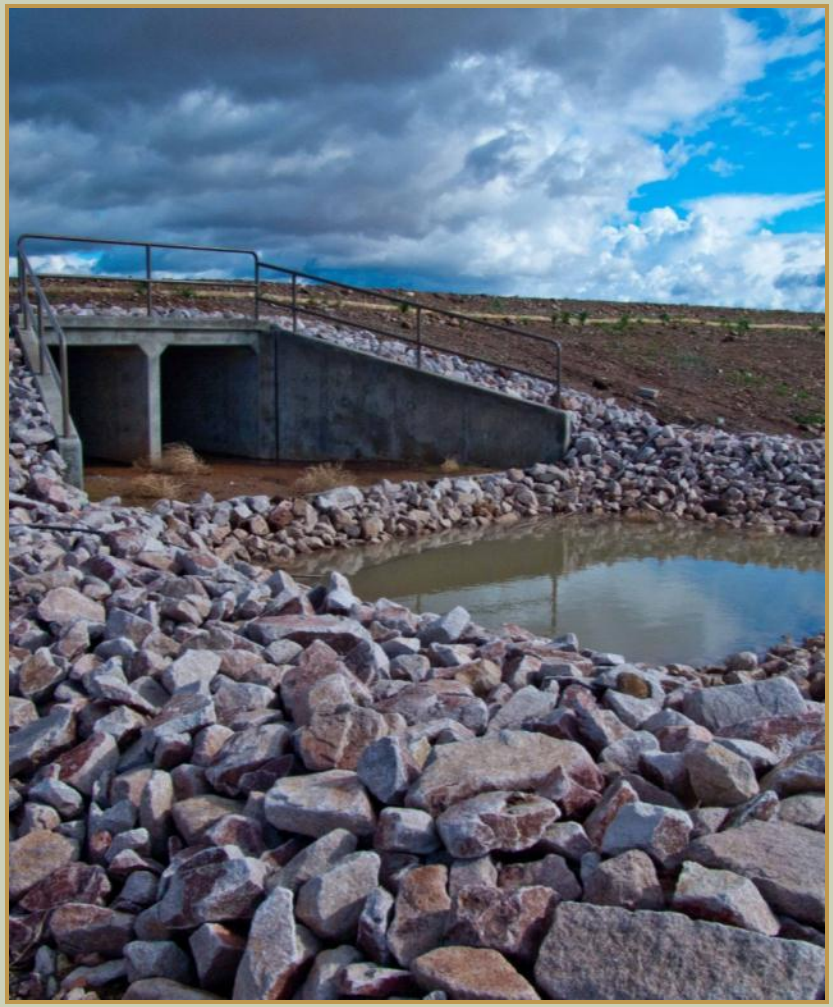
- Install sediment controls on project perimeter downslopes to stop sediment transport from the site.

APPLYING THE PRINCIPLES

Sediment Control Principle #8:

Retain sediment on-site and control dewatering practices.

- Sediment basins or traps detain runoff allowing sediment to settle before the runoff is discharged.
  - May be required for drainage locations where 10 or more acres are disturbed at any one time.
- Dewatering methods remove ground / rain water from work areas, preventing discharge of muddy water into storm drains and watercourses.



APPLYING THE PRINCIPLES

Sediment Control Principle #9:

<u>Establish stabilized construction exits.</u>

- Designate construction entrances and exits and apply/install tracking controls to stabilize these areas. Use wheel (vehicle) washing and street sweeping BMPs to supplement stabilized construction exits.

APPLYING THE PRINCIPLES

Sediment Control Principle #10:
<u>Inspect and maintain controls.</u>

- Establish routine inspection schedules of control measures per the applicable stormwater discharge permit and maintain or replace BMPs per permit requirements.
  - Routine and spot inspections will identify if BMPs are performing as intended.
  - Timely maintenance will correct deficiencies to ensure compliance with water quality goals.

APPLYING THE PRINCIPLES

Good Housekeeping Principle #1:
<u>Provide for waste management.</u>

- Effective construction site waste management procedures and practices can help to prevent or reduce pollution of stormwater. Designated collection areas for trash, recyclables and hazardous waste; and timely and proper litter clean up are critical to successful construction site waste management.

APPLYING THE PRINCIPLES

Good Housekeeping Principle #2:

<u>Establish proper construction material handling and staging areas.</u>

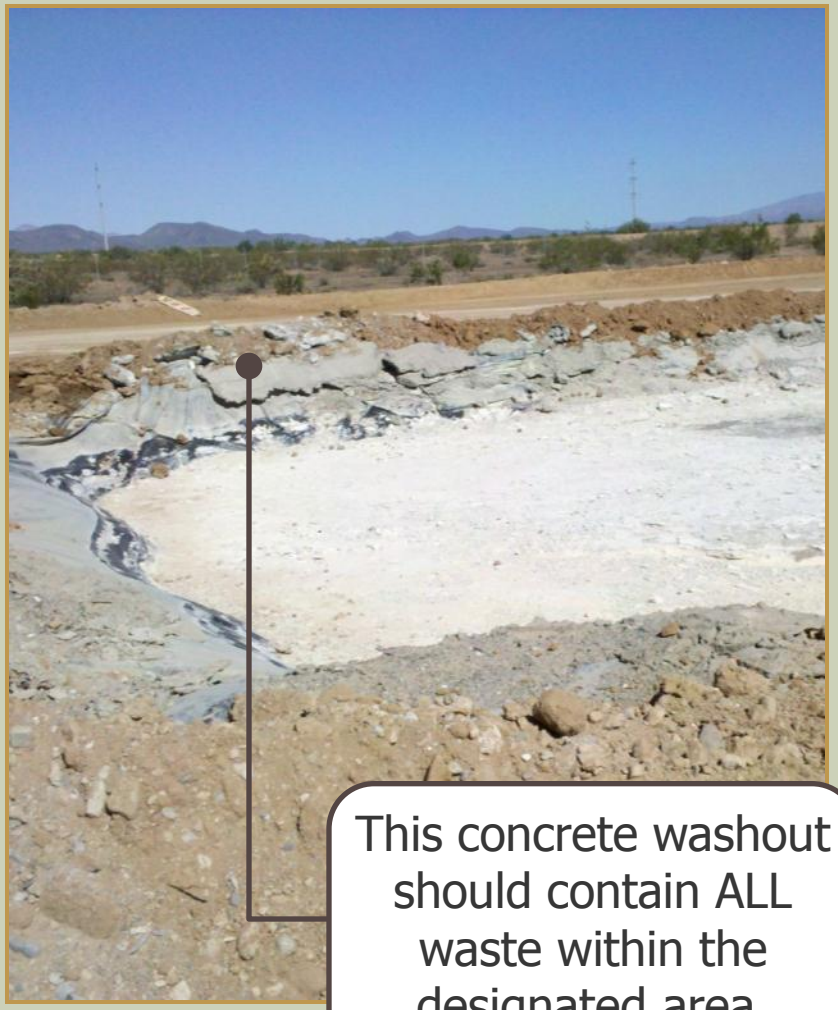
- Well-defined management and handling of materials, especially hazardous or toxic substances must be included in the SWPPP.
- Store hazardous materials in designated, preferably covered areas incorporating secondary containment techniques to prevent the spread of spills throughout the site.

APPLYING THE PRINCIPLES

Good Housekeeping Principle #3:

Designate paint and concrete washout areas.

- Washout areas for concrete, paint or stucco must be provided on-site if contractors cannot utilize facilities at their own plants.
  - Washout water can be highly polluted and must be contained and allowed to evaporate before recycling, or properly disposing of, the solid washout waste.
  - Locate washout areas at least 50 yards from storm drains and watercourses.



This concrete washout should contain ALL waste within the designated area.

APPLYING THE PRINCIPLES

Good Housekeeping Principle #4:

<u>Establish proper equipment/vehicle fueling and maintenance practices.</u>

- Vehicle fueling and maintenance is a potential source of stormwater pollution.
  - Establish on-site fueling and maintenance areas that are clean, dry and have spill kits readily available to address spill control and containment.
  - Perform fueling and maintenance of equipment and vehicles at an off-site facility if possible.

APPLYING THE PRINCIPLES

Good Housekeeping Principle #5:

<u>Control equipment/vehicle cleaning and allowable non-stormwater discharges.</u>

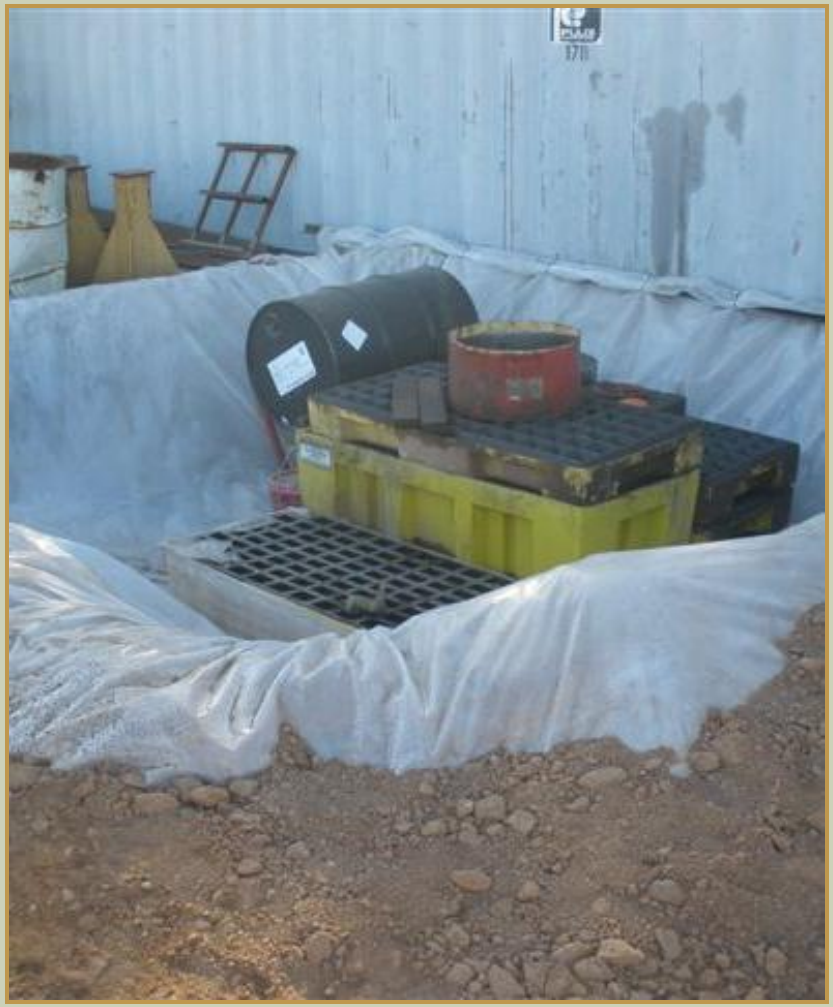
- Use off-site facilities to wash equipment and vehicles.
- Non-stormwater discharges include fire hydrant flushing, dust control water and landscape irrigation, all of which can infiltrate into the ground or be routed to sediment ponds, detention basins or other BMP treatment.

APPLYING THE PRINCIPLES

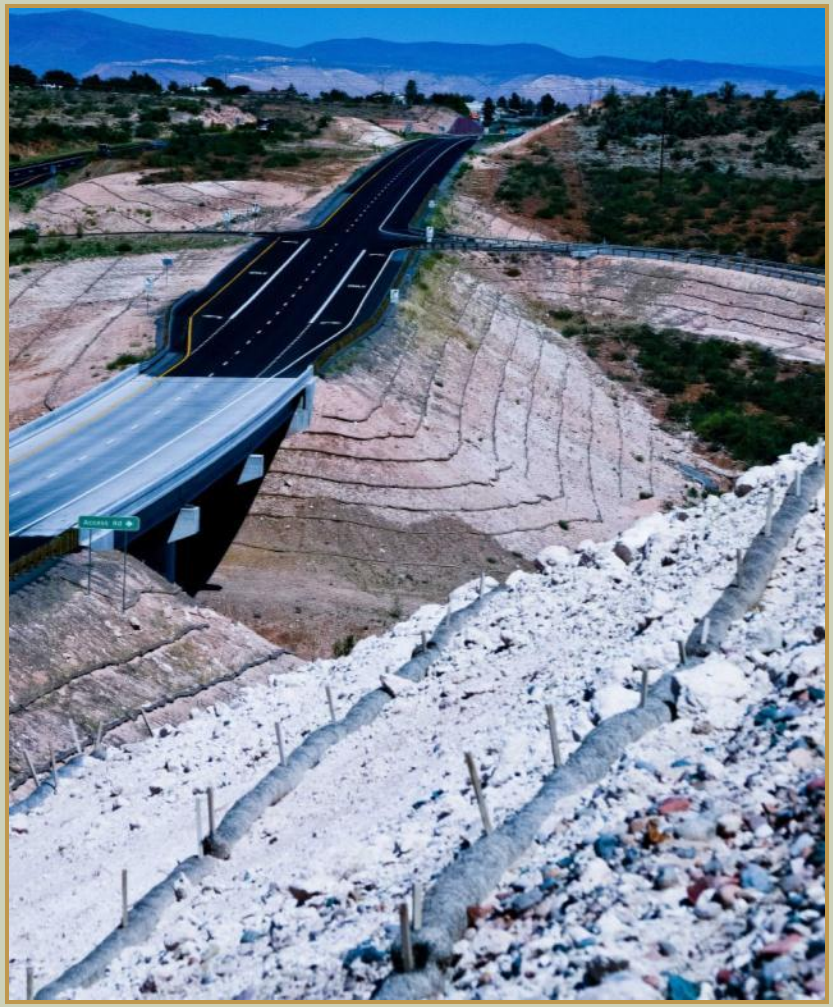
Good Housekeeping Principle #6:

<u>Develop a spill prevention and response plan.</u>

- Discharge permits require inclusion of a spill prevention and response plan in the SWPPP good housekeeping procedures.
  - At a minimum the plan will identify ways to reduce, contain, and clean up spills, and identify training methods for employees responsible for spill prevention and response.



CONSTRUCTION BMP SELECTION GUIDE

BMP SELECTION PROCESS

- Identify and evaluate potential erosion and pollutant sources.
- Use the Principles to guide development of effective controls for the project.
- Develop list of BMPs. Consider site conditions, appropriateness of application, and cost.
- Verify that BMP combinations have been selected for the most effective control.
- Be prepared to select alternate BMPs based upon construction site conditions and BMP performance.