Arizona Department of Transportation

Erosion and Pollution Control Manual

For Highway Design and Construction

Erosion and Pollution Control Manual

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Written and Edited by
Wheat Scharf Associates

under the Direction of
ADOT Erosion and Pollution Control Review Committee

LeRoy Brady
Roadside Development Section

Wendy Terlizzi
Water Quality Group

Tao Zi Fong
Roadside Development Section

for the
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Intermodal Transportation Division

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CHAPTER 1

INTRODUCTION

1.1 HIGHWAY CONSTRUCTION AND STORMWATER QUALITY

The highway design and construction process requires thorough planning, thoughtful design, responsible construction practices and diligent monitoring of erosion and pollution controls to meet the water quality requirements of federal, state and local agencies.

Construction of highways typically disturbs large areas of natural vegetative cover and modifies slopes resulting in higher volumes of runoff and accelerated rates of soil erosion. Stormwater runoff from highway construction activities has been identified as a primary source of soil erosion and generation of sediment. This runoff can have significant impacts on water quality through the collection, transport and deposition of sediment, debris and chemical pollutants to storm sewer systems or waters of the United States (e.g. wetlands, dry washes, rivers, lakes, coastal waters, etc.)

Sedimentation can degrade or destroy aquatic habitat and disturb the physical stability of ephemeral channels; debris can clog receiving waters and reach oceans to impact marine wildlife habitat and chemical pollutants can harm or kill fish and other wildlife. Other environmental impacts of stormwater runoff include:

- **Turbidity** reduces in-stream photosynthesis and increases water temperatures leading to reduced food supply and aquatic habitat
- **Eutrophication** is a process whereby bodies of water receive excess nutrients that stimulate excessive plant growth and decay, reducing dissolved oxygen in the water
- **Removal of top** soil leaves hard, rocky and infertile soils that are difficult to revegetate

Construction Best Management Practices (BMPs) used to help prevent, reduce and/or mitigate the potentially harmful effects of highway pollutants in stormwater runoff are key components of the highway design and construction process. As used in this manual, BMP refers to operational activities (non-structural) or physical controls (structural) implemented to meet water quality goals.

The Arizona Department of Transportation (ADOT) has adopted this Manual to assist in developing erosion and pollution controls during the design, construction and maintenance of roadways.

1.2 PURPOSE OF MANUAL

The Manual is written to provide guidance to contractors, design professionals, field inspectors, maintenance personnel, ADOT staff and local public officials or staff.

The purpose of the Manual is to:

- Provide an overview of water quality regulations and permits.
- Outline ADOT's procedures for complying with water quality regulations and permits.
- Provide guidance for the selection of construction (temporary) BMPs on ADOT construction projects.
- Provide a "tool box" of construction BMPs.

1.3 ORGANIZATION OF THE MANUAL

The manual is organized into five chapters:

Chapter 1: Introduction includes an introduction to stormwater runoff pollutants, the purpose of the manual and an overview of water quality regulations and permits.

Chapter 2: Project Planning and Design Guide provides design guidance for incorporating stormwater quality controls into the project planning and design phases and discusses the selection of construction BMPs.

Chapter 3: Instructions for Obtaining Stormwater Discharge Permit Authorization For ADOT Construction Projects describes the steps necessary to obtain Arizona or Federal Construction General Permit authorization for ADOT projects.

Chapter 4: Stormwater Pollution Prevention Plans provides an overview of Stormwater Pollution Prevention Plan (SWPPP) preparation, a requirement for Construction General Permit (CGP) or ADOT Statewide Stormwater Discharge Permit authorization (ADOT staff only projects).

Chapter 5: Best Management Practices is a tool box of BMPs for consideration by ADOT, design professionals and the contractor during design and construction of ADOT projects.

1.4 HOW TO USE THIS MANUAL

This Manual is written to provide guidance to a wide range of users with potentially different levels of knowledge and experience.

If you are new to the subject of stormwater management, read the entire Manual to grasp the regulations, understand your role in erosion and pollution control and review the BMPs.

If you are experienced and familiar with Federal, Arizona and ADOT stormwater quality requirements and erosion and pollution control techniques, browse the table of contents, review section titles for possible new information, review the revised Construction BMPs and note the website locations for SWPPP templates and electronic Notice of Intent (NOI)/Notice of Termination (NOT) filings that will facilitate document preparation.

Remember, this Manual is a guide; always refer to the applicable regulations and permits for the exact requirements that apply to your specific project.

1.5 WATER QUALITY REGULATIONS AND PERMITS

All ADOT construction projects must comply with federal, state and local water quality regulations and permit requirements. Attention must be given to these regulations and permit requirements throughout the planning, design, construction and maintenance of a project to ensure that the quality of the waters of the United States is not compromised. Water quality regulations and permits are administered by Federal and State agencies/programs and possibly by County, City or other local agencies/programs.

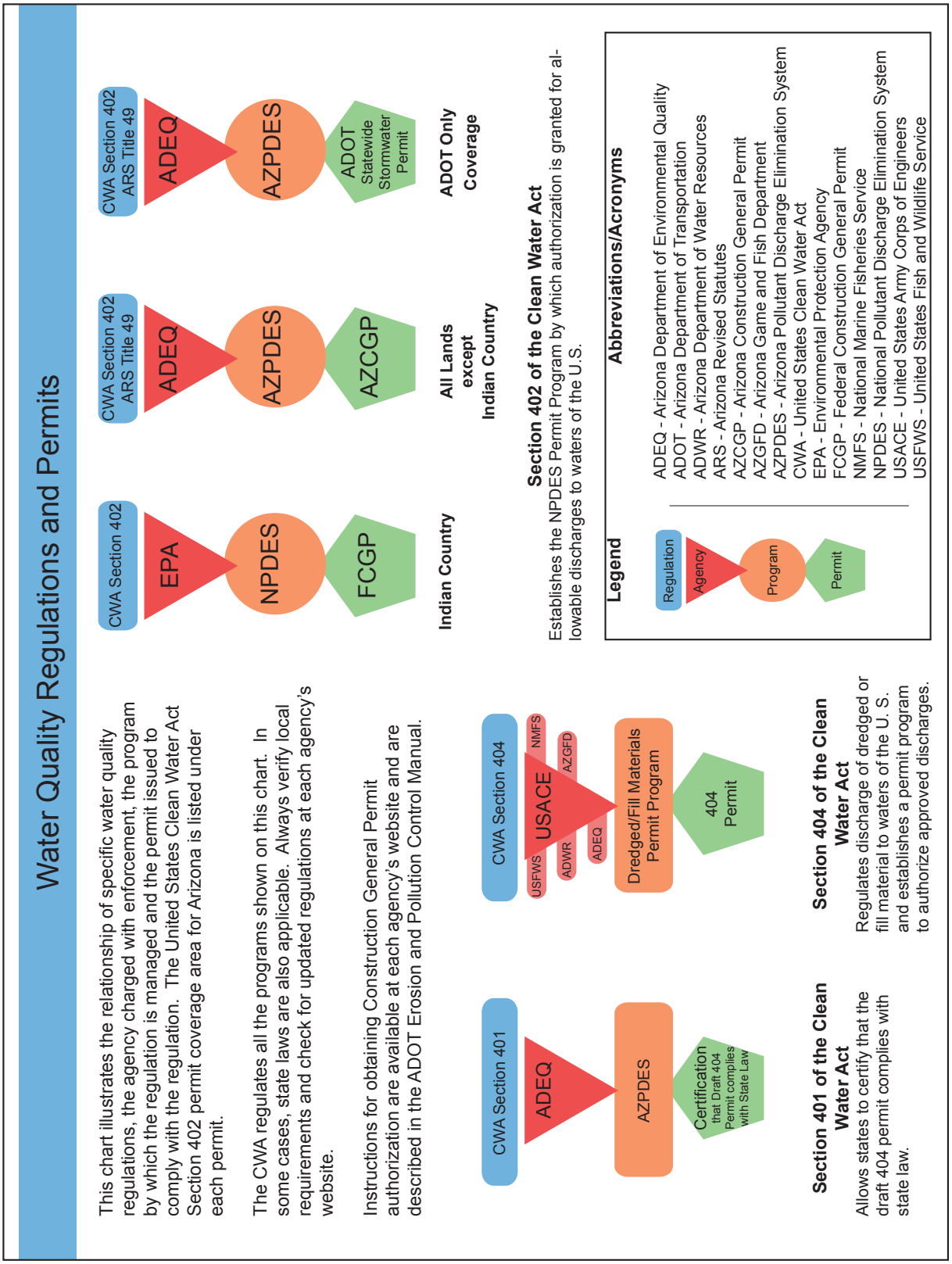

Figure 1.1: Water Quality Regulations and Permits

1

INTRODUCTION

Figure 1.1 illustrates water quality regulation/agency/program/permit relationships for discharge of pollutants and dredged/fill material to waters of the United States. Use this chart to assist in understanding the overview of the pertinent regulations and permitting requirements in the chapter text. Detailed information on water quality regulations and permits is found at agency websites.

United States Clean Water Act

The United States Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and for regulating quality standards for surface waters. The basis of the current CWA, the Federal Water Pollution Control Act, was enacted in 1948, and was significantly reorganized and expanded in 1972. The Environmental Protection Agency (EPA) administers the CWA.

Three sections of the CWA have significant impact on the design, construction and maintenance of Arizona's highways:

Section 401

Section 401 of the CWA enables states to provide certification that the draft 404 permit is in compliance with state law. The ADOT Environmental Planning Group (EPG) obtains 401 certification during the design process from ADEQ. Section 401 certification requirements apply to all activities regulated under Section 404 of the CWA. The Arizona Department of Environmental Quality (ADEQ) may approve or deny certification for any Section 404 Permit based on the anticipated effect on water quality. A Letter of Certification will be issued by ADEQ if the applicant is in compliance with these standards and conditions.

Section 402

Section 402 of the CWA establishes the National Pollutant Discharge Elimination System (NPDES) Permit Program which issues individual permits for allowable discharges to waters of the United States and grants authorization to use the Federal Construction General Permit (FCGP) to qualified applicants. All facilities that discharge pollutants from any point source into waters of the United States are required to seek coverage under a NPDES permit. The EPA administers this Federal Program and has authorized individual states to operate the Program at the state level. In Arizona, this permit provides coverage for projects in Indian Country.

The Arizona Department of Environmental Quality (ADEQ) operates the Arizona Pollutant Discharge Elimination System (AZPDES) Permit Program and issues individual permits for allowable discharges to waters of the United States and grants authorization to use the Arizona Construction General Permit (AZCGP) to qualified applicants. In Arizona, this permit provides coverage for projects outside of Indian Country.

ADOT is authorized to discharge stormwater under the ADOT Statewide Permit for Discharge to Waters of the United States Individual Permit issued by ADEQ. This permit covers ADOT staff-only projects; operators (refer to glossary) under contract to ADOT must apply for authorization under the FCGP or the AZCGP.

Compliance with the requirements of the AZCGP constitutes compliance with the FCGP.

Chapter 3 describes the steps necessary for operators to obtain AZCGP or FCGP authorization and the steps ADOT must follow to comply with the ADOT Statewide Stormwater Discharge Permit requirements.

Section 404

Section 404 of the CWA regulates the discharge of dredged or fill material to waters of the United States and establishes a permit program. In Arizona, the U.S. Army Corps of Engineers (USACE) administers this program with advisory input from the U.S. Fish & Wildlife Service (USFWS), the National Marine Fisheries Service and Arizona resources agencies such as the ADEQ, the Game and Fish Department and the Department of Water Resources.

Essentially, any proposed work in washes, rivers, streams, lakes and wetlands requires ADOT's OES to obtain a permit from the Corps. During construction, the USACE evaluates adherence to permit conditions. Typical construction activities that are affected include the construction and maintenance of culverts, bridges, and stream bank erosion protection.

Contact the Corps for determination of permit requirements. Locate the district office nearest the project at http://www.spd.usace.army.mil/cwpm/public/ops/regulatory/index.html.

Section 402 vs. Section 404:
What's the Difference?

Section 402 provides permission to discharge treated stormwater to waters of the United States in compliance with permit limitations, conditions and use of BMPs.

Section 404 provides permission to add dredged or fill material to the waters of the United States.

Other AZPDES Permits

Other permits that fall under the AZPDES Program include:

- De Minimis General Permit (DMGP) covers small discharges resulting from specific activities, e.g., charitable car washes, aquifer testing,fire hydrants.
- Multi-Sector General Permit (MSGP) covers discharges from certain industrial sites of a non-construction nature.
- Municipal Separate Storm Sewer System (MS4) General Permit covers discharges from small or large municipal storm sewer systems.

Although these permits are not required for highway construction projects, they are relevant to a discussion of stormwater discharges.

Learn more about these permits at http://www.azdeq.gov/environ/water/permits/index.html.

Aquifer Protection Program Permit

ADEQ administers the Aquifer Protection Program and issues Aquifer Protection Permits (APP). A permit must be obtained "if you own or operate a facility that discharges a pollutant to an aquifer or the land surface or the vadose zone in such a manner that there is a reasonable probability that the pollutant will reach an aquifer." All highway construction projects with concrete washout activities must obtain an APP.

Additional Federal Land Requirements

Several agencies within the U.S. government manage public lands and may have their own erosion and pollution control requirements. These agencies include the Bureau of Indian Affairs (BIA), the Bureau of Land Management (BLM), the National Park Service (NPS), the U.S. Department of Agriculture Forest Service (USFS) and the USFWS. Each affected agency must be included in the planning and design process when roadway plans are prepared within their jurisdictions. Doing so will ensure that their requirements are incorporated into the plans.

Contact Information:

Bureau of Indian Affairs - http://www.bia.gov/

Bureau of Land Management - http://www.blm.gov/wo/st/en.html

National Park Service - http://www.nps.gov/index.htm

U.S. Department of Agriculture Forest Service - http://www.fs.fed.us/

U.S. Fish and Wildlife Service – http://www.fws.gov/

Local Government Requirements

Projects may also be located within the jurisdictions of local governments. These may include MS4s and County Flood Control Districts. Each affected agency must be included in the planning and design process when roadway plans are prepared within their jurisdictions. This will ensure that their requirements are incorporated into the plans.

> Other environmental issues such as archaeological and/or cultural sites affecting design and construction decisions may be identified during project planning and design. These issues may affect the contractor's proposed activities outside of the environmentally-cleared construction areas.

Contact Information:
Local Government Units

Phone Listings in Government Pages
Arizona Council of Governments Website:
http://www.mag.maricopa.gov/archive/AZ-COGs/index.html

Municipal Separate Storm Sewer Systems

Arizona Department of Environmental Quality Listings:
http://www.azdeq.gov/environ/water/permits/stormwater.html#ms4
EPA Region 9: Water Programs Website:
http://www.epa.gov/region09/water/npdes/index.html

County Flood Control Districts

Phone Listings County Government Pages
Arizona Association of Counties Website:
http://www.azcounties.org/

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CHAPTER 2

PROJECT PLANNING AND DESIGN GUIDE

2.1 INTRODUCTION

Effective erosion and pollution control begins with project planning and design, continues through construction and is ongoing throughout project establishment and maintenance.

This chapter defines erosion and sediment control and good housekeeping principles, discusses erosion and pollution control considerations in project planning and design, and control methods to support the principles; outlines ADOT categories of construction Best Management Practices (BMPs); and provides guidance for selecting construction BMPs.

Use this chapter, together with Chapter 5 Best Management Practices, as a planning and design guide to define control methods and select BMPs that best address project conditions to achieve water quality goals.

2.2 PROJECT PLANNING AND DESIGN

During the design process, the Landscape Architect and Engineer must endeavor to minimize the impacts to water quality that may be caused by the project.

As part of the project design process, the designer will develop *Erosion and Pollution Control Plans and Details* which specify BMP locations and direct the contractor in the proper installation and maintenance of BMPs. The intent of these plans and details is to provide general direction and specific BMP expectations to the contractor. They will not be considered a *Stormwater Pollution Prevention Plan* (SWPPP) and shall not replace the contractor's SWPPP, since the project plans and details are prepared assuming standard construction practices and may not reflect the contractor's actual methods of construction, access requirements or project phasing. The contractor shall use the project Construction Documents including the *Erosion and Pollution Control Plans and Details* as a guide in developing his or her own SWPPP.

SWPPP vs. Erosion and Pollution Control Plans and Details:
What's the Difference?

The **SWPPP,** required to obtain coverage under NPDES or AZPDES CGP permits, will include Erosion and Pollution Control Plans and Details and/or BMPs.

Erosion and Pollution Control Plans and Details are not the SWPPP.

Specific erosion and pollution control design considerations are included with each erosion and sediment control principle discussion in section 2.5 Applying the Principles.

Low Impact Development

The Center for Environmental Excellence by AASHTO defines Low Impact Development (LID) as a stormwater management strategy concerned with maintaining or restoring the natural hydrologic functions of a site to achieve natural resource protection objectives and fulfill environmental regulatory requirements. LID incorporates a set of overall site design strategies as well as highly localized, small-scale, decentralized source control techniques known as Integrated Management Practices. Consider LID strategies and practices in preparing your *Erosion and Pollution Control*

Plans and Details. Examples of LID site design strategies and practices include:

- Phase and limit the amount of actively disturbed area on a construction site to reduce erosion and sediment loss.
- Grade to encourage sheet flow and lengthen flow paths.
- Maintain natural drainage divides to keep flow paths dispersed.
- Preserve naturally vegetated areas and soil types that slow runoff, filter pollutants, and facilitate infiltration.
- Direct runoff into or across vegetated areas to help filter runoff and encourage recharge.
- Provide small-scale distributed features and devices that help meet regulatory and resource objectives.
- Treat pollutant loads where they are generated, or prevent their generation

Bioretention, filter strips, grassed swales, infiltration trenches, inlet pollution traps/removal devices, and permeable pavers and pavement are some of the common LID tools. Greater use of soil amendments increases the capacity of soil to absorb moisture and sustain vegetation, curbside or in swales, which in turns removes water through transpiration. Additional information is available at http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/3_7.aspx

2.3 BEST MANAGEMENT PRACTICES

In this manual the term BMP refers to operational activities or physical controls that reduce erosion the discharge of pollutants and minimize potential impacts upon receiving waters. There are two major classifications of Erosion and Pollution Control BMPs within ADOT: construction (temporary) and post-construction (permanent).

This manual focuses primarily on construction BMPs. Construction BMPs are temporary measures to control stormwater quality during the construction process. Most construction BMPs will be removed as construction progresses and stabilization is achieved or at the completion of construction, but some could remain in place as permanent control measures. Table 2.1 lists, by category, construction BMPs included in this manual.

Post-construction BMPs are permanent measures to manage stormwater quality both during and after construction of the project. The *ADOT Post-Construction Best Management Practices Manual* serves to guide the roadway designer in the selection and design of structural post-construction BMPs. Chapter 2 of that manual describes how to properly plan for and select post-construction BMPs on ADOT roadway projects. Off-road, Overland Flow Erosion Control; Roadway Drainage Conveyance; and Water Quality and Treatment are the BMP categories featured in the *ADOT Post-Construction BMP Manual*.

The *ADOT Post-Construction Best Management Practices Manual* should be used with this manual to select the most effective erosion and pollution control measures for each ADOT project.

2.4 EROSION AND SEDIMENT CONTROL AND GOOD HOUSEKEEPING PRINCIPLES

Erosion and pollution control principles serve as the foundation for successful erosion and pollution control on all ADOT projects. These principles drive planning, design, construction and

CP	**Construction Site Planning and Management**
CP-1	Construction Sequencing
CP-2	BMP Inspection and Maintenance
EC	**Erosion Control**
EC-1	Preserve Existing Vegetation
EC-2	Minibenches/Slope Roughening
EC-3	Mulch Cover
EC-4	Seeding
EC-5	Geotextiles/Erosion Control Blankets
EC-6	Soil Binders
EC-7	Crown Ditch
RC	**Runoff Control**
RC-1	Earth Dikes/Drainage Swales and Lined Ditches
RC-2	Cut to Fill Slope Transitions
RC-3	Erosion Protection at Structures
RC-4	Rock Outlet Protection/ Velocity Dissipation Devices
RC-5	Slope Drains
RC-6	Check Dam
SC	**Sediment Control**
SC-1	Sediment Control Berm
SC-2	Silt Fence
SC-3	Sediment Trap
SC-4	Sediment Basin
SC-5	Sediment Wattle
SC-6	Sediment Log
SC-7	Gravel Bag Protection
SC-8	Storm Drain Inlet Protection
SC-9	Curb Inlet Protection
SC-10	Stabilized Construction Entrance/Exit
SC-11	Stabilized Construction Roadway

SC	**Sediment Control, continued**
SC-12	Compost Sock
SC-13	Rock Berm
GH	**Good Housekeeping**
GH-1	Vehicle and Equipment Cleaning
GH-2	Vehicle and Equipment Fueling
GH-3	Vehicle and Equipment Maintenance
GH-4	Street Sweeping and Vacuuming
GH-5	Material Delivery and Storage
GH-6	Material Use
GH-7	Stockpile Management
GH-8	Spill Prevention and Control
GH-9	Portable Toilet
NS	**Non-Stormwater**
NS-1	Water Conservation Practices
NS-2	Dewatering Operations
NS-3	Paving and Milling Operations
NS-4	Temporary Watercourse Crossing
NS-5	Water Diversion
NS-6	Structure Demolition/Removal Over or Adjacent to Water
NS-7	Material and Equipment Use In/Over Watercourses
WM	**Waste Management**
WM-1	Solid Waste Management
WM-2	Hazardous Waste Management
WM-3	Contaminated Soil Management
WM-4	Concrete Waste Management
WM-5	Liquid Waste Management

Table 2.1: Construction BMPs

maintenance of erosion and pollution control measures. They serve as the criteria for all to ensure meeting required water quality goals throughout all project stages.

The EPA document, *Developing Your Own Stormwater Pollution Prevention Plan*, identifies the following Erosion and Sediment Control and Pollution Prevention Principles with example BMPs to assist in developing effective erosion and pollution control measures. Good Housekeeping Principles are also defined to assist contractors in developing site controls to prevent contamination of stormwater runoff.

Erosion Control Principles (1st Line of Defense)

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

Sediment Control Principles (2nd Line of Defense)

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

Good Housekeeping Principles

1. Provide for waste management (BMPs- Solid Waste Management, Hazardous Waste Management)
2. Establish proper material handling and staging areas (BMPs- Material Delivery and Storage, Material Use)
3. Designate paint and concrete washout areas (BMP- Concrete Waste Management)
4. Establish proper equipment/vehicle fueling and maintenance practices (BMPs- Vehicle and Equipment Fueling, Vehicle and Equipment Maintenance)
5. Control equipment/vehicle washing and allowable non-stormwater discharges (BMP- Vehicle and Equipment Cleaning)
6. Develop a spill prevention and response plan (BMP- Spill Prevention and Control)

2.5 APPLYING THE PRINCIPLES

Multiple highway design and construction project participants are responsible for project erosion and pollution control from planning to maintenance and although each has a defined role and is responsible for a specific work product (e.g. *Erosion and Pollution Control Plans and Details*,

SWPPP-with its many facets, maintenance plan) the ultimate goal is to prevent stormwater pollution. Each party will apply the principles and use this Manual as a guide to develop the erosion and pollution control measures for which he or she is primarily responsible.

The following section presents each principle and provides example suggestions for planners, designers and contractors on selecting and/or developing erosion, pollution and good housekeeping control measures that support each principle. These control measures may include planning and design considerations as well as construction and post-construction BMPs. The examples are not all inclusive, but are intended to generate thought and discussion of project planning and design, erosion control plans and details, SWPPP preparation and BMP selection.

Stormwater management requirements during maintenance activities are discussed in *The Maintenance and Facilities Best Management Practices Manual*. That ADOT manual identifies which maintenance activities require the use of stormwater protection BMPs. ADOT Maintenance actions occur only after the contractor has closed out their Notice of Intent (NOI).

Erosion Control Principles

Erosion controls include non-structural and structural practices to keep sediment in place and are the primary means to minimize stormwater pollution. Non-structural practices include strategic planning such as scheduling to limit soil disturbance. Structural practices protect slopes and direct stormwater-flow through the site. Effective erosion control is the foundation for the most successful stormwater pollution prevention plans. Use the following discussion of erosion control principles as a guide in selecting the best erosion control BMPs for the SWPPP.

Erosion Control Principle #1:

Minimize disturbed area and protect natural features and soil.

Limiting disturbed areas to those only required for the construction of the highway project and preservation of natural vegetation beyond the limits of slope rounding and warping are two cost-saving erosion control methods (BMPs).

Planner/Designer:

- Select highway corridor alignment to limit impact on existing vegetation and natural features
- Design to balance cut and fill and to reduce the length and steepness of slopes and the extent of grading
- Preserve vegetation within transition areas of cuts or fills and outside of clear zones (specify in plans and Special Provisions)
- Specify location of temporary roads to avoid stands of significant vegetation and to follow existing contours
- Specify location of temporary roads within limits of area to be disturbed by permanent road construction
- Establish construction limits to maximize preservation of existing vegetation and natural features
- Assess site conditions for preservation and/or salvage of topsoil

Contractor:

- Develop SWPPP to include BMPs that support this principle
  - Construction Sequencing, Preserve Existing Vegetation, Soil Binders
- Retain existing vegetation as long as possible where activity is scheduled to occur later in the construction process
- Schedule to limit extent of disturbed areas
- Properly delineate and enforce construction limits and access control
- Delineate and enforce areas to be preserved prior to start of soil-disturbing activities
- Locate temporary roads within limits of area to be disturbed by permanent road construction
- Inspect BMPs per applicable CGP requirements and/or construction documents
- Adjust and maintain BMPs

Erosion Control Principle #2:

Phase construction activity.

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.

Contractor:

- Submit a construction schedule per Standard Specifications Section 108.03.
- Schedule construction activities to limit area of exposed soil area at any one time; ADOT specification 104.09 limits that exposed area amount to 750,000 square feet (~17.25 acres).
- Include the Construction Sequencing BMP specifying phased final stabilization (stabilize disturbed soils “as you go”) in the SWPPP

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.

Design may increase the amount of impermeable surface area resulting in increased runoff quantities from the project site. Design may also increase the velocities of existing offsite runoff flows by concentrating those flows into smaller drainage structures. Consequently, storm events may result in greater peak runoff rates and discharges into existing drainages than those drainages may have historically received.

Planner/Designer:

- Calculate pre- and post-construction impervious area percentages to evaluate increased runoff flows.
- Consider the following to assist in addressing increased runoff rates and quantities:
  - Bridges typically affect offsite run-off less significantly than do culverts and may be less visually intrusive
  - Live fascines or pole plantings
  - Protect receiving drainages by means of vegetation, geotextile mats, rock or riprap
  - Energy/velocity dissipation devices at culvert outlets
  - Smooth transitions between culvert inlets/outlets and drainages to reduce turbulence and scour
  - Detention facilities to reduce peak discharges
  - Spread run-off flows across channel outlet structures to mimic natural drainage channels
- Specify run-on/diversion control BMPs to divert run-on from exposed soil areas and run-off control BMPs to control flows through the site in the Erosion and Pollution Control Plans
- Use ditches and dikes to intercept and direct surface run-off into a drain and/or into an existing drainage. Ditch and dike design considerations:
  - Calculate peak flows, velocities and volumes for all drainage structures; provide erosion control measures where erodible velocities occur
  - Use riprap to prevent down-cutting on all ditches and dikes that exceed five percent slope
  - Install rock check dams to reduce run-off velocity and capture sediment
  - Install crown ditches at tops of slopes to divert run-off from the slope face; provide access for maintenance
  - Install slope ditches at bottom and mid-slope locations to intercept sheet flow and convey concentrated flows
  - Utilize embankment curbs on cut and fill slopes to intercept sheet flow from roadway surfaces
- Protect cut-to-fill slope transitions
- Culvert and structural channel outlets are typically areas of high concern for erosion. Considerations include:
  - Review of inlet invert elevation; if lower than the existing natural channel, protect channel backslope to avoid headcutting by run-off
  - Use of flared end sections at inlets and outlets to help prevent scour
  - Install velocity/energy dissipation devices to protect outlets from scour
  - Protect soil/drainage structure interface with rock or other protective measure to prevent erosion

Contractor:

- Develop SWPPP to include combinations of BMPs that support this principle
  - Crown Ditch, Earth Dikes/Drainage Swales and Lined Ditches, Check Dam, Sediment Trap, Slope Drains
- Inspect BMPs per applicable Construction General Permit (CGP) requirements and/or construction documents
- Adjust and maintain BMPs

Erosion Control Principle #4:

Stabilize soils promptly.

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.

Planner/Designer:

- Require soil testing to evaluate soil type and horticultural properties to support vegetation; specify amendments as necessary to improve revegetation success
- Include soil stabilization BMPs in Erosion and Pollution Control Plans

Contractor:

- Develop SWPPP to include slope and channel stabilization BMPs
  - Seeding, Minibenches/Slope Roughening, Mulch Cover, Geotextile/Erosion Control Blankets, Soil Binders
- Protect soil stockpiles from erosion; use Silt Fence, Sediment Log, Soil Binder BMPs
- Achieve phased final stabilization in areas where construction is complete.
- Inspect BMPs per applicable CGP requirements and/or construction documents
- Adjust and maintain BMPs

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 sediment wattles installed along contours, preserve vegetation in place, seed disturbed slopes and use erosion control blankets to protect slopes from direct rainfall.

Vegetated and/or hard surfaces may be used to protect slopes. Vegetated surfaces offer several advantages to hard surfaces including lower runoff volumes, slower runoff velocities, increased times of concentration and lower cost. However, where site-specific conditions would prevent adequate establishment and maintenance of a vegetative cover, hard surfacing should be considered.

Hard surfaces consist of placing concrete, rock or rock and mortar. Typically, these permanent measures are considered where vegetation will not provide adequate erosion control and/or where vegetation will be difficult to maintain. The designer should consider the downstream effects of increased runoff volumes and velocities from hard surfaces. Typical applications include bank protection and bridge abutments. Refer to the *ADOT Slope Erosion Control for Urban Freeways in Arid Climates* poster at http://www.azdot.gov/Highways/Roadway_Engineering/Roadside_Development/Resources.asp for information on 1-1/4 inch granite mulch used for slope erosion control.

Planner/Designer:

- Evaluate project site topography, soil type and conditions to support vegetation; specify amendments as necessary to improve revegetation success
- Evaluate existing native vegetation
- Design slopes to maximize rainfall infiltration and minimize concentrated runoff flows and velocity
- Consider salvage of existing project site topsoil and vegetation during clearing and grubbing operations. Use salvaged topsoil as part of surface preparation prior to seeding.
- Include diversion and slope stabilization BMPs in *Erosion and Pollution Control Plans and Details*
    - Install crown ditches at tops of slopes to divert run-off from slope face; provide access for maintenance
    - Install slope ditches at bottom and mid-slope locations to intercept sheet flow and convey concentrated flows
    - Protect cut-to-fill slope transitions
    - Install slope (over-side) drains
    - Prepare slopes for revegetation success- use mini-benching and roughening
    - Use vegetation as long-term (permanent) slope protection

Contractor:

- Develop SWPPP to include diversion and slope stabilization BMPs
    - Geotextile/Erosion Control Blankets, Seeding, Minibenches/Slope Roughening, Sediment Wattle
- Inspect BMPs per applicable CGP requirements and/or project Special Provisions
- Adjust and maintain BMPs

Sediment Control Principles

Sediment controls include structural practices to keep sediment in place and are the “2nd Line of Defense” to minimize stormwater pollution. Properly selected, designed and installed sediment controls, implemented in combination with effective erosion controls, provide the most successful results in stormwater erosion and sediment control. There are numerous structural practices that can be used to retain sediment on the construction site. Use the following discussion of sediment control principles as a guide in selecting the appropriate sediment control BMPs for the SWPPP.

Sediment Control Principle #6:

Protect storm drain inlets.

Storm drain inlet protection both within and outside the project area is an ongoing sediment control measure from project start through project completion. Inspection and maintenance of inlet protection BMPs is very important to successful sediment control. Never use storm inlet protection as a primary BMP; use erosion control techniques to prevent erosion, and sediment control BMPs to backup erosion control BMPs. Storm drain inlet protection is one construction BMP that should be removed at project completion, upon approval of the Engineer.

Planner/Designer:

- Include Storm Drain Inlet protection BMPs in *Erosion and Pollution Control Plans and Details* together with other upstream erosion and sediment control BMPs to minimize sediment transport to inlets
- Design inlet protection to handle the volume of water from the area being drained
- Design inlet protection to handle anticipated trapped sediment

Contractor:

- Develop SWPPP to include BMPs that support this principle
  - Storm Drain Inlet Protection and other upstream erosion and sediment control BMPs to minimize quantity of sediment reaching inlets
- Install storm drain inlet protection as soon as inlets are installed and before soil-disturbing activities begin in areas with existing storm drain systems.
- Install storm drain inlet protection for storm drains outside the construction area that may receive stormwater runoff from the project
- Inspect BMPs per applicable CGP requirements and construction documents
- Adjust and maintain BMPs

Sediment Control Principle #7:

Establish perimeter controls.

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

Planner/Designer:

- Clearly define limits of disturbance on plans
- Specify BMPs in *Erosion and Pollution Control Plans*
  - Check Dams to reduce run-off velocity and capture sediment before reaching project perimeter
  - Sediment Log, Compost Sock, Silt Fence

Contractor:

- Develop SWPPP to include BMPs that support this principle
  - Check Dam, Silt Fence, Sediment Log, Compost Sock
- Enforce construction limits and perimeter controls
- Inspect BMPs per applicable CGP requirements and construction documents
- Adjust, maintain BMPs

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. Sediment basins should be used for drainage locations where 10 or more acres are disturbed at any one time. Dewatering methods are used to remove ground water or rain water from work areas to prevent the discharge of muddy water into storm drains and waters of the United States.

Planner/Designer:

- Specify BMPs in *Erosion and Pollution Control Plans*
  - Sediment Basins or Sediment Traps as site conditions dictate and to supplement other sediment controls discussed earlier in this section
  - Dewatering Operations

Contractor:

- Develop SWPPP to include BMPs that support this principle
  - Sediment Basin, Sediment Trap, Silt Fence, Sediment Log, Compost Sock, Dewatering Operations, Curb Inlet Protection
- Inspect BMPs per applicable CGP requirements and construction documents
- Adjust and maintain BMPs

Sediment Control Principle #9:

Establish stabilized construction exits.

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.

Planner/Designer:

- Specify BMPs in Erosion and Pollution Control Plans
  - Stabilized Construction Entrance/Exit

Contractor:

- Develop SWPPP to include BMPs that support this principle
  - Stabilized Construction Entrance/Exit, Stabilized Construction Roadway
  - Supplemental BMPs: Vehicle and Equipment Cleaning, Street Sweeping and Vacuuming
- Inspect BMPs per applicable CGP requirements and construction documents
- Adjust and maintain BMPs

Sediment Control Principle #10:

Inspect and maintain controls.

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

Contractor:

- Per applicable permit requirements-inspect, maintain, adjust and /or replace with alternate BMP(s) that may be more effective based on specific site conditions

Good Housekeeping Principles

The contractor must implement good housekeeping procedures to prevent contamination of stormwater from litter, construction debris, construction materials and chemicals and/or other construction-related waste or operations. BMPs designed to prevent pollution through the use of good housekeeping measures must be included in the SWPPP. Employee training is a key element of construction site pollution prevention. Training programs should discuss proper material and waste storage, handling, inventory and cleanup techniques for construction sites. Use the following as a guide in selecting good housekeeping BMPs for the SWPPP.

Good Housekeeping Principle #1:

Provide for waste management.

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.

- Develop SWPPP to include BMPs that promote proper waste management
  - Solid Waste Management, Hazardous Waste Management, Contaminated Soil Management, Concrete Waste Management, Liquid Waste Management

Good Housekeeping Principle #2:

Establish proper construction material handling and staging areas.

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.

- Include the following BMPs in the SWPPP
  - Material Delivery and Storage, Material Use, Stockpile Management

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 the solid washout waste. Locate washout areas at least 50 yards away from storm drains and watercourses whenever possible.

- Include the following BMPs in the SWPPP
  - Concrete Waste Management
- Comply with the requirements of the Arizona Aquifer Protection Permit.

Good Housekeeping Principle #4:

Establish proper equipment/vehicle fueling and maintenance practices.

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.

- Include the following BMPs in the SWPPP
  - Vehicle and Equipment Fueling, Vehicle and Equipment Maintenance

Good Housekeeping Principle #5:

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

Use off-site facilities to wash equipment and vehicles. Alternatively, provide designated cleaning areas with proper containment methods to prevent discharge to storm drains or off-site. 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.

- Include the following BMPs in the SWPPP
  - Vehicle and Equipment Cleaning

Good Housekeeping Principle #6:

Develop a spill prevention and response plan.

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 specify training methods for employees responsible for spill prevention and response.

- Include the following BMPs in the SWPPP
  - Spill Prevention and Control

2.6 CONSTRUCTION BMP SELECTION GUIDE

Proper BMP design, selection and installation are essential to achieve the goals of this manual. As discussed earlier in this chapter, BMP selection begins during the design phase but must be continued by the contractor and ADOT throughout the life of the project. The most effective way to reduce erosion, transportation of soil and sedimentation, and to prevent the contamination of stormwater is to select and install BMPs that best fit the specific site conditions.

The following BMP selection process suggests a step-by-step approach to facilitate selecting the BMPs that will provide the best erosion and pollution control for each project.

1. Identify and evaluate potential erosion and pollutant sources impacting your project.
2. Use the Erosion and Sediment Control Principles and the Good Housekeeping Principles as guides to develop effective erosion and pollution control for the project.
3. Based upon the sources identified in step 1 above, determine which BMPs should be used to reduce erosion and to reduce or eliminate pollutant discharges from the project site. Develop the list of BMPs from the BMP tool box in Chapter 5 of this manual and/or design additional control measures to meet project-specific needs.
   a. Further evaluate site factors: specific conditions, limitations (physical constraints) to assist in the selection of BMPs.
   b. Narrow (edit) the initial list using the BMP information sheets in Chapter 5 Best Management Practices. Start with the AT A GLANCE section, then read the Appropriate Applications, Advantages and Limitations sections on each BMP sheet to confirm or eliminate chosen BMPs. Read the other sections for additional knowledge that may influence choices.
   c. Analyze costs (design, installation and maintenance) to further edit the list.
4. Verify that BMP combinations have been selected for the most effective control.
5. Finalize the BMP list for the work product (*Erosion and Pollution Control Plan and Details*, SWPPP, Maintenance Plan, etc.).
6. Be prepared to select alternate or replacement BMPs based upon dynamic construction site conditions and BMP performance.

Remember:
Use combinations of BMPs to most effectively control stormwater erosion and pollution.

CHAPTER 3

INSTRUCTIONS FOR OBTAINING STORMWATER DISCHARGE PERMIT AUTHORIZATION FOR ADOT CONSTRUCTION PROJECTS

3.1 INTRODUCTION

ADOT is authorized to discharge stormwater to waters of the United States under a Statewide Stormwater Discharge Permit issued by the Arizona Department of Environmental Quality (ADEQ) under the Arizona Pollutant Discharge Elimination System (AZPDES) program. This permit, effective September 19, 2008 through September 18, 2013, is authorized statewide, except for Indian Country, and covers stormwater and other specified discharges to waters of the United States. Specific coverage includes:

- Activities associated with ADOT operated Municipal Separate Storm Sewer Systems (MS4)
- Activities associated with construction activities initiated and controlled by ADOT
- Facilities associated with industrial and maintenance activities owned and operated by ADOT

Contractors working under contract to ADOT must obtain authorization to discharge stormwater under the AZPDES Arizona Construction General Permit (AZCGP).

This chapter describes the steps that operators follow to comply with the AZCGP and the steps ADOT (owner) will follow to comply with the ADOT Statewide Stormwater Discharge Permit requirements. Federal Construction General Permit (FCGP) instructions, applicable to projects in Indian Country in Arizona, are described at the end of this chapter. Table 3.1 summarizes the steps in the permit authorization process and includes FCGP, AZCGP and ADOT Statewide Stormwater Discharge Permit citations.

Requirements in each step are discussed briefly and individual responsibilities identified in a chart with each step. Applicable discharge permit citations are listed in italics immediately after the step title. **Erosion and pollution control is a shared obligation among ADOT, the general contractor and subcontractors to protect the environment. It is neither the general contractor's nor ADOT's sole responsibility to comply with AZCGP, FCGP or ADOT Statewide Stormwater Discharge Permit requirements.**

3.2 STEP 1: PREPARE A STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

ADOT Statewide Stormwater Discharge Permit Section 5.2
AZCGP Part III
FCGP Part 7.

A complete SWPPP shall be developed by the Erosion Control Coordinator (ECC) hired by the contractor and approved by ADOT in accordance with the Standard Specifications and Special Provisions. Refer to Chapter 4 for information on developing a SWPPP. Two copies of the draft SWPPP shall be submitted to the ADOT Resident Engineer at the preconstruction conference if possible, but no later than 14 calendar days after ADOT approval of the contractor's ECC.

Steps for Obtaining Construction General Permit Authorization

Step	Action	ADOT 2008 Statewide SW Permit Citation	AZCGP 2008 Citation	FCGP 2012 Citation	Information and Forms
1	Prepare Stormwater Pollution Prevention Plan (SWPPP)	Section 5.2	Part III	Part 7	EPCM: Chapter 4, Appendix A; Contract Documents; ADOT Stored Specification 104SWDEQ
2	Certify the SWPPP	Sections 5.3.1, 11.3.4	Parts III.A.3, VIII.J	Part 7.2.15 App. I.11.4, App. I.11.5	EPCM: Appendix A: AZPDES SWPPP Index Sheet, NPDES SWPPP Index Sheet
3	Submit Notice of Intent (NOI)	Section 5.3.1.1	Parts II.A, II.B	Parts 1.4 1.4.1, 1.4.2, 7.1.1	EPCM: Appendix A: NOI ADEQ website Smart NOI websites
4	Retain SWPPP and NOI at the job site	Sections 5.2.1.5, 5.3.1	Part III.G	Parts 7.2.16, 7.3	Project Specifications
5	Implement the SWPPP	Section 5.2.1.2	Part III.A	Part 7	EPCM: Appendix A: ADOT AZPDES Inspection Checklist; Maintenance, record keeping, site-monitoring forms; Project Specifications
6	Inspect the BMPs regularly and after each storm event	Section 5.2.5	Part IV.H	Part 4	ADOT Inspection Form Appendix A Project Specifications
7	Adjust SWPPP to fit site conditions	Section 5.2.6	Part IV.I.2	Part 7.4.1	Project Specifications
8	Maintain an updated SWPPP	Section 5.2.6	Parts III.E, IV.H.5	Part 7.4	Project Specifications
9	Maintain the BMPs	Section 5.2.4	Part IV.I	Part 5	EPCM: Chapter 5, Appendices A, B
10	Evaluate job site to determine Final Stabilization	Sections 5.3.2, 12	Part II.C.1.a	Parts 2.2.2 App. A, page A-5	EPCM: Appendix A: Methodology for Determining Final Stabilization Project Specifications
11	Submit Notice of Termination (NOT)	Sections 5.3.1.1, 5.3.2.	Part II.C	Part 8	EPCM: Appendix A: NOT ADEQ website Project Specifications
12	Retain records after project completion for 3 years (5 years for ADOT)	Sections 5.2.5.6, 11.16	Parts VII, VIII.I.2	App. I.15	Project Specifications

Follow the ADOT Statewide Stormwater Permit if ADOT is the owner and operator.

Table 3.1: Steps for Obtaining Construction General Permit Authorization

Step 1 Responsibilities	
ADOT	**Contractor**
Provide supporting documents to complete the SWPPP	Designate a qualified ECC who will prepare the SWPPP
Review credentials of ECC selected by the contractor	Prepare and submit the SWPPP
Review draft SWPPP submitted by the contractor and provide comments	

3.2.1 Project Document BMPs

During the project design process, ADOT and the project design team will utilize BMPs from this Manual and BMPs developed for unique project conditions to prepare:

- Erosion and pollution control plans, entitled "*Erosion and Pollution Control Plans*"
- Erosion and pollution control details, entitled "*Erosion and Pollution Control Details*"
- Special Provisions to Section 810 of the Standard Specifications

The project documents will provide direction and specific expectations to the contractor regarding erosion control and stormwater pollution prevention. However, these documents shall not be considered a complete SWPPP and shall not replace the contractor's SWPPP, since the project documents are prepared assuming typical construction practices and may not reflect the contractor's actual methods of construction, access requirements or project phasing. Instead, the contractor shall use the project documents as a guide in developing the project SWPPP.

3.3 STEP 2: CERTIFY THE SWPPP

ADOT Statewide Stormwater Discharge Permit Section 5.3.1, Section 11.3.4
AZCGP Part III.A.3, Part VIII.J
FCGP Part 7.2.15., Appendix I.11.4., Appendix I.11.5.

ADOT, the general contractor and any subcontractors that are responsible for constructing the erosion and pollution controls must certify the SWPPP. In the case of ADOT local government projects involving federal aid, the appropriate municipality must also certify the SWPPP. Specific certification and signatory requirements are defined in the AZCGP and ADOT Statewide Stormwater Discharge Permit citations listed above. The certifications shall occur after award of the contract and before construction begins.

As described earlier, it is the obligation of all personnel involved in the construction process to protect the environment. The certification requirement reinforces the fact that it takes a team effort to properly control stormwater pollution and that responsibility is shared equally among ADOT and its contractors and subcontractors.

The following certification is required by ADEQ and is included on the ADOT NPDES and AZPDES SWPPP Index Sheets Refer to Appendix C for sample Index Sheets.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person

or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Step 2 Responsibilities	
ADOT	**Contractor**
Certify the SWPPP	Certify the SWPPP

Note: The FCGP, AZCGP and the ADOT Statewide Stormwater Discharge Permit define authorized signatories for the SWPPP and other permit-required documents. Refer to the Permit citations listed directly below 3.3 STEP 2: CERTIFY THE SWPPP to ensure compliance with the signatory requirements.

3.4 STEP 3: SUBMIT NOTICE OF INTENT (NOI)

ADOT Statewide Stormwater Discharge Permit Section 5.3.1.1
AZCGP Part II.A., Part II.B.
FCGP Part 1.4., Part 1.4.1., Part 1.4.2., Part 7.1.1.

The NOI form serves as a promise that the operator(s) will comply with the AZCGP conditions. ADOT does not need to file an NOI as it is has promised to comply with regulations under the ADOT Statewide Stormwater Discharge Permit.

A complete and accurate NOI form must be prepared by a construction site owner or operator and signed by a qualified signatory as defined in AZCGP Part VIII.J to receive coverage under the AZCGP. An operator(s) is any person associated with the project that has control over the construction plans or specifications or day-to-day operational control of the site (the Contractor, the ECC, and any Subcontractor directly associated with installation or maintenance of BMPs). Part III.B.1 of the AZCGP provides a complete definition of operator.

The NOI must be submitted to ADEQ allowing for up to a two full business-day review period before any construction activities occur at the site. If the project is located within or has the potential to discharge to an MS4, a copy of the certificate authorizing permit coverage must also be submitted to the MS4 or local authority(s). A list of MS4 municipalities in Arizona is located on the ADEQ website http://www.azdeq.gov/environ/water/permits/stormwater.html#ms4. Also, contractors operating under an approved local erosion and pollution control plan, grading plan, or stormwater management plan shall send a copy of the certificate authorizing permit coverage to the local authority(s). If the project site is located within 1/4 mile of outstanding or impaired waters, the NOI must be submitted at least 32 business days before any construction activities occur at the site.

A SWPPP that satisfies the conditions of the AZCGP must be completed and certified prior to submitting the NOI to ADEQ. It is not necessary that the SWPPP be included with the NOI, but the SWPPP must always be available for ADEQ review. The SWPPP must be submitted to ADEQ with the NOI if the construction site is located within 1/4 mile of a outstanding or impaired water.

The most efficient method for filing the NOI is to use the ADEQ Smart NOI online program at http://az.gov/app/smartnoi/.

Alternatively, the NOI form may be submitted by certified mail or hand delivery to:

Arizona Department of Environmental Quality
Surface Water Section / Stormwater & General Permits Unit
1110 W. Washington Street, 5415A-1
Phoenix, AZ 85007

Forms may also be faxed to 602-771-4528.

The NOI form and detailed instructions for completing the form are available at the ADEQ website, http://azdeq.gov/function/forms/appswater.html. A copy of the NOI form is included in Appendix C of this manual.

Receipt and acceptance of an NOI is documented by issuance of an authorization certificate and number.

Refer to section 3.14.1 for FCGP (Indian Country only) NOI filing information.

Step 3 Responsibilities	
ADOT	**Contractor**
Review contractor's(s') NOI	Prepare an NOI after certification of the SWPPP
Ensure contractors(s) file an NOI	File an NOI

3.5 STEP 4: RETAIN DOCUMENTS AT THE JOB SITE

ADOT Statewide Stormwater Discharge Permit Section 5.2.1.5, Section 5.3.1
AZCGP Part III.G.
FCGP Part 7.2.16, Part 7.3

Table 3.2 lists documents that must be kept with the SWPPP and retained on the job site, or a location easily accessible to the project site during normal business hours, throughout the construction process.

Step 4 Responsibilities	
ADOT	**Contractor**
The Engineer/Inspector will keep document copies at the construction office or in their vehicles at the project site	Post the authorization # 'AZCON-_____' at main entrance to construction site
	Keep copy of authorization certificate in the SWPPP
	Keep SWPPP and all attachments in the construction office or in the contractor's vehicle at the project site

Documents to be Retained on the Job Site with the SWPPP				
Document	**ADOT Statewide SW Permit Citation**	**AZCGP 2008 Citation**	**FCGP 2012 Citation**	**References**
Copy of the AZPDES AZCGP OR Copy of the current NPDES FCGP	Section 5.3.1	Part III.D	Part 7.2.16	http://www.azdeq.gov/environ/water/permits/download/2008_cgp.pdf http://www.epa.gov/npdes/pubs/cgp2008_finalpermit.pdf
Copy of the NOI submitted to ADEQ OR Copy of the NOI submitted to EPA	Section 5.3.1	Part II.B	Part 7.2.16	http://az.gov/webapp/noi/main.do http://cfpub1.epa.gov/npdes/stormwater/enoi.cfm
Copy of the authorization certificate with authorization number received from ADEQ OR EPA	Section 5.3.1.2	Part II.B.3	Part 7.2.16	Provided from ADEQ OR EPA via mail, fax, or electronically via the Smart NOI OR eNOI system after NOI is approved
Copy of Environmental Clearance Letter	–	–	–	ADOT environmental clearance documents ADOT Erosion and Pollution Control Manual Appendix
Identification of any municipality that received a copy of the authorization certificate	Section 5.3.1	Part III.D	–	
Copies of any other agreements (such as 404 permits, local grading permits, etc.) with any state, local, or federal agencies that would affect the provisions or implementation of the SWPPP	Section 5.3.1	Part III.D	Part 7.2.14	ADOT environmental clearance documents

Table 3.2: Documents to be Retained on the Job Site with the SWPPP

3.6 STEP 5: IMPLEMENT THE SWPPP

ADOT Statewide Stormwater Discharge Permit Section 5.2.1.2
AZCGP Part III.A.
FCGP Part 7.

After the NOI is accepted and an authorization number received, construction may begin that will require implementation of the SWPPP. The erosion and pollution controls (i.e., the BMPs) shall be constructed in accordance with the SWPPP.

The SWPPP is intended to be a dynamic plan that must be revised in response to unanticipated or changing conditions during construction. Making changes to the Plan where it is not effective is also a requirement of the permit. Any changes to the plan shall be noted and dated in the plan.

Step 5 Responsibilities	
ADOT	**Contractor**
Monitor and record weekly-extended weather forecasts	Monitor and record weekly-extended weather forecasts
Discuss weather forecasts at scheduled weekly progress meetings	Discuss weather forecasts at scheduled weekly progress meetings
	If probability of precipitation is high for the project area, verify that BMPs are properly installed and maintained
	If probability of precipitation is high for the project area, install additional erosion control measures as directed by the Engineer
	Within 14 days, install stabilization measures where construction activities have temporarily or permanently ceased. AZCGP Part IV.B.2

The ADOT Resident Engineer and the contractor are jointly responsible for implementing the SWPPP and maintaining dated records of:

- Major grading activities
- Areas where construction activities have temporarily or permanently stopped
- Installation of stabilization measures (BMPs)
- Delays and reasons for delays in installation of stabilization measures

These records must be included in the SWPPP. A copy of a 'Grading and Stabilization Record' used to track grading and stabilization activities is located in Appendix C of this Manual and Appendix D of the ADOT SWPPP Template, http://www.azdot.gov/Inside_ADOT/OES/Water_Quality/Stormwater/Other_Resources.asp.

3.7 STEP 6: INSPECT BMPS REGULARLY

ADOT Statewide Stormwater Discharge Permit Section 5.2.5
AZCGP Part IV.H.
FCGP Part 4.

Regular site inspections are required to ensure that BMPs are functioning properly and that the SWPPP is properly maintained. Inspections must be performed by qualified personnel (i.e. ECC)

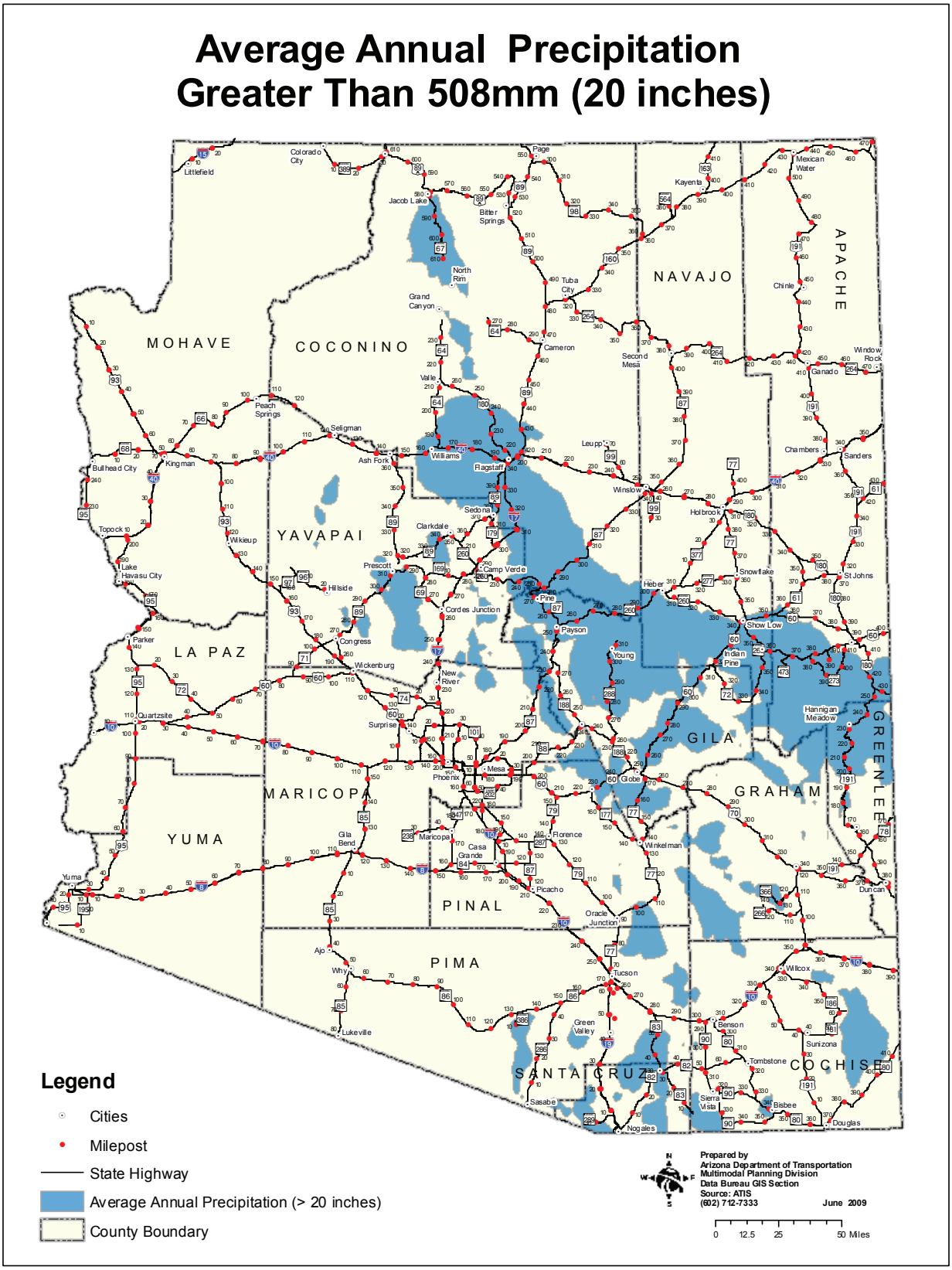

Figure 3.1: Average Annual Precipitation

as described in the AZCGP and the ADOT Statewide Stormwater Discharge Permit.

Routine inspection is required every 7 calendar days OR once every 14 calendar days and also within 24 hours after a rainfall event of 1/2 inch or greater. Reduced inspection frequency may apply under certain permit-specified conditions. For example, the ADOT Statewide Stormwater Discharge Permit allows for reduced inspections in areas of the state that receive less than 20 inches average annual rainfall and construction occurs during the seasonal dry period. Under these conditions, inspections are required monthly, anytime rain is predicted and within 24 hours following a rainfall event of 1/2 inch or greater. Figure 3.1 illustrates locations in Arizona where the average annual rainfall is greater than 20 inches. Refer to the applicable permit for additional information on reduced inspection frequency.

Inspections must include all areas of the site disturbed by construction activity, staging areas and areas used for storage of materials that are exposed to precipitation. A minimum list of inspection items is provided in AZCGP Part IV.H.3 and in the ADOT Statewide Stormwater Discharge Permit section 5.2.5.4. Minimum Inspection Report contents are listed in the AZCGP Part IV.H.4 and minimum Construction Compliance Evaluation Report (Inspection Report) contents are listed in the ADOT Statewide Stormwater Discharge Permit section 5.2.5.5. The Report and records of any follow-up actions taken shall be retained as part of the SWPPP.

Step 6 Responsibilities	
ADOT	**Contractor**
Inspections of BMPs	Inspections of BMPs and inspection reports
Approval of follow-up actions deemed necessary following inspections	Installation and maintenance of all BMPs
	Required follow-up actions within time limits described in the permit and project specifications

3.8 STEP 7: ADJUST THE SWPPP TO FIT SITE CONDITIONS

ADOT Statewide Stormwater Discharge Permit Section 5.2.6
AZCGP Part IV.I.2.
FCGP Part 7.4.1.

The operator shall complete follow-up actions based on results of the inspection process within 4 calendar days or by the next anticipated storm event following the inspection, whichever is sooner, per ADOT Standard Specification Paragraphs 104.09.F.2, or as required by the project Special Provisions.

Step 7 Responsibilities	
ADOT	**Contractor**
Approval of changes or additions to the SWPPP based upon specific site conditions	Installation and adjustment of BMPs necessary as a result of inspections
	Update SWPPP to reflect adjustments

3.9 STEP 8: MAINTAIN AN UPDATED SWPPP

ADOT Statewide Stormwater Discharge Permit Section 5.2.6
AZCGP Part III.E, Part IV.H.5.
FCGP Part 7.4.

It is imperative that the SWPPP be kept current with the changes and adjustments made in the field. Failure to update the SWPPP is considered a violation of AZCGP, FCGP, the ADOT Statewide Stormwater Discharge Permit and the Clean Water Act conditions, and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or denial of permit renewal application.

The SWPPP shall be updated within 15 calendar days if changes in design, scheduling or maintenance activities have a significant effect on the discharge of pollutants or it is determined that discharges from the construction site are causing or contributing to water quality exceedances.

Step 8 Responsibilities	
ADOT	**Contractor**
Retain copies of updated SWPPP in the construction office or vehicle	Maintain an updated SWPPP

3.10 STEP 9: MAINTAIN THE BMPS

ADOT Statewide Stormwater Discharge Permit Section 5.2.4
AZCGP Part IV.I.
FCGP Part 5.

All erosion and pollution control measures and other protective measures identified in the SWPPP must be maintained in effective operational condition.

The ADOT Statewide Stormwater Discharge Permit requires a maintenance plan.

Step 9 Responsibilities	
ADOT	**Contractor**
Inspections and approval of BMP maintenance activities	Maintenance of all erosion and pollution control measures (BMPs)

3.11 STEP 10: EVALUATE JOB SITE TO DETERMINE FINAL STABILIZATION

ADOT Statewide Stormwater Discharge Permit Section 5.3.2, Section 12
AZCGP Part II.C.1.a.
FCGP Part 2.2.2., Appendix A, page A-5

Final Stabilization means all soil-disturbing activities have been completed; all construction materials, waste and temporary erosion and pollution control BMPs have been removed and properly disposed of and either of the two following criteria has been met:

1. A uniform (i.e., evenly distributed, without large bare areas) perennial vegetative cover with a density equivalent to 70% of the native background vegetative cover has been established on all unpaved areas and areas not covered by permanent structures. Where perennial vegetation is not yet fully established, temporary erosion control devices are properly installed and fully operational.
2. Permanent stabilization measures (e.g., riprap, decomposed granite, gabions or geotextiles) have been employed and are fully operational.

Appendix C includes a copy of the ADOT Methodology for Determining Final Stabilization document. Check for updates at http://www.azdot.gov/Highways/Roadway_Engineering/Roadside_Development/Resources.asp.

Step 10 Responsibilities	
ADOT	**Contractor**
Determine final acceptance in accordance with project specifications	Request inspections to determine if final stabilization has been achieved

3.12 STEP 11: SUBMIT NOTICE OF TERMINATION (NOT)

ADOT Statewide Stormwater Discharge Permit Section 5.3.1.1, Section 5.3.2
AZCGP Part II.C.
FCGP Part 8.

The operator must submit a complete and accurate NOT to ADEQ after it has been reviewed by the Engineer and it has been determined that the project has met the submittal criteria as described in 3.11 and per the permit citations listed above. ***Note: Closing a project does not mean the NOT can be filed; final stabilization criteria must be met before filing the NOT.***

Submission of the NOT form constitutes notice that the party identified on the form is terminating coverage under the AZCGP. Termination is effective at midnight on the day the NOT is received by ADEQ. ADOT does not need to file an NOT as it is covered under the ADOT Statewide Stormwater Discharge Permit.

The most efficient method for filing the NOT is to use the ADEQ Smart NOI program online at http://az.gov/app/smartnoi/. If the NOI was filed using the Smart NOI program, the project information on the NOI can be accessed to complete the NOT.

Alternatively, submit the NOT form by certified mail or hand delivery to:

Arizona Department of Environmental Quality
Water Permits Section - Stormwater & General Permits Unit
1110 W. Washington Street, 5415A-1
Phoenix, AZ 85007

Forms may also be faxed to 602-771-4528.

The NOT form is available at the ADEQ website http://www.azdeq.gov/environ/water/permits/download/constnot.pdf. A copy of the NOT form is also included in Appendix C of this manual. Refer to the EPA website http://cfpub2.epa.gov/npdes/stormwater/cgp.cfm for FCGP NOT filing information.

Step 11 Responsibilities	
ADOT	**Contractor**
Approve contractor's intent to submit the NOT	Obtain approval from the ADOT Resident Engineer to file the NOT
	Submit NOT form to ADEQ and one copy to the ADOT Engineer

3.13 STEP 12: RETENTION OF RECORDS

ADOT Statewide Stormwater Discharge Permit Section 5.2.5.6, Section 11.16
AZCGP Part VII, Part VIII.I.2.
FCGP Appendix I.15

The Contractor shall retain copies of SWPPPs and all documentation required by the applicable permit, including records of all data used to complete the NOI to be covered by this permit, for at least 3 years from the date of NOT filing.

ADOT shall retain copies of SWPPPs for the permit term and copies of the *State Stormwater Management Plan* (SSWMP) and other documents for at least five years from the permit expiration date.

3.14 SPECIAL CONDITIONS, REQUIREMENTS AND EXCEPTIONS

Table 3.3 summarizes special conditions, requirements and exceptions for obtaining construction general permit authorization.

3.14.1 Permit Requirements for Indian Country

If the project is located entirely in Indian Country, FCGP permit coverage shall be obtained through the Environmental Protection Agency at http://cfpub2.epa.gov/npdes/stormwater/cgp.cfm.

Follow the steps listed below and described in detail at the EPA website http://cfpub2.epa.gov/ndes/stormwater/application_coverage.cfm and refer to the ADOT Stored Specification 104SWEPA to obtain coverage.

- Step 1: Read the FCGP and fact sheet.
- Step 2: Determine if project is eligible for coverage under the FCGP.
- Step 3: Develop and implement SWPPP (follow instructions in Chapter 4 of this Manual).
- Step 4: Complete and submit an NOI.

Complete and submit the NOI using the EPA's electronic stormwater permit application (eNOI) at http://cfpub2.epa.gov/npdes/stormwater/enoi.cfm.

Special Conditions, Requirements and Exceptions for Obtaining Construction General Permit Authorization		
Condition, Requirement or Exception	**Action**	**Location of forms and further information**
Indian Country	Obtain FCGP through the EPA Region IX or other appropriate permitting authority	http://www.epa.gov/region09/water/npdes/index.html
Post-Construction Discharges	Post-construction discharges from industrial sites may need to be covered by a separate AZPDES permit	http://www.azdeq.gov/environ/water/permits/azpdes.html
Discharges Mixed with Non-Stormwater except as defined in Part I.C.2 of the AZCGP	Mixed discharges may need to be covered by a separate AZPDES permit	http://www.azdeq.gov/environ/water/permits/azpdes.html
Discharges Covered by Other AZPDES Permits.	Obtain appropriate permit through ADEQ	http://www.azdeq.gov/environ/water/permits/azpdes.html
Discharges to Impaired and Unique Waters	Follow instructions outlined in AZCGP; submit NOI, SWPPP and Monitoring Program 32 business days before construction activity will begin	http://az.gov/app/smartnoi/ http://www.azdeq.gov/environ/water/permits/azpdes.html
Exempt Discharges as defined In Part I.D.6 of the AZCGP	Determine if discharges meet exemption	http://www.azdeq.gov/environ/water/permits/download/2008_cgp.pdf
Permit Requirements for Batch Plants, Borrow Pits and Material Pits located outside the right-of-way	Obtain permit coverage under Multi-Sector General Permit (MSGP) for construction activities not directly related to a construction site. Monitor per ADOT Statewide SW Permit Sections 5.1.3.3, 5.1.3.4	After NOI is approved, from ADEQ via mail, fax, or electronically via the Smart NOI system http://www.azdeq.gov/environ/water/permits/msgp.html
Concrete Washout	Must comply with the Arizona Aquifer Protection Permit requirements	http://www.azdeq.gov/environ/water/permits/app.html

Table 3.3: Special Conditions, Requirements and Exceptions for Obtaining Construction General Permit Authorization

Alternatively, with prior approval from the Regional Office, submit a the paper NOI form per the 'How to File Forms' section at http://cfpub2.epa.gov/npdes/stormwater/application_coverage.cfm.

NOI form and instructions are available at:
http://www.epa.gov/npdes/pubs/cgp2008_appendixe.pdf

For project sites located on the White Mountain Apache Reservation (WMAR), the NOI shall be sent to:
Tribal Environmental Planning Office
P.O. Box 2109
Whiteriver, AZ 85941

Forms may also be faxed to WMAR at 928-338-5195.

For project sites located on the Hualapai Tribal Lands, the NOI shall be sent to:
Water Resources Program
P.O. Box 179
Peach Springs, AZ 86434

> Stormwater discharge authorization must be obtained for each jurisdiction in which the project is located. For example, AZCGP and FCGP authorization must be obtained for projects located in both Indian Country and non-Indian Country in Arizona.

3.14.2 Post-Construction Discharges

The AZCGP does not authorize stormwater discharges that originate from the site after construction activities have been completed and the site, including any temporary support activity site, has achieved final stabilization and an NOT has been filed. Post-construction stormwater discharges from industrial sites may need to be covered by a separate AZPDES permit.

3.14.3 Discharges Mixed with Non-Stormwater

The AZCGP does not authorize discharges that are mixed with non-stormwater sources except as allowed in Part I.C.2.

3.14.4 Discharges Covered by Another AZPDES Permit

The AZCGP does not authorize stormwater discharges associated with construction activities that are covered under an individual permit or construction activities that are required to obtain coverage under an alternate general permit.

3.14.5 Permit Requirements for projects located within ¼ mile of Impaired or Outstanding Waters

If the project site is located within ¼ mile of outstanding (R18-11-112) or impaired (Section 303(d) of the CWA) waters, the NOI and the SWPPP must be submitted to ADEQ at least 32 business

days before any construction activities occur at the site, per AZCGP Part II.B.1. This time frame allows ADEQ to review the SWPPP to determine whether selected BMPs are sufficiently protective of water quality.

The SWPPP must include a proposal for monitoring to determine if BMPs and controls are effective per AZCGP Part I.D.5.a.

3.14.6 Permit Requirements for Batch Plants, Borrow Pits and Material Pits

Discharges from support activities such as concrete or asphalt batch plants, equipment staging yards, material storage areas, screening and crushing plants, excavated material disposal areas and borrow areas are covered under the AZCGP if the conditions of the permit are followed per AZCGP Part I.C.1. The contractor must obtain coverage under a separate Multi-Sector General Permit (MSGP) for activities that do not fall under the allowable discharges of the AZCGP.

3.14.7 Waivers for Small Construction Activities

Both the AZCGP and FCGP specify conditions for a Rainfall Erosivity Waiver on small construction projects which disturb between one and five acres. ***THIS WAIVER IS NOT ALLOWED ON ADOT PROJECTS*** per the ADOT Statewide Stormwater Discharge Permit Part 5.1.2.

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CHAPTER 4

STORMWATER POLLUTION PREVENTION PLANS

4.1 INTRODUCTION

Stormwater Pollution Prevention Plans (SWPPPs) are project-specific documents that identify potential sources of stormwater pollutants; describe pollutant mitigations, operational activities, physical controls (BMPs); and describe pollutant monitoring that will be used to prevent the discharge of pollutants into the waters of the United States for the duration of a construction project. On ADOT construction projects, the contractor prepares the SWPPP as a first step in obtaining Arizona Construction General Permit (AZCGP) or Federal Construction General Permit (FCGP) authorization. The SWPPP is a living document that requires continual updating to document changes in the project and/or BMPs, inspections and other pertinent information.

SWPPP preparation time varies depending upon project size and complexity. Typical preparation time is about 3 days, but could take much longer (e.g. 2 weeks). ADOT Standard Specification 104.09.B.3 requires submittal of a draft SWPPP within 14 days of the designated Erosion Control Coordinator (ECC) approval. Accordingly, the contractor is advised to allow sufficient time to prepare the SWPPP and apply for AZCGP authorization to meet project start dates.

The contractor is strongly encouraged to use the ADOT Construction SWPPP Template and the instructions available at http://www.azdot.gov/Inside_ADOT/OES/Water_Quality/Stormwater/Other_Resources.asp. This template provides detailed, step-by-step instructions for preparing an SWPPP including suggested text and example text of the information required. A Construction SWPPP Checklist is included in Appendix A of the Template. The SWPPP Template Table of Contents is shown below as an introduction to the SWPPP Template and the information necessary to complete the template.

4.2 ADOT CONSTRUCTION SWPPP TEMPLATE TABLE OF CONTENTS

AMENDMENT LOG
1. INTRODUCTION
- **1.1 Project Operators**
- **1.2 Incorporated References**
- **1.3 List of Acronyms**

2. PROJECT INFORMATION
- **2.1 Project Description**
  - 2.1.1 Receiving Waters and Unique Site Features
  - 2.1.2 Pollution Prevention Plan Implementation Schedule
  - 2.1.3 Total Site Area and Total Disturbed Area
  - 2.1.4 Runoff Coefficients, Soil Data, and Discharge Quality
- **2.2 Site Map**
- **2.3 Authorized Discharges**
  - 2.3.1 Allowable Stormwater Discharges
  - 2.3.2 Allowable Non-stormwater Discharges
- **2.4 Potential Sources of Pollutants**

3. EROSION, SEDIMENT, AND OTHER CONTROLS
- **3.1 Structural Controls**
  - 3.1.1 Soil Stabilization

3.1.2 Scheduling and Documentation of Stabilization Efforts
3.1.3 Sediment and Concentrated Flow Controls
3.1.4 Postconstruction Stormwater Management Measures
3.1.5 Structures Located in Floodplains
3.2 Support Activity Discharge Controls
3.3 Nonstructural BMPS
3.3.1 Good Housekeeping
3.3.2 Spill Control and Response
3.3.3 Training
3.3.4 Preventive Maintenance
3.3.5 Inspections
4. MAINTENANCE OF CONTROLS
5. INSPECTIONS
5.1 Inspection Frequency and Protocols
5.2 Inspection Reporting Procedures and Documentation
6. SWPPP MODIFICATIONS AND DOCUMENTATION
6.1 Maintaining Updated SWPPP
6.2 Public Notification and SWPPP Documentation
7. AZPDES AND OTHER PERMIT REQUIREMENTS
7.1 Copy of Construction General Permit (AZPDES)
7.2 Applicable State, Federal, or Local Plans
8. MONITORING AND REPORTING
8.1 Monitoring Plan
8.2 Reporting and Recordkeeping
9. SWPPP CERTIFICATION
9.1 SWPPP Certification
9.2 SWPPP Approval

APPENDIX A ADEQ Construction SWPPP Checklist
APPENDIX B-1 Site Maps and/or Plan Sheets
APPENDIX B-2 Soils Data/Discharge Data (if applicable)
APPENDIX C SWPPP Index Sheet, Descriptive BMPs, and Erosion and Sediment Control Plan BMP Detail Sheets
APPENDIX D Grading and Stabilization Record
APPENDIX E Spill Report
APPENDIX F Appendix F-1: Construction Site Inspection Log
Appendix F-2: Stormwater Monitoring Log
Appendix F-3: Compliance Evaluation Report
APPENDIX G BMP Maintenance and Repair Documentation
APPENDIX H Monitoring Plan
APPENDIX I Notice of Intent/ADEQ Authorization/ECC Certificate
APPENDIX J Copy of the AZCGP and Optional Copy of Section 404 Permits

4.3 PERMIT RELATED DOCUMENTS

Refer to Chapter 3 of this manual, Table 3.2 “Documents to be Retained on the Job Site with the SWPPP” for a list of permit related documents to include with the SWPPP.

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CHAPTER 5

BEST MANAGEMENT PRACTICES

5.1 INTRODUCTION

Best Management Practices (BMPs) are operational activities or physical controls that reduce the discharge of pollutants and minimize potential impacts upon receiving waters. In order to complete the *Stormwater Pollution Prevention Plan* (SWPPP) for ADOT approval, the contractor is required to select those BMPs which will best control stormwater pollution. Chapter 2 Project Planning and Design Guide of this manual offers one approach for selecting construction BMPs.

This chapter discusses BMP implementation factors and provides a toolbox of BMPs. Each highway construction project has unique conditions that may require new or custom BMPs to be designed or developed to meet water quality goals. Refer to the *ADOT Post-Construction Best Management Practices Manual* for a list of permanent BMPs for use in highway design and construction.

The design standards, details and material specifications for BMPs in this manual are subject to change. Stormwater erosion and pollution control BMPs are rapidly evolving and should be periodically checked for updates in design methods, specifications or materials.

5.2 IMPLEMENTING CONSTRUCTION SITE BMPS

Throughout the highway project development process each responsible participant will have identified BMPs to be used to prevent stormwater pollution. Successful implementation of these BMPs depends on many factors including:

- Thorough project site assessment prior to BMP installation and start of construction
- Comprehensive review of plans, details and specifications
- Development of the SWPPP including accurate maps of BMP locations
- Identification of strategies to limit the extent of disturbance throughout the entire project timeline
- Properly sized BMPs (flows typically increase down the watershed)
- Use of combinations of BMPs for most effective erosion and pollution control
- Inspection, maintenance and repair or replacement of BMPs
- Use of alternative BMPs
- Proper employee training
- Diligent record keeping to document BMP inspection, performance and maintenance

The contractor is advised to consider these factors as he or she prepares to implement project BMPs, both those specified in plans and details, and those he has included in the SWPPP.

Stormwater erosion and pollution control is a dynamic process that requires continuing effort to meet water quality goals.

Construction sites that disturb less than one acre are exempt from permit coverage, **however, operators are required to apply stormwater quality and erosion/sediment control BMPs as part of ADOT's compliance practices and pollution prevention measures.** The exemption of NPDES or AZPDES permit coverage for sites under one acre of soil disturbance could be canceled if the operator violates water quality standards by not correctly implementing BMPs.

Construction BMPs

CP	**Construction Site Planning and Management**
CP-1	Construction Sequencing
CP-2	BMP Inspection and Maintenance
EC	**Erosion Control**
EC-1	Preserve Existing Vegetation
EC-2	Minibenches/Slope Roughening
EC-3	Mulch Cover
EC-4	Seeding
EC-5	Geotextiles/Erosion Control Blankets
EC-6	Soil Binders
EC-7	Crown Ditch
RC	**Runoff Control**
RC-1	Earth Dikes/Drainage Swales and Lined Ditches
RC-2	Cut to Fill Slope Transitions
RC-3	Erosion Protection at Structures
RC-4	Rock Outlet Protection/ Velocity Dissipation Devices
RC-5	Slope Drains
RC-6	Check Dam
SC	**Sediment Control**
SC-1	Sediment Control Berm
SC-2	Silt Fence
SC-3	Sediment Trap
SC-4	Sediment Basin
SC-5	Sediment Wattle
SC-6	Sediment Log
SC-7	Gravel Bag Protection
SC-8	Storm Drain Inlet Protection
SC-9	Curb Inlet Protection
SC-10	Stabilized Construction Entrance/Exit
SC-11	Stabilized Construction Roadway

SC	**Sediment Control, continued**
SC-12	Compost Sock
SC-13	Rock Berm
GH	**Good Housekeeping**
GH-1	Vehicle and Equipment Cleaning
GH-2	Vehicle and Equipment Fueling
GH-3	Vehicle and Equipment Maintenance
GH-4	Street Sweeping and Vacuuming
GH-5	Material Delivery and Storage
GH-6	Material Use
GH-7	Stockpile Management
GH-8	Spill Prevention and Control
GH-9	Portable Toilet
NS	**Non-Stormwater**
NS-1	Water Conservation Practices
NS-2	Dewatering Operations
NS-3	Paving and Milling Operations
NS-4	Temporary Watercourse Crossing
NS-5	Water Diversion
NS-6	Structure Demolition/Removal Over or Adjacent to Water
NS-7	Material and Equipment Use In/Over Watercourses
WM	**Waste Management**
WM-1	Solid Waste Management
WM-2	Hazardous Waste Management
WM-3	Contaminated Soil Management
WM-4	Concrete Waste Management
WM-5	Liquid Waste Management

Table 5.1: Construction BMPs

5.3 CONSTRUCTION BEST MANAGEMENT PRACTICES

Table 5.1 Construction BMPs lists the BMP categories and the BMPs included in this manual. Post-Construction BMPs are discussed in the *ADOT Post-Construction Best Management Practices Manual For Highway Design and Construction (July 2009)*. Use both manuals to assist in developing effective erosion and pollution controls for highway projects.

BMP Categories and Sheets

The BMP sheets that follow are organized by category. Each BMP sheet includes a definition, purpose, and the AT A GLANCE section which provides brief information to assist in the selection of BMPs applicable to your project. Photographs and specific information on appropriate applications, limitations, planning/design considerations, material specifications, design standards and inspection and maintenance requirements complete each sheet. ADOT Erosion/Sediment Control and Water Quality Protection Details listed on individual BMP sheets are available at the ADOT Roadside Development Section website: http://www.azdot.gov/Highways/Roadway_Engineering/Roadside_Development/Resources.asp.

References and Resources

- *Arizona Department of Environmental Quality – Aquifer Protection Permit.*
- *Arizona Department of Environmental Quality Arizona Department of Transportation Statewide Permit for Discharges to Waters of the United States under the Arizona Pollutant Discharge Elimination System Program, February 2008*.
- *Arizona Department of Environmental Quality Arizona Pollutant Discharge Elimination System General Permit for Discharge from Construction Activities to Waters of the United States, February 2008*.
- *Environmental Protection Agency National Pollutant Discharge Elimination System General Permit for Discharge from Construction Activities to Waters, February, 2012*.
- *ADOT Erosion and Pollution Control Manual: for Highway Design and Construction, January 25, 2005.*
- *ADOT Maintenance and Facilities Best Management Practices Manual, 2010.*
- *ADOT Post-Construction Best Management Practices Manual June 2009.*
- *ADOT Statewide Storm Water Management Plan, February 2005 (3rd revision).*
- *ADOT SWPPP Template*, *June 10, 2010.*
- *Environmental Protection Agency Developing Your Stormwater Pollution Prevention Plan, A Guide for Construction Sites, May, 2007.*

Additional references and sources are listed on each BMP sheet as applicable.

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Construction Site Planning & Management (CP) BMPs

Construction site planning and management can reduce erosion and sediment loss by limiting the amount of disturbed area on the site at any one time, through proper implementation, inspection and maintenance of BMPs, through achievement of final stabilization of disturbed areas as the project progresses and by implementation of other considerations described in the Construction Sequencing BMP.

- CP-1 Construction Sequencing
- CP-2 BMP Inspection and Maintenance

Section 104.09 of the ADOT Stored Specifications states:

"Unless otherwise approved by the Engineer, the contractor shall not expose a surface area of greater than 750,000 square feet (17.22 acres) to erosion through clearing and grubbing, or excavation and filling operations within the project limits until temporary or permanent erosion control devices for that portion of the project have been installed and accepted by the Engineer.

The contractor shall indicate each 750,000 square-foot (17.22 acres) sub-area in the draft SWPPP, along with proposed erosion control measures for each sub-area. The draft SWPPP shall also include the sequence of construction for each sub-area, and installation of the required temporary or permanent erosion control measures."

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Construction Sequencing CP-1

DEFINITION

The development of a work schedule for every project that includes sequencing of construction and land disturbing activities in conjunction with the implementation of construction site BMPs.

PURPOSE

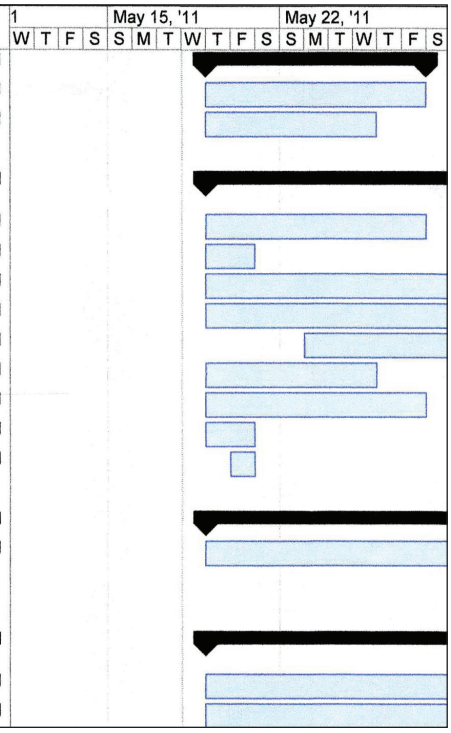
- Reduce the amount and duration of soil exposed to erosion by construction activities.
- Ensure installation of erosion and sediment control BMPs per a planned schedule.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Plan and schedule to disturb only portions of a site at any one time • Coordinate cut and fill to minimize movement and storage of soils
Alternate BMPs to consider: • N/A
Use in combination with: • Project specific BMPs
Maintenance Needs: • Evaluate and update construction progress and schedule

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		X	
Non-Stormwater			X
Waste Management			X

ID	Task Name	Duration	Start	Finish
1	**DARK STAR/ SR-90**	**7 days**	**Thu 5/19/11**	**Fri 5/27/11**
2	QWEST	7 days	Thu 5/19/11	Fri 5/27/11
3	FENCE/GATES	5 days	Thu 5/19/11	Wed 5/25/11
4				
5	**I-10 NEW WEST BOUND AND EAST BOUND**	**16 days?**	**Thu 5/19/11**	**Thu 6/9/11**
6	SWPPP	7 days	Thu 5/19/11	Fri 5/27/11
7	SUBGRADE PREP	2 days	Thu 5/19/11	Fri 5/20/11
8	TRUCK HAUL	14 days	Thu 5/19/11	Tue 6/7/11
9	STORMDRAIN	14 days	Thu 5/19/11	Tue 6/7/11
10	ELECTRICAL	14 days	Mon 5/23/11	Thu 6/9/11
11	BC5	5 days	Thu 5/19/11	Wed 5/25/11
12	FENCE	7 days	Thu 5/19/11	Fri 5/27/11
13	ABC	2 days	Thu 5/19/11	Fri 5/20/11
14	PAVE (W/B MAINLINE)	1 day?	Fri 5/20/11	Fri 5/20/11
15				
16	**SR-90**	**12 days**	**Thu 5/19/11**	**Fri 6/3/11**
17	SOIL NAIL (PERMANENT WEST/EAST)	12 days	Thu 5/19/11	Fri 6/3/11
18				
19	**GRAVES BORROW SITE**	**14 days**	**Thu 5/19/11**	**Tue 6/7/11**
20	EARTH WORK	14 days	Thu 5/19/11	Tue 6/7/11
21	TRUCK HAUL	14 days	Thu 5/19/11	Tue 6/7/11



2-Week Look Ahead Schedule Example.

Construction Sequencing CP-1

APPROPRIATE APPLICATIONS

- All construction projects.

LIMITATIONS

- Weather and other variables might affect construction schedules. The schedule should be updated to reflect changes due to these variables.

PLANNING/DESIGN CONSIDERATIONS

- Plan and schedule construction activities to minimize the amount of disturbed land exposed to erosive conditions.
- Install and maintain stabilization measures as work progresses, not just at the completion of construction.
- Schedule the installation of construction (temporary) and post-construction (permanent) controls as specified in the applicable stormwater discharge permit (FCGP, AZCGP, ADOT Statewide).
- The schedule of construction activities and concurrent application of construction and post-construction BMPs is developed as part of the SWPPP.
- Schedule clearing and grubbing activity to allow existing vegetation to remain in place as long as possible.
- For larger projects, the contractor shall not expose more than 750,000 square feet in any location until construction or post-construction BMPs have been installed and accepted by the Engineer.
- Stabilize non-active or construction-delayed areas as specified in the CGP.
- Monitor weather forecast and adjust the construction schedule to allow for the implementation of soil stabilization and sediment controls on all disturbed areas prior to the onset of rain.

DESIGN STANDARDS

- Develop the project construction schedule per the applicable permit requirements and ADOT specifications.
- The schedule should:
  - clearly define where and when BMPs will be installed.
  - include dates for installation of permanent drainage systems and runoff diversion devices. Install these devices as early as possible in the construction process.
  - include good housekeeping, non-stormwater and waste management BMPs.
  - include dates for significant long-term operations or activities that may have planned non-stormwater discharges such as dewatering, saw-cutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, bridge cleaning, etc.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow the schedule as written; monitor and modify as needed prior to implementing changes in construction activities.

Construction Site Planning & Management
BMP Inspection and Maintenance CP-2

DEFINITION

BMP inspection and maintenance are critical to successful construction site stormwater management. Routine (planned) and non-routine (repair) inspection and maintenance help identify potential problems and can reduce the need for BMP replacement or major repair.

PURPOSE

- Ensure proper BMP installation and functionality.
- Minimize potential impacts of stormwater erosion and pollution through early detection, repair and replacement of ineffective BMPs.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Frequency of inspection and type of maintenance may vary for each BMP
Alternate BMPs to consider: • N/A
Use in combination with: • CP-1 Construction Sequencing • All BMPs
Maintenance Needs: • Refer to the applicable stormwater discharge permit and individual BMPs for requirements

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	X		
Non-Stormwater	X		
Waste Management	X		

ARIZONA DEPARTMENT OF TRANSPORTATION - INTERMODAL DIVISION
Construction Inspection Quantlist
Roadside Development - Division VIII Storm Water: BMP Inspection

Tracs Number:		Location:	
Reviewer:		Normal / Rain Event:	
Author:	Leroy Brady	ECC Name:	
Version:	02222007		
Subcontractor:		Supervisor:	
Type:	Inspection	Date:	

Conforming	Attributes	
Y N N/A	1. The contractor is monitoring rainfall with a commercially manufactured rain gauge accurate to within 0.10 inches of rain, with results filed in the SWPPP, and copies submitted the Engineer on a weekly basis.	Stored Spec.
4	Comments:	104.09-F
Y N N/A	2. No clearing, grubbing, earthwork or other work elements affected by the requirements in the Storm Water Pollution Prevention Plan (SWPPP)are started until areas of environmental importance are clearly marked.	ADOT-EPCM
4	Comments:	5.1.2
Y N N/A	3. Joint inspections (ECC and ADOT)are conducted every 14-calendar days or at the frequency specified in the approved SWPPP, by the contractor's ECC.	Stored Spec.
4	Comments:	104.09-F
Y N N/A	4. Joint inspections (ECC and ADOT) are conducted within 24 hours after any storm event of 0.50 inch or more.	Stored Spec.
4	Comments:	104.09-F
Y N N/A	5. Complete and accurate Compliance Evaluation Reports are prepared and signed by the ECC for each inspection, filed in the contractor's SWPPP, with a copy to the Engineer.	Stored Spec.
4	Comments:	104.09-F
Y N N/A	6. BMPs designated by the SWPPP to intercept upslope run -on water or protect fill slopes such as wattles, sediment logs, silt fence and sediment control berms are properly installed prior to excavation and embankment activities .	ADOT-EPCM
4	Comments:	5.2 to 5.3

Page 1 of 6

Typical Construction Inspection Checklist.

Sediment wattle inspection.

BMP Inspection and Maintenance CP-2

APPROPRIATE APPLICATIONS

- All construction site BMPs.
- Inspection and maintenance must be performed at a minimum per the applicable stormwater discharge permit requirements on all highway construction and/or maintenance projects.

LIMITATIONS

- Stockpiles of materials for timely BMP repair and/or replacement may be necessary.

PLANNING/DESIGN CONSIDERATIONS

- Develop and adhere to a routine inspection schedule per the applicable stormwater discharge permit requirements.
- Erosion Control Coordinators must conduct inspections and identify BMPs in need of repair or replacement.

MATERIAL SPECIFICATIONS

- N/A

DESIGN STANDARDS

- Maintain BMPs per individual BMP sheet design and maintenance sections, ADOT Erosion/Sediment Control and Water Quality Protection Details and project Special Provisions.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Refer to the applicable stormwater discharge permit and individual BMP sheets for requirements.

Erosion Control (EC) BMPs

Erosion control (soil stabilization) consists of preparing the soil surface and applying BMPs or combinations thereof to disturbed soil areas. Temporary soil stabilization shall be applied to disturbed soil areas of construction projects per plans, details, specifications, and applicable Construction General and/or ADOT permits.

Erosion control BMPs are the first line of defense, rely on them to retain soil in place.

- EC-1 Preserve Existing Vegetation
- EC-2 Minibenches/Slope Roughening
- EC-3 Mulch Cover
- EC-4 Seeding
- EC-5 Geotextiles/Erosion Control Blankets
- EC-6 Soil Binders
- EC-7 Crown Ditch

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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.

Preserve Existing Vegetation EC-1

APPROPRIATE APPLICATIONS

- Protect trees and natural areas not in direct conflict with construction zones and activities.
- Stage clearing and grubbing and grading operations to maximize preservation of existing of vegetation.
- Especially beneficial for floodplains, wetlands, stream banks, steep slopes and areas where other erosion controls may be difficult to establish, install or maintain.

LIMITATIONS

- Difficult on sites with restricted access.
- May limit area available for construction activity.

PLANNING/DESIGN CONSIDERATIONS

TIMING

- Evaluate existing vegetation early in the planning process and adjust grading limits around high quality natural areas.
- Identify areas to be preserved in place on the project plans; clearly mark and fence these on site.
- Conform to scheduling requirements set forth in the Special Provisions.
- Do not begin clearing and grubbing, grading and other soil-disturbing construction activities prior to marking and fencing of existing vegetation.
- Specify a regular watering schedule or install a temporary irrigation system.

DESIGN AND LAYOUT

- Mark areas to be preserved with highly visible, non-metallic, temporary fencing as described in the project Special Provisions.
- Place temporary fencing beyond the canopy of vegetative cover by a distance that is 1½ times the radius.
- Construct temporary roads within limits of disturbance of permanent road to minimize disturbance to existing vegetation.
- Do not locate construction materials, parking areas and/or store equipment within fenced preservation areas.
- Do not store waste materials or vegetation to be removed within the fenced preservation areas.

CONSTRUCTION ACTIVITIES

- Cover disturbed tree roots with soil as soon as possible and consult a certified arborist.
- Cleanly cut damaged roots and limbs.
- Consult a certified arborist to examine seriously damaged trees.
- Remove and replace trees if they are damaged seriously enough to affect their survival.
- Aerate soil compacted by construction activity.
- Immediately repair damage to irrigation systems and flush soil from lines.
- Remove fencing from around preserved areas and trees during final site cleanup.

MATERIAL SPECIFICATIONS

- Refer to project Special Provisions for fencing material requirements or other preservation material requirements.

DESIGN STANDARDS

- Conform with Arizona Native Plant Law and local jurisdiction requirements.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect the preservation fencing to ensure that it is intact and that there has been no encroachment into the preservation area.
- Evaluate preserve-in-place vegetation for signs of stress.
- Address unhealthy and declining vegetation as described in project Special Provisions.
- Maintain preservation fencing as needed

Mature trees preserved in place. Notice sediment wattles, erosion control blanket, seeding and mulch cover BMPs used in combination to achieve the most effective erosion control for these site conditions.

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Erosion Control
Minibenches/Slope Roughening EC-2

DEFINITION

Increasing the relief of a bare soil surface by creating horizontal grooves, parallel contours, furrows, terraces, serrations or stair-steps on the soil surface.

PURPOSE

- Reduce the speed of runoff, trap sediment and improve water infiltration.
- Improve seed retention, germination and thus revegetation.
- Increase effectiveness of construction and post-construction soil stabilization practices.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Apply to all constructed slopes • Evaluate slope type and equipment availability to determine method of roughening • Seed roughened areas as soon as possible
Alternate BMPs to consider: • SC-5 Sediment Wattle
Use in combination with: • EC-3 Hydraulic Mulch • EC-4 Seeding • EC-7 Crown Ditch • Slope Rounding, ADOT Standard Drawing C-02 series
Maintenance Needs: • Monitor vegetation establishment • Inspect and repair after storm events

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			

Compare slope treatment effectiveness.

Minibenched slope with vegetation.

Minibenches/Slope Roughening EC-2

APPROPRIATE APPLICATIONS

- All constructed slopes.
- Soils prone to erosion.
- Where there is a large area of undisturbed slope above a constructed slope.
- Prior to application of permanent seeding.

LIMITATIONS

- Not appropriate on rocky slopes.

PLANNING/DESIGN CONSIDERATIONS

- Construct minibenches from the top of a cut slope down **DURING** slope construction.
- Construct minibenches, terraces, furrows and other horizontal roughening techniques parallel to the contours along the entire length.
- Apply seeding for revegetation and permanent erosion control as the slope is being constructed to conform to the application limits of the seeding/mulching equipment.
- Where horizontal roughening falls away from the contour, additional BMPs may be required to protect the slope.
- Use with other BMPs and run-on diversion measures to prevent scour.

MATERIAL SPECIFICATIONS

- N/A

DESIGN STANDARDS

- ADOT Erosion/Sediment Control and Water Quality Protection Detail: Slope Minibenching.
- ADOT Standard Specifications for Road and Bridge Construction Section 805-3.02(B).
- ADOT Erosion/Sediment Control and Water Quality Protection Detail: Slope Rounding.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.

Erosion Control
Mulch Cover EC-3

DEFINITION

The placement of a layer of organic material on slopes and other disturbed roadside areas by either incorporating it into the soil through mechanical means (e.g., a drill or studded roller) or by a tackifier that adheres the material to the soil surface. Types of mulch cover include hydraulic mulch, straw mulch, compost mulch and bonded fiber matrix.

PURPOSE

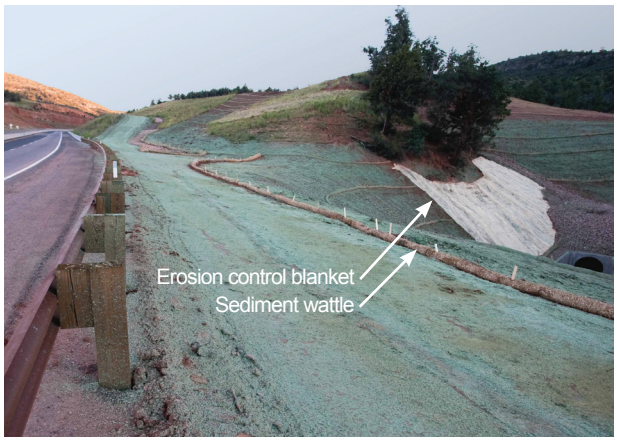
- Reduce soil erosion through temporary stabilization.
- Improve infiltration.
- Protect exposed soil from erosion by raindrop impact or wind.
- Aid in plant and seeding establishment.
- Prevent surface compaction or crusting.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Select type of mulch material based on soil type
Alternate BMPs to consider: • EC-6 Soil Binders
Use in combination with: • CP-1 Construction Sequencing • EC-2 Minibenches/Slope Roughening • EC-7 Crown Ditch
Maintenance Needs: • Inspect for firm continuous contact of material with soil • Inspect and repair until vegetation is established

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			

Straw mulch cover over a seeded slope.



Mulch cover used in combination with sediment wattles, erosion control blankets and vegetation preserved in place.

APPROPRIATE APPLICATIONS

- Disturbed areas to temporarily stabilize soils until permanent measures are installed and final stabilization is achieved.
- Sensitive areas can be mulched if rain is predicted at the end of a day's operations.

LIMITATIONS

HYDRAULIC MULCH

- Wood fiber hydraulic mulches are typically short-lived (less than a growing season).
- Hydraulic tackifiers typically require 24 hours of cure time to be effective; therefore, they should not be applied immediately prior to a storm event.
- Subject to wind and erosion during large storm events.
- May delay seed germination due to changes in soil surface temperature.

STRAW MULCH

- Where mechanical straw blowers are used, application areas are typically limited to within approximately 150 feet of equipment. Therefore, for large slopes frequent mobilizations and applications are necessary.
- Application of straw mulch by hand is typically expensive.
- Potential for accidental introduction of undesirable weed species.
- Blown straw becomes an air quality issue when applied in urban areas, if not prewetted.

COMPOST/WOOD MULCH

- Susceptible to wind disturbance; therefore must be anchored to the soil by:
  - crimping, tracking, disking or punching.
  - hydraulic bonding using organic or acrylic tackifiers.
  - covering with netting and stapled.
- Potential for accidental introduction of undesirable weed species and/or insects.
- Must be accessible to equipment used for application of mulch.
- Will not withstand significant concentrated flows and is prone to sheet erosion.
- Wood is **not** acceptable as final cover over seeding.

BONDED FIBER MATRIX

- Higher application rates required for steeper slopes may inhibit germination of seed and establishment of long-term vegetation.
- Surface treatment only - unlikely to improve compacted, nutrient depleted, or poorly draining soils necessary to ensure vigorous long term vegetative cover.
- Inefficient technique to treat disturbed areas less than 0.5 acres.

PLANNING/DESIGN CONSIDERATIONS

- Required as grading proceeds.
- Mulch cover may or may not require a binder, netting or tacking.
- Hydraulic matrices are typically effective for longer periods of time.

MATERIAL SPECIFICATIONS

- Natural mulches should be used when possible.
- All mulch material should be free of seed.
- Organic soluble powder adhesive, derivative of plant material psyllium or Guar should be used as tackifier.
- Thermally refined wood fiber.
- Compost must meet the requirements Section 810-2.02 of the ADOT Standard Specifications.
- Refer to Standard Specification Section 805-2.03 for types of mulching materials.
- Comply with applicable jurisdictions' regulations and guidelines.

DESIGN STANDARDS

- Crimp or tack mulch material.
- Requires adequate coverage to prevent erosion, washout and poor plant establishment.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Maintain an unbroken ground cover throughout the period of construction if the soils are not being reworked.
- Repair, reseed and/or remulch surfaces if washout, breakage or erosion occurs.
- Install anchors if needed.
- Reapply mulch when more than 20% bare ground is exposed in application areas.

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Erosion Control
Seeding EC-4

DEFINITION

The ADOT seeding process includes tillage and amending the soil prior to seed application and straw mulching after seed application to protect exposed soils from erosion by water and wind.

PURPOSE

- Reduce erosion through establishing perennial vegetative cover and/or soil stabilization
- Meet Final Stabilization as required by Section 402 of the Clean Water Act.
- Minimize long-term maintenance costs.

AT A GLANCE

GENERAL INFORMATION

Key Design Considerations
- Determine appropriate seed species and rate of application based on project conditions, including soils and climate
- Protect adjacent areas from over-spray
- Adherence to Section 805 of the ADOT Standard Specifications

Alternate BMPs to consider:
- EC-3 Mulch Cover
- EC-5 Geotextiles/Erosion Control Blankets
- EC-6 Soil Binders

Use in combination with:
- EC-2 Minibenches/Slope Roughening
- EC-3 Mulch Cover
- SC-5 Sediment Wattles

Maintenance Needs:
- Repair and reseed areas if damaged from flooding or erosion

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			

Hydraulically applied compost may be used on slopes steeper than 3:1 or where broadcast application is not feasible.

Successful wildflower seed germination on properly prepared slope.

APPROPRIATE APPLICATIONS

- Where permanent, long-lived vegetation cover is the most economical or practical.

LIMITATIONS

- Vegetative establishment is affected by dry or cold weather.
- Application cannot occur during windy conditions.
- Seeded areas cannot be driven over by mechanical equipment.
- Requires time for seed to establish; immediate results are not seen.

PLANNING/DESIGN CONSIDERATIONS

- Site conditions must be evaluated prior to determining suitable species selection and application rates. Attributes such as soil types, topography, local climate and season, maintenance requirements, proximity of sensitive areas (e.g., live streams), and existing native vegetation types are factors.
- Follow the seeding steps to achieve the most successful vegetative cover:
  - Tillage: till areas to be seeded per the project specifications; soil shall be loose and friable prior to application.
  - Amending the Soil: apply low solubility/slow release fertilizers, sulfur and compost over rough, ripped soils prior to final tillage per the specifications.
  - Seed Application: apply seed by drilling, hydroseeding or broadcasting as soon as possible after grading is completed.
  - Straw Mulching: mulch with certified, weed-free straw that is crimped and tacked or hydraulically applied.
  - Rain and Time: with rain and time, vegetation will establish if steps 1-4 are implemented properly and in the correct sequence.
- Prior to use, ADOT shall approve application rates for mulches, tackifier, soil amendments and seed mixtures per specifications.

MATERIAL SPECIFICATIONS

- All seed shall be in conformance with requirements of the project specifications.
- ADOT Standard Specifications for Road and Bridge Construction Section 805-2.

DESIGN STANDARDS

- ADOT Standard Specifications for Road and Bridge Construction Section 805-3

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Identify areas that need to be reseeded or where additional BMPs are necessary.
- The contractor is responsible for maintaining all slopes to prevent erosion and reduce sediment loss.

REFERENCES AND SOURCES

- ADOT Standard Specifications for Road and Bridge Construction Section 805

Geotextiles/Erosion Control Blankets EC-5

DEFINITION

A natural (excelsior, straw, coconut, etc.) or synthetic (usually polyethylene) material manufactured by weaving or bonding fibers, installed to reduce soil erosion by wind or water.

PURPOSE

- Reduce rainfall impact and improve infiltration.
- Provide a microclimate to promote seed establishment.
- Protect exposed soil from wind and rain.
- Reduce erosiveness of concentrated flows.
- Hold mulch, seed, fertilizer and topsoil in place.

AT A GLANCE

GENERAL INFORMATION

Key Design Considerations

- Obtain prior approval from ADOT Roadside Development Section
- Select appropriate geotextile material for site conditions
- Properly prepare site
- Must be properly anchored

Alternate BMPs to consider:

- Erosion Control BMPs: EC-1-EC-4, EC-6-EC-7

Use in combination with:

- EC-4 Seeding
- EC-7 Crown Ditch
- SC-2 Silt Fence

Maintenance Needs:

- Inspect to ensure blanket maintains continuous contact with the ground
- Repair or replace if rilling under blanket occurs
- Remove trapped sediment after each storm event

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			

Blanket used in combination with mulch cover, sediment wattles and rock mulch.

Erosion control blanket installation.

Geotextiles/Erosion Control Blankets EC-5

APPROPRIATE APPLICATIONS

- Concentrated flow areas such as ditches and channels with flows exceeding 3.3 ft./sec. (refer to ADOT Hydraulic Manual for channel lining criteria).
- Stockpiles.
- Slopes with highly erosive soils and slopes adjacent to bodies of water, when recommended by ADOT.

LIMITATIONS

- Material, installation and maintenance costs are typically high.
- Not suitable for excessively rocky sites or rough slopes.
- Not suitable for all soil types. May not perform well on clay soils.
- Not suitable for areas where vegetation will be mowed.
- Some geotextiles disintegrate when exposed to light.
- Must be properly anchored; some geotextiles may increase runoff or blow away.
- May trap wildlife.
- Effectiveness depends on strength of fabric and proper installation.

PLANNING/DESIGN CONSIDERATIONS

- Proper selection, design and installation of the appropriate geotextile is critical to its effectiveness.
- Must be properly anchored to reduce undermining.
- Proper site preparation is essential for adequate contact with soil.
- Use only in limited areas to address a specific site condition.

MATERIAL SPECIFICATIONS

- Select geotextile material based on soil conditions.
- Many geotextiles are available; select the geotextile fabric to match specific project needs.
- Erosion control blanket materials include:
  - Straw
  - Jute fiber
  - Wood fiber (Excelsior)
  - Coconut fiber (Coir)
- Refer to Standard Specifications and the project Special Provisions.

DESIGN STANDARDS

- Woven geotextiles are used for filter and separation applications.
- Non-woven geotextiles are used for stabilization, reinforcement and filtration, and separation applications.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect regularly for cracks or tears in the fabric.
- Repair or replace damaged fabric immediately.
- Maintain contact between geotextile and the ground at all times.
- Remove trapped sediment after storm events.

Soil Binders EC-6

DEFINITION

The application of dust palliatives (water, polymeric, psyllium or Guar stabilizers or emulsions) to temporarily prevent wind-induced erosion of exposed soils on construction sites.

PURPOSE

- Reduce the movement of soil particles through temporary soil stabilization.
- Reduce the movement of soil particles by the wind, which causes air pollution and eventual sediment release into waters of the U.S.

AT A GLANCE

GENERAL INFORMATION

Key Design Considerations

- Ensure measures are in place before large earth moving occurs
- Select appropriate soil binder type based on soil type, slope ratio, topography and wind velocity
- Protect adjacent vegetation, vehicular ways and structures from overspray

Alternate BMPs to consider:

- EC-3 Mulch Cover

Use in combination with:

- CP-1 Construction Sequencing
- EC-1 Preserve Existing Vegetation
- EC-2 Minibenches/Slope Roughening
- EC-4 Seeding
- SC-5 Sediment Wattles

Maintenance Needs:

- Inspect prior to forecast of rain, after rain events and per the applicable permit
- Reapply if erosion occurs

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			

Wind erosion is common and increases with disturbed or exposed soil areas.

Application of soil binder.

APPROPRIATE APPLICATIONS

- All soil surfaces exposed to wind.
- Temporary protection of disturbed areas until permanent measures are installed.
- Temporary protection of disturbed areas that must be re-disturbed following a period of inactivity.
- In areas where grading activities will soon resume because binders can often be incorporated back into the soil.
- Where vegetation is not appropriate.
- Material stockpiles.

LIMITATIONS

- Temporary in nature and may require reapplication, especially after heavy or prolonged rainfall.
- Chemical palliatives typically require a cure time of approximately 24 hours.
- Easily disturbed by vehicular or pedestrian traffic.
- Do not adhere well to compacted or dense (clay) soils.
- May not perform well under conditions of low relative humidity or low temperatures.
- May be slippery if oversprayed onto vehicular travelways.
- If not properly applied, can create impervious surfaces where water cannot infiltrate.

PLANNING/DESIGN CONSIDERATIONS

- Contact ADOT Transportation Planning Division, Air Quality Policy Section for the most up to date information about air quality control on construction projects.
- Use dust control treatments that conserve water wherever feasible.
- Site conditions (soil type, temperature, humidity) must be evaluated prior to determining appropriate soil binder type.
- Consider where soil binder will be applied and length of time stabilization will be needed.
- Frequency of application.
- Must be non-toxic to plants and wildlife.
- Investigate products other than those lists below; new products are being continuously developed.

MATERIAL SPECIFICATIONS

POLYMERIC EMULSION BLEND

- Acrylic Copolymers and polymers.
- Liquid polymers of methacrylates and acrylates.
- Poly-acrylamide and copolymer of acrylamide.
- Hydro-colloid polymers.

PLANT-MATERIAL BASED (short-lived)

- Guar.
- Psyllium.
- Starch.

PLANT-MATERIAL BASED (long-lived)

- Pitch and rosin emulsion.

DESIGN STANDARDS

- Comply with federal, state and local air quality regulations and guidelines.
- ADOT Standard Specifications for Road and Bridge Construction.
- Follow manufacturer's recommendations for application rates, pre-wetting of area and cleaning of equipment after use.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Check areas that have been protected to ensure coverage.
- Daily inspection of high traffic areas and weekly inspection of lower traffic areas.
- Reapplication of binder may be required.

Properties of Soil Binders Used for Erosion Control			
Chemicals	Copolymer	Psyllium	Guar
Comments	forms semi-permeable transparent crust	effective on dry, hard soils	effective on dry, hard soils
	resists ultraviolet radiation and moisture-induced breakdown	forms a crust	forms a crust
Penetration	Moderate	High	High
Longevity	1 to 2 years	3 to 6 months	3 to 6 months
Minimum curing time before rain	24 hours	24 hours	24 hours
Compatibility with Existing vegetation	Good	Poor	Poor
Mode of degradation	Chemically degradable	Biologically degradable	Biologically degradable
Liquid/Powder	Liquid	Powder	Powder

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Crown Ditch EC-7

DEFINITION

Structures that intercept, divert and convey surface run-on, usually sheet flow over slopes, to prevent erosion.

PURPOSE

- Intercept and divert direct runoff to minimize sheet flow on to a slope.
- Direct runoff to a channel or stabilized watercourse.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Determine stormwater flow, velocity and volume when designing crown ditch • Evaluate top of slope vegetation and soil infiltration rates to properly design crown ditch • Periodically divert water by warping ditch into undisturbed slopes
Alternate BMPs to consider: • RC-1 Earth Dikes/Drainage Swales and Lined Ditches
Use in combination with: • EC-1 Preserve Existing Vegetation • EC-2 Minibenches/Slope Roughening • SC-5 Sediment Wattles • Slope Minibenching Detail • Slope Rounding, ADOT Standard Drawing C-02 series
Maintenance Needs: • Inspect for erosion, deterioration or breaches • Repair as necessary

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			

Crown ditch blends with adjacent landscape and materials.

Gabion-style crown ditch used for extreme drainage conditions.

Crown Ditch EC-7

APPROPRIATE APPLICATIONS

- At the top of cut and fill slopes, but primarily cut slopes.

LIMITATIONS

- Not suitable as sediment trapping structures.
- Provide potential for disturbing existing vegetation and soil.

PLANNING/DESIGN CONSIDERATIONS

- Consider stormwater flow, velocity, volume and slope of the proposed ditch.
- Provide stabilized outlets.
- Requires warping of ditch periodically into undisturbed areas.
- Consider ditch alignment and outlets carefully.
- Stake ditch layout in the field prior to construction to evaluate visibility and avoid existing vegetation where possible.
- Consider maintenance access.

MATERIAL SPECIFICATIONS

- N/A

DESIGN STANDARDS

- Warp crown ditch into undisturbed slopes where ditch slope exceeds 5%.
- Design ditches to daylight into existing drainages.
- ADOT Erosion/Sediment Control and Water Quality Protection Detail: Slope Minibenching.
- ADOT Erosion/Sediment Control and Water Quality Protection Detail: Slope Rounding.
- ADOT Roadway Standard Drawing C-03.10.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.

Runoff Control (RC) BMPs

Runoff controls (also called temporary concentrated flow conveyance controls) consist of BMPs used alone or in combination to intercept, direct, divert, convey, and discharge concentrated flows with a minimum of soil erosion, both on-site and offsite. Runoff controls may be required to direct run-on around or through the project in a non-erosive fashion.

- RC-1 Earth Dikes/Drainage Swales and Lined Ditches
- RC-2 Cut to Fill Slope Transitions
- RC-3 Erosion Protection at Structures
- RC-4 Rock Outlet Protection/Velocity Dissipation Devices
- RC-5 Slope Drains
- RC-6 Check Dam

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Runoff Control
Earth Dikes/Drainage Swales/Lined Ditches RC-1

DEFINITION

Structures and grading techniques that intercept, divert, and convey surface runoff, usually sheet flow, to a desired location.

PURPOSE

- Divert runoff away from erodible surfaces and toward sediment trapping devices.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Construct and fully stabilize before any major land disturbance • Consider volume and velocity of runoff to be diverted • Consider erodibility of soils
Alternate BMPs to consider: • EC-7 Crown Ditch
Use in combination with: • CP-1 Construction Sequencing
Maintenance Needs: • Maintain height of dikes for effectiveness • Inspect for erosion or deterioration

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			

Gabion mattress designed for anticipated high-velocity flows.

Rock lined ditch.

Earth Dikes/Drainage Swales/Lined Ditches RC-1

APPROPRIATE APPLICATIONS

- Base of fill slopes where runoff begins to concentrate.
- Top of slopes to control rill and gully erosion. Refer to BMP *EC-7 Crown Ditch*.
- Bottom and mid-slope locations to intercept sheet flow and convey concentrated flows.
- Divert runoff toward a stabilized watercourse or drainage structure.
- Divert sediment laden water to sediment trapping device.
- Divert stormwater around construction staging areas.

LIMITATIONS

- Runoff must be diverted into existing or stabilized drainages or sediment basins.
- High runoff velocities may scour and erode dikes and swales. May be necessary to combine with other BMPs such as *EC-5 Geotextiles/Erosion Control Blankets, RC-6 Check Dam* and/or *SC-6 Sediment Log*.
- Does not control erosion or remove sediment.

PLANNING/DESIGN CONSIDERATIONS

- Size correctly for expected flows.
- Line ditches where high runoff velocities are expected.
- Stabilize dikes by compaction or other means such as erosion control blankets or riprap.
- Provide stabilized outlets to divert sediment-laden flow into sediment traps.
- Where installed at construction traffic crossings, the top width may be wider and side slopes may be flatter compared to other applications.
- Install early in the construction process, when possible.
- Must conform to local floodplain management regulations and not adversely impact adjacent properties.
- Seed earthen dike and ditch immediately after construction if diversion measure will be used longer than 15 days.

MATERIAL SPECIFICATIONS

- ADOT Standard Specifications for Road and Bridge Construction Section 810-2.03 and Section 913.
- Project plans, details and Special Provisions.

DESIGN STANDARDS

- ADOT Erosion/Sediment Control and Water Quality Protection Detail: Sediment Control Berm.
- ADOT Erosion/Sediment Control and Water Quality Protection Detail: Rock Protection for Cut & Fill Transition and Channel Lining.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect for washouts and erosion.
- Check outlet stabilization for signs of erosion.
- Repair where damaged by construction equipment.
- Properly re-compact material added to repair the dike.
- Maintain as described in BMP *SC-3 Sediment Trap* where flows are directed into sediment traps.

Cut to Fill Slope Transitions RC-2

DEFINITION

- Rock riprap/rock mulch placed along cut-fill slope transitions.

PURPOSE

- Stabilize and reduce erosion at cut-fill transitions.
- Convey concentrated flows to stabilized drainage.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Properly prepare subgrade • Size rock riprap based on flow velocity • Rock riprap must be 1-2 inches below adjacent finish grade
Alternate BMPs to consider: • N/A
Use in combination with: • RC-1 Earth Dikes/Drainage Swales and Lined Ditches • RC-4 Rock Outlet Protection/Velocity Dissipation Devices
Maintenance Needs: • Inspect for erosion and sedimentation in rock riprap

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			

Cut to fill transition leads to stable drainage.

Riprap should blend with landscape.

Cut to Fill Slope Transitions RC-2

APPROPRIATE APPLICATIONS

- Where concentrated surface flows must be conveyed from a cut ditch, down to the toe of the adjoining downstream fill slope.

LIMITATIONS

- Reduce erosion only when they have been sized and constructed properly.

PLANNING/DESIGN CONSIDERATIONS

- Proper subgrade preparation.
- Embed rock riprap into grade.
- Field adjust to meet existing roadside ditch.

MATERIAL SPECIFICATIONS

- Rock riprap should conform to Gradations A or B, as defined by Section 810 of the ADOT Standard Specifications for Road and Bridge Construction.
- Rock mulch should conform to Gradations C, as defined by Section 810 of the ADOT Standard Specifications for Road and Bridge Construction.
- River run materials are not allowed.

DESIGN STANDARDS

- Refer to ADOT Erosion/Sediment Control and Water Quality Protection Detail: Rock Protection for Cut & Fill Transition and Rock Riprap/Mulch Channel Lining.
- Cut-to-fill transition shall terminate at a planned or existing stabilized drainage.
- Size of rock used must be large enough to withstand expected design flow through the transition.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect for signs of slope erosion under and around the rock protection, check for erosion and displacement of rock at the outlet. Replace rock and repair as needed.

Runoff Control
Erosion Protection at Structures RC-3

DEFINITION

Rock riprap placed along the soil interface of concrete and metal structures such as spillways, pipes or drainage structures.

PURPOSE

- Reduce or eliminate the potential for undercutting and erosion at structures.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Size rock riprap based on volume of runoff expected and slope characteristics • Consider wire-tieing riprap if installed on steep slopes
Alternate BMPs to consider: • SC-7 Gravel Bag Protection
Use in combination with: • SC-2 Silt Fence • SC-5 Sediment Wattle
Maintenance Needs: • Inspect after storm events; repair if damaged or eroded

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			

Rock at interface of soil and drainage pipe.

Excavation prior to rock placement at drainage structure (use gravel bags to anchor logs/wattles).

Erosion Protection at Structures RC-3

APPROPRIATE APPLICATIONS

- At structures that abut a soil surface and where concentration and/or velocity of stormwater is great enough to cause erosive flows.
- At pipe headwalls.

LIMITATIONS

- Riprap loss may occur due to erosion and sliding if rock riprap is placed on slopes greater than 2:1.
- Can increase erosion if installed improperly.

PLANNING/DESIGN CONSIDERATIONS

- Rock interface protection is very effective only when the rock is sized and placed properly.
- Embed rock riprap so that the top is 1 to 2 inches below adjacent finish grade.

MATERIAL SPECIFICATIONS

- Use angular, crushed rock material.
- River run materials are not allowed.

DESIGN STANDARDS

- Size as specified in the contract documents or as directed by the Engineer.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect for signs of erosion and undercutting around the structure.
- Replace rock and repair erosion damage as needed.

Runoff Control
Rock Outlet Protection/Velocity Dissipation Devices RC-4

DEFINITION

Rock riprap, grouted or wire-tied riprap placed at outlet ends of culverts, conduits, or channels. *NOTE: By definition this is a post-construction BMP. Refer to the ADOT Post-Construction Best Management Practices Manual, Outlet Protection BMP for additional information.*

PURPOSE

- Prevent scour and reduce velocity of concentrated stormwater flows.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Use only angular rock • Size rock based on velocity of flows and per drainage design
Alternate BMPs to consider: • N/A
Use in combination with: • RC-3 Erosion Protection at Structures • RC-5 Slope Drains
Maintenance Needs: • Inspect after storm events and repair promptly to prevent a progressive failure • May need to control weed growth

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			

Protection around drainage pipe needs to be addressed.

Proper sizing of rock riprap is essential to design effectiveness.

Rock Outlet Protection/Velocity Dissipation Devices RC-4

APPROPRIATE APPLICATIONS

- Where discharge velocities and energies at the outlets of culverts, pipes or channels are sufficient to erode the downstream channel and/or undermine and create turbulence at the outfall area.
- At discharge outlets that carry continuous flows of water.
- At points where lined conveyances discharge to unlined conveyances.
- Wherever ADOT discharges offsite.

LIMITATIONS

- Loose rock may be washed away during high flows.
- Freeze/thaw cycles may break up grouted riprap.

PLANNING/DESIGN CONSIDERATIONS

- Grouted or wire-tied rock riprap can minimize maintenance requirements.
- Rock must be sized and installed properly to be effective. Refer to ADOT Drainage Manual and project drainage plans.
- A sediment trap below the outlet may be required.

MATERIAL SPECIFICATIONS

- Section 810 of the ADOT Standard Specifications.
- Use sound, durable, angular rock.
- River run material is not allowed.

DESIGN STANDARDS

- Refer to ADOT Erosion/Sediment Control and Water Quality Protection Detail: Rock Protection for Inlets, Outlets and Headwall Transition.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect for displacement of riprap or damage to underlying fabric
- Inspect for signs of scour beneath the riprap or around the outlet.
- Replace rock and repair apron and slopes as needed.

Slope Drains RC-5

DEFINITION

A temporary rigid pipe or flexible conduit drain used to intercept and convey runoff into a stabilized drainage.

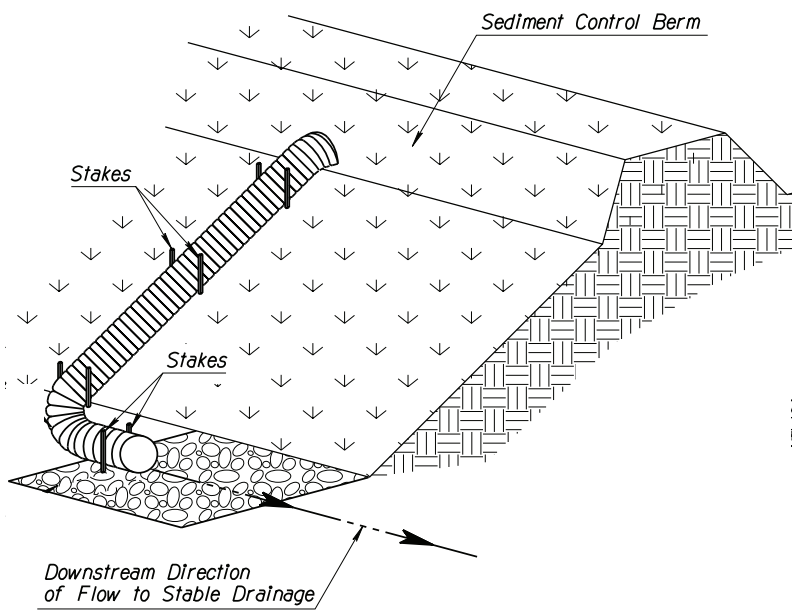
PURPOSE

- Prevent sheet flow erosion over fill slopes.
- Prevent channelized flows from eroding slopes.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Pipe size depends on velocity and volume of flow • Pipe must daylight at a stable drainage
Alternate BMPs to consider: • RC-4 Rock Outlet Protection/Velocity Dissipation Devices
Use in combination with: • RC-1 Earth Dikes/Drainage Swales and Lined Ditches • RC-3 Erosion Protection at Structures • RC-4 Rock Outlet Protection/Velocity Dissipation Devices • SC-3 Sediment Trap
Maintenance Needs: • Inspect after storm event; repair as needed

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			



Slope Drain detail.

APPROPRIATE APPLICATIONS

- Install where slopes may be eroded by surface runoff.
- Where final road grades are completed but remain unpaved.
- May be used as emergency spillway for sediment basin.

LIMITATIONS

- Volume of runoff to be conveyed must not exceed capacity of structure.
- Larger areas require a paved spillway, rock lined channel or additional pipes.
- May become clogged or overcharged during large storms forcing water around pipe.
- Failure causes extreme slope erosion.

PLANNING/DESIGN CONSIDERATIONS

- Most effective when used in combination with temporary embankment curb

MATERIAL SPECIFICATIONS

- Slope drain types:
  - Rigid pipe.
  - Flexible pipe.

DESIGN STANDARDS

- Pipe inlet may need additional stabilization to prevent undercutting.
- Refer to Erosion/Sediment Control and Water Quality Protection Detail: Downslope Drain.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect for structural integrity, blockage and stability at the inlet and outlet.
- Inspect for downstream scour.
- Repair if scour occurs.
- Reinforce inlet with compacted soil or sandbags if undercutting occurs.
- If outlet flow is directed to a sediment-trapping device, sediment should be removed as required for that device.

Runoff Control
Check Dam RC-6

DEFINITION
A small dam constructed across a roadside ditch or channel.

PURPOSE
- Reduce the velocity of concentrated water flows.
- Reduce channel erosion.
- Allow sediment to settle.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Calculate acreage that channel is draining • Base of upstream dam to be at same elevation as top of next downstream dam • Rock material must be placed, not dumped into the channel • Remove dams only after contributing drainage area is stabilized and at the direction of the Engineer
Alternate BMPs to consider: • SC-6 Sediment Log • Sediment Control • SC-12 Compost Sock
Use in combination with: • EC-5 Geotextiles/Erosion Control Blankets • RC-4 Rock Outlet Protection/Velocity Dissipation Devices • SC-6 Sediment Log
Maintenance Needs: • Remove large debris, trash and leaves that have built up behind dam • Remove sediment that has built up to 1/2 the height of the dam

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			

Weir in check dam.

Series of check dams in roadside ditch.

APPROPRIATE APPLICATIONS

- Small channels which drain 10 acres or less.
- Channels constructed in erosive soils.
- Channels constructed with steep profile grades (greater than 5%).
- In temporary ditches or swales that, because of their short length of service, will not receive permanent protection.
- In permanent ditches or swales that will not receive permanent non-erodible linings.
- In ditches that need protection during the establishment of vegetative cover.

LIMITATIONS

- Not for use in live streams.
- Do not use in channels that have already been lined or vegetated unless erosion is expected.
- Promotes sediment trapping, which can be re-suspended during subsequent storms or removal of check dam.
- Installation may be affected if installed within Clear Zone.

PLANNING/DESIGN CONSIDERATIONS

- Must be designed and constructed with adequate spillways, dissipater aprons and tie-ins to the channel banks and/or bed to protect the channel and structure during times of peak flow.
- In locating the check dam, consideration shall be given to the effects and the reach of the impounded water and sediment.
- If installation is to be permanent, the final depth of the silted ditch must be considered in the original design of the ditch.
- Rock shall be large enough to stay in place given the expected design flow through the channel.

MATERIAL SPECIFICATIONS

- Check dams shall be constructed of angular rock.
- River run material is not allowed.
- Rock shall be sized as specified in the contract documents or as stated in the ADOT Hydraulics Manual.
- Refer to the ADOT Erosion/Sediment and Water Quality Protection BMP Detail: Rock Check Dam.

DESIGN STANDARDS

- Rock shall be placed to achieve complete coverage of the channel or swale.
- The center of the dam shall be lower than the edges.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Remove sediments when depth reaches one-third of check dam height. Removed sediment shall be incorporated into the project at locations approved by the Engineer or removed from the right-of-way.
- Erosion caused by high flows around the edges of the dam should be corrected immediately.

Sediment Control (SC) BMPs

Sediment control BMPs are back-up control measures to erosion control BMPs to keep sediment from leaving the construction site. Construction (temporary) sediment control practices include those measures that intercept and slow or detain the flow of stormwater to allow sediment to be trapped and settle.

Sediment control BMPs are the second line of defense, rely on them to capture sediment on site.

- SC-1 Sediment Control Berm
- SC-2 Silt Fence
- SC-3 Sediment Trap
- SC-4 Sediment Basin
- SC-5 Sediment Wattle
- SC-6 Sediment Log
- SC-7 Gravel Bag Barrier
- SC-8 Storm Drain Inlet Protection
- SC-9 Curb Inlet Protection
- SC-10 Stabilized Construction Entrance/Exit
- SC-11 Stabilized Construction Roadway
- SC-12 Compost Sock
- SC-13 Rock Berm

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Sediment Control Berm SC-1

DEFINITION

A temporary sediment barrier consisting of compacted salvaged topsoil, surface soils and/or vegetation pushed into a small berm at top or toe of fill slopes.

PURPOSE

- Intercept sediment-laden sheet flow runoff, allowing runoff to infiltrate and sediment to drop out of suspension.
- Stockpiling of surface soil for future plating on slopes.

AT A GLANCE

GENERAL INFORMATION

Key Design Considerations

- Construct using topsoil prior to placement of roadway embankment
- Construct along contour and allow for a minimum 2' sediment loading zone
- Place outside of vehicle recovery area

Alternate BMPs to consider:

- SC-2 Silt Fence
- SC-5 Sediment Wattle
- SC-6 Sediment Log
- SC-12 Compost Sock

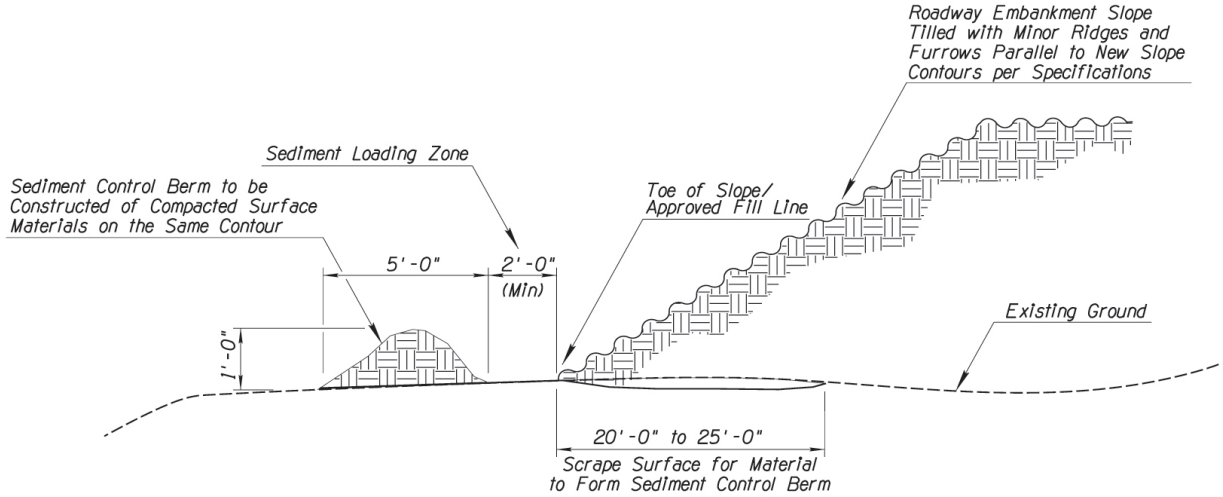
Use in combination with:

- EC-2 Minibenches/Slope Roughening
- RC-6 Check Dam

Maintenance Needs:

- Inspect berm for signs of erosion, particularly after storm events
- Remove sediment when 50% capacity is reached

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			



Sediment Berm detail.

Sediment Control Berm SC-1

APPROPRIATE APPLICATIONS

- Below the toe or at top of exposed and erodible slopes or soil stockpiles.
- May be utilized in place of silt fence or sediment wattles or logs.
- May be constructed in conjunction with topsoil salvage operations. Soil may be reincorporated into adjacent slopes upon completion of final slope geometry.

LIMITATIONS

- Can create a temporary sedimentation pond on the upstream side of the berm.
- Must be graded out prior to application of BMPs and seeding of final slopes.
- Additional BMPs are required where profile slopes exceed 3% and/or where concentrated flows occur.

PLANNING/DESIGN CONSIDERATIONS

- Berm shall be stabilized to prevent erosion.
- Salvage topsoil as directed in the project plans or by the Engineer.
- Create a stabilized weir for runoff to pond and control water overtopping the berm.

MATERIAL SPECIFICATIONS

- Surface materials i.e. soil, rock, branches, leaves, slash and chips.

DESIGN STANDARDS

- Construct a minimum 2’-0” sediment loading zone between toe of slope and sediment berm.
- Compact sediment control berms per ADOT Erosion/Sediment Control and Water Quality Protection Detail: Sediment Control Berm.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect for breaks and erosion in berms.
- Repair as necessary.
- Remove berm when adjacent slope area has been permanently stabilized. Grade area to blend in with existing ground.

Silt Fence SC-2

DEFINITION

A temporary sediment barrier consisting of a filter fabric that is entrenched into the soil, stretched between and attached to posts and wire fence for support.

PURPOSE

- Intercept and slow sediment-laden sheet flow runoff, allowing sediment to drop out of suspension.

AT A GLANCE

GENERAL INFORMATION

Key Design Considerations

- Locate at low or down-slope areas of relatively small disturbance/construction sites
- Properly trench bottom of silt fence for maximum functionality
- Overlap ends of silt fence where a continuous length of fence is not possible

Alternate BMPs to consider:

- SC-1 Sediment Control Berm
- SC-5 Sediment Wattle
- SC-12 Compost Sock

Use in combination with:

- EC-2 Minibenches/Slope Roughening
- SC-5 Slope Drains

Maintenance Needs:

- Inspect for sediment build-up behind silt fence or for breaks in fence; repair immediately
- Remove accumulated sediment when 1/3 fence height is reached

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			

Proper wire mesh support for fabric.

*Do **not** use silt fence across ditches or drainage channels.*

APPROPRIATE APPLICATIONS

- At downstream perimeter of disturbed site.
- Below the toe of exposed slopes and soil stockpiles.
- Above active riparian areas as a **last** line of defense.

LIMITATIONS

- Not for use in live streams.
- Do not use in channels that have already been lined or vegetated unless erosion is expected.
- Not practical where large flows or large areas of disturbance are involved.
- Not suitable for areas where large amounts of concentrated runoff are likely.
- Can create a temporary sedimentation pond on the upstream side of the fence and cause temporary flooding.
- Typical fabric lifespan is between five and eight months.
- Only effective if used in combination with upstream BMPs.
- Limited sediment capture area.

PLANNING/DESIGN CONSIDERATIONS

- Use in areas where flows do not exceed .5 cfs and drainage area for the fence does not exceed .25 acre per 100 feet of fence length.
- Do not install silt fence across streams, ditches or waterways.
- Do not use where rocky or hard areas will prevent uniform installation of posts and entrenching of the fabric.
- Must be removed following final approved stabilization of disturbed area.

MATERIAL SPECIFICATIONS

- Refer to Standard Specification Section 1014-8 for fabric requirements.
- Refer to Standard Drawing C-12.10 for additional requirements.

DESIGN STANDARDS

- Install per ADOT Erosion/Sediment Control Water Quality Protection Detail: Silt Fence.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect for
  - depth of accumulated sediment
  - splits or tears in fabric
  - fabric attachment to fence posts
  - post stability
  - undercutting
- Remove sediment when it reaches one-third the height of the fence. Removed sediment shall be incorporated into the project at locations approved by the engineer or removed from site.
- Remove fence when up-slope area has been permanently stabilized. Fill and compact post holes and fabric trench, remove accumulated sediment, grade area to blend in with adjacent ground and stabilize area disturbed due to fence removal.

Sediment Trap SC-3

DEFINITION

A small impoundment formed by excavation and/or constructing an embankment so that sediment-laden runoff is temporarily detained.

PURPOSE

- Allow sediment to settle out of construction runoff before the water is discharged.
- Simplify stormwater management on a construction site by trapping small amounts of sediment at multiple spots.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Soils need to be appropriate for infiltration • Locate to minimize potential for groundwater contamination • Use for drainage areas of 5 acres or less
Alternate BMPs to consider: • SC-1 Sediment Control Berm
Use in combination with: • RC-1 Earth Dikes/Drainage Swales and Lined Ditches • RC-4 Rock Outlet Protection/Velocity Dissipation Devices • RC-5 Slope Drain • SC-5 Sediment Wattle • SC-7 Gravel Bag Protection
Maintenance Needs: • Inspect after storm events to ensure functionality • Repair eroded areas or re-evaluate placement if erosion occurs frequently or install additional BMPs. • Remove accumulated sediment when 50% capacity is reached

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			

Small sediment trap.

Sediment trap with rock protection.

Sediment Trap SC-3

APPROPRIATE APPLICATIONS

- Projects under construction during the rainy season.
- At the outlets of stormwater diversion structures, channels, slope drains, construction site entrance/exit wash racks or any other runoff conveyance that discharges waters containing sediment and debris.
- At outlets of disturbed soil areas less than 5 acres in size.

LIMITATIONS

- Life span is usually 24 months.
- Detention period is too short for removing fine silt and clay particles.

PLANNING/DESIGN CONSIDERATIONS

- Use for drainage areas of 5 acres or less.
- Note natural drainage patterns and place traps in areas of highest erosion potential.
- Locate for ease of maintenance and inspection.
- Traps are formed by excavating an area and placing an earthen embankment across a low area or drainage swale.
- Most effective when used in combination with other BMPs that stabilize upland soils.

MATERIAL SPECIFICATIONS

- Use Gravel Bags to construct small sediment traps.

DESIGN STANDARDS

- Design to minimize surface area for infiltration and sediment settling.
- Bottom of sediment trap should be flat.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect after each rainfall to ensure trap is draining properly.
- Inspect for damage from erosion.
- Verify that depth of spillway is maintained at a minimum of 1.5 feet below the low point of the trap embankment.
- Remove accumulated sediment when 50 percent sediment capacity is reached.

Sediment Basin SC-4

DEFINITION

A temporary basin formed by excavation and/or constructing an embankment so that sediment-laden runoff is temporarily detained.

PURPOSE

- Capture sediment from stormwater runoff before it leaves the construction site
- Slow the velocity of runoff through detention.

AT A GLANCE

GENERAL INFORMATION

Key Design Considerations

- Soils must be appropriate for infiltration
- Use for drainage areas of 5-100 acres
- Locate to minimize groundwater contamination potential

Alternate BMPs to consider:

- SC-3 Sediment Trap

Use in combination with:

- RC-1 Earth Dikes/Drainage Swales and Lined Ditches
- RC-4 Rock Outlet Protection/Velocity Dissipation Devices
- RC-5 Slope Drain
- SC-2 Silt Fence
- SC-5 Sediment Wattle

Maintenance Needs:

- Inspect after storm events to ensure functionality.
- Repair eroded areas or re-evaluate placement if erosion occurs frequently or install additional BMPs.
- Remove accumulated sediment when 50% capacity is reached.

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			

A large area allows sediment to settle out.

Soil may not be providing adequate infiltration.

Sediment Basin SC-4

APPROPRIATE APPLICATIONS

- Where sediment-laden water may enter the drainage system or watercourses.
- At outlets of disturbed soil areas measuring between 5 and 100 acres.

LIMITATIONS

- Require large surface areas to permit settling of sediment.
- Not appropriate in live streams.
- If safety is a concern, basins may require protective fencing around the perimeter.
- Size may be limited by availability of right-of-way.
- Ground water contamination, soils and obstructions are concerns.
- Could pose a mosquito problem if basin becomes blocked and there is standing water.

PLANNING/DESIGN CONSIDERATIONS

- Require a large area to be effective.
- Soils must be adequate for infiltration.
- Use in combination with other BMPs for best effectiveness.

MATERIAL SPECIFICATIONS

- Dependent on material chosen to construct the basin. Refer to applicable material spec, i.e. rock mulch.

DESIGN STANDARDS

- Bottom of sediment basin should be flat.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect after each rainfall to ensure trap is draining properly.
- Inspect for damage from erosion.
- Verify that depth of spillway is maintained at a minimum of 1.5 feet below the low point of the trap embankment.
- Remove accumulated sediment when 50 percent sediment capacity is reached.

Sediment Wattle SC-5

DEFINITION

Weed-free wheat or rice straw or excelsior wood fiber bound into tight tubular rolls encased in biodegradable natural fiber netting or UV-degradable polypropylene netting used primarily in slope stabilization and in unlined ditches.

PURPOSE

- Intercept runoff, reduce flow velocities, and promote infiltration.
- Release runoff as sheet flow.
- Reduce sediment transport from runoff.
- Promote (improve) seed germination.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Spacing and wattle diameter depend on slope ratio • Adjacent wattles to be tightly abutted • Must maintain continuous contact with ground • Place along contours perpendicular to slope
Alternate BMPs to consider: • EC-2 Minibenches/Slope Roughening • SC-12 Compost Sock
Use in combination with: • Erosion Control BMPs: EC-3 through EC-7
Maintenance Needs: • Inspect for rilling or erosion underneath wattles; repair as necessary • Inspect to ensure wattles are properly anchored and have not been damaged

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			

Proper staking of wattles.

Sediment wattles spaced on a slope.

Sediment Wattle SC-5

APPROPRIATE APPLICATIONS

- At the top, face and at grade breaks of exposed slopes.

LIMITATIONS

- Not for use in live streams.
- Do not use in channels that have already been lined or vegetated unless erosion is expected.
- Have a limited sediment capture area.
- Proper staking and entrenchment are critical to wattle effectiveness and to reduce potential movement by high velocity flows.

PLANNING/DESIGN CONSIDERATIONS

- Not for use at toe of slope; use 20” diameter sediment logs instead.
- Do not use where creeping, slumping or sliding of the slope may occur.
- Readily shaped to fit slope contours.
- Must be trenched per project plans, specifications and details to be effective.
- Turn terminal ends of wattles upslope 45% to prevent channeling.
- Typically left in place on slopes after Final Stabilization.

MATERIAL SPECIFICATIONS

- Refer to ADOT Standard Specifications for Road and Bridge Construction section 810-2.06 for requirements.

DESIGN STANDARDS

- Refer to ADOT Erosion/Sediment Control and Water Quality Protection Detail: Sediment Wattle.
- Adjust wattle spacing based on soil erosivity; decrease spacing on more erosive soils, increase spacing on less erosive soils.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect to ensure that wattles remain firmly anchored and have not been damaged by traffic.
- Inspect for tears and splits in wattles and evidence of erosion.
- Repair rills or gullies promptly, re-stake wattle as necessary.
- Remove accumulated sediment when 50 percent sediment capacity is reached prior to seeding and mulching operations. **DO NOT REMOVE SEDIMENT AFTER SEEDING AND MULCHING HAS BEEN COMPLETED.**

Sediment Log SC-6

DEFINITION

Excelsior wood fiber that has been bound into a tight tubular roll secured with long-term biodegradable natural fiber netting or UV-degradable polypropylene netting.

PURPOSE

- Intercept runoff and reduce flow velocities.
- Reduce sediment transport from runoff.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Trenching or burial is not necessary except when used at toe of slope • Must maintain continuous contact with ground
Alternate BMPs to consider: • RC-6 Check Dam • SC-2 Silt Fence (for perimeter applications) • SC-12 Compost Sock
Use in combination with: • RC-6 Check Dam • SC-8 Storm Drain Inlet Protection
Maintenance Needs: • Inspect for rilling or erosion around sediment logs • Inspect to ensure logs are properly anchored and have not been damaged

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			

Sediment logs stored on site are immediately available for replacing damaged/displaced logs.

Sediment logs used as check dams.

Sediment Log SC-6

APPROPRIATE APPLICATIONS

- As check dams for small runoff volumes in roadway ditches and channels downstream of disturbed soils.
- At toe of exposed slopes.
- Along the perimeter of a project.
- Around temporary stockpiles.
- Around storm drain inlets associated with disturbed areas.
- Outfall of small drainage channels or structures.

LIMITATIONS

- Not for use in live streams.
- Do not use in channels that have already been lined or vegetated unless erosion is expected.
- Should not be used in place of linear sediment barrier such as silt fence.
- Not practicable where large flows are involved.
- Not suitable for rock sub-grades where stakes cannot be securely installed.

PLANNING/DESIGN CONSIDERATIONS

- Trenching or burial is not necessary except when used at toe of slope.

MATERIAL SPECIFICATIONS

- Refer to ADOT Standard Specifications for Road and Bridge Construction section 810-2.06 for requirements.

DESIGN STANDARDS

- Refer to ADOT Erosion/Sediment Control and Water Quality Protection Detail: Sediment Log.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect to ensure that logs remain firmly anchored and have not been damaged by traffic.
- If used as check dam, remove sediment,prior to seeding, when it reaches one-third the height of the log.
- Inspect for tears and splits in logs and evidence of erosion.
- Remove sediment when it reaches 1/2 the height of the log.
- Repair rills or gullies promptly, reposition and/or re-stake log as necessary.
- Remove after Final Stabilization.

Gravel Bag Protection SC-7

DEFINITION

Bags made of a woven geotextile material, filled with angular gravel.

PURPOSE

- To slow the velocity of concentrated flow and allow sediment to settle before entering drainage structures or leaving a construction site.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Adjacent construction traffic may limit use • Ponding may occur for a short time around bags • Stack bags in an overlapping, pyramid configuration
Alternate BMPs to consider: • SC-8 Storm Drain Inlet Protection
Use in combination with: • SC-2 Silt Fence • SC-5 Sediment Wattle • SC-6 Sediment Log • GH-4 Street Sweeping and Vacuuming
Maintenance Needs: • Follow schedule specified in the applicable stormwater permit • Replace bags if deteriorated due to extended sunlight exposure • Replace damaged bags

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			

Gravel bags used to anchor sediment wattle.

Sediment wattles held in place with gravel bags can be used to provide protection for curb inlets.

Gravel Bag Protection SC-7

APPROPRIATE APPLICATIONS

- Drainage structures or at downslope perimeter of construction areas where staking Sediment Wattles is not possible due to soil or ground conditions.
- Where flows are moderately concentrated to divert and/or detain flows.

LIMITATIONS

- Tendency of bag material to tear if subjected to heavy traffic.
- Water can pond at gravel bag barrier until enough time has passed to allow water to filter through.
- Not for use in ditches or as check dams.

PLANNING/DESIGN CONSIDERATIONS

- Adjacent construction traffic may prohibit the use of gravel bags.
- Amount of time gravel bags are needed, as bags exposed to sunlight will need to be replaced every two to three months.

MATERIAL SPECIFICATIONS

- Bags should be woven polypropylene, polyethylene or polyamide fabric. Refer to standard Specification Section 810-1017 for characteristics of fabric material.
- Bag dimensions approximately 24 inches long by 16 inches wide and 4 inches thick.
- Fill material to be clean and washed decomposed granite (DG) free of silt/dust, or other equivalent clean and washed angular shape aggregate/gravel material as approved by the Engineer. All gravel/aggregate materials shall be cleaned and washed by the manufacturer/producer prior to final delivery to the project site. Refer to Standard Specification Section 810-1017 for gradation requirements.

DESIGN STANDARDS

- Use in conjunction with other soil stabilization controls up-slope to provide the most effective erosion and sediment control.
- Stack gravel bags using an overlapping, stair-stepped approach where the upper rows overlap the joints of the lower rows. Ends of adjoining gravel bags to abut tightly.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Gravel bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.
- Reshape or replace gravel bags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches 1/2 of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
- Remove gravel bag barriers when no longer needed. Remove sediment accumulation and clean, re-grade, and stabilize the area. Removed sediment should be disposed of properly or incorporated into the project.

Storm Drain Inlet Protection SC-8

DEFINITION

Fabric filter, rock mulch and/or riprap surrounding or placed in a storm drain inlet.

PURPOSE

- Serve as a final protection measure to filter sediment and debris from entering the storm drain.
- Reduce erosion along the soil interface at the entrance to the drainage structure
- Reduce flow velocity before entering the storm drain system.

AT A GLANCE

GENERAL INFORMATION

Key Design Considerations

- Identify inlets to be protected and implement before disturbance occurs
- Select type of protection based on site conditions and construction sequencing
- Typically used for areas draining 1 acre or less

Alternate BMPs to consider:

- SC-7 Gravel Bag Protection

Use in combination with:

- SC-3 Sediment Trap
- SC-4 Sediment Basin
- SC-6 Sediment Log
- SC-12 Compost Sock

Maintenance Needs:

- Check all storm drain inlets after each storm event; remove sediment or debris clogging inlet protection

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			

Rock mulch and sediment logs used to protect storm drain inlet.

Storm Drain Inlet Protection SC-8

APPROPRIATE APPLICATIONS

- Disturbed drainage areas that have not yet been permanently stabilized.
- Where stormwater surface runoff can enter a drain inlet.

LIMITATIONS

- Ponding can occur at the inlet with possible short term flooding.
- Frequent maintenance may be required in areas susceptible to high flow.
- Effectiveness decreases rapidly if not properly maintained.

PLANNING/DESIGN CONSIDERATIONS

- Identify existing and/or proposed storm drain inlets that must be protected and determine which method of protection to use.
- Use for areas of less than 1 acre; route stormwater to other sediment trapping devices for areas larger than 1 acre.
- Ensure that ponding will not encroach into highway traffic.
- Verify applicable Municipal Separate Storm Sewer System (MS4) ordinances and product requirements.

MATERIAL SPECIFICATIONS

- Refer to Section 810 of the ADOT Standard Specifications for Road and Bridge Construction for material specifications of inlet protection.

DESIGN STANDARDS

- Calculate anticipated flow volumes and velocities to determine the size of rock to use.
- Use geotextile as a separator between the soil and graded rock.
- Refer to ADOT Erosion/Sediment Control and Water Quality Protection Details: Inlet Protection Combined BMPs, Median Inlet Protection and Gravelbag Protection.
- Refer to ADOT construction standard drawings C-13.60 and C-13.65 for slotted drain details.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect for
  - damage
  - failure to filter sediment
  - accumulation of sediment or debris
  - damage from temporary flooding after a storm event
- Repair as necessary
- Replace filter fabric if it becomes clogged
- Remove sediment
  - after each rainfall event
  - as specified in the contract documents
  - as directed by the Engineer
- Remove all inlet protection devices within 30 days after the site is stabilized or when inlet protection is no longer needed.
- If necessary, regrade and stabilize disturbed areas after inlet protection is removed.

Curb Inlet Protection SC-9

DEFINITION

A temporary filtering device placed in the flow line of completed curb inlets before final stabilization has been achieved.

PURPOSE

- Prevent sediment and debris from entering the stormwater system by filtering runoff.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Identify inlets to be protected and install before disturbance occurs • Select type of protection based on site conditions and construction sequencing • Typically used for areas draining 1 acre or less
Alternate BMPs to consider: • SC-7 Gravel Bag Protection
Use in combination with: • SC-3 Sediment Trap • SC-4 Sediment Basin • SC-6 Sediment Log • SC-12 Compost Sock
Maintenance Needs: • Check all storm drain inlets after each storm event; remove sediment or debris clogging inlet protection

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			

A variety of inlet protection products are available.

This inlet protection device is doing a good job of capturing fine sediment. Proper maintenance will help ensure continued performance.

Curb Inlet Protection SC-9

APPROPRIATE APPLICATIONS

- Where completed curb inlets are exposed to sediment-laden runoff from adjacent areas that have not been permanently stabilized.

LIMITATIONS

- Requires consistent maintenance to keep accumulated sediment and debris out of vehicular travel lanes and storm sewer system.
- Are easily damaged on roads open to the public.
- Typically ineffective on slopes steeper than 5%: runoff bypasses the inlet and continues downhill.

PLANNING/DESIGN CONSIDERATIONS

- Consider traffic conditions when designing curb inlet protection; roadways open to public traffic may require different protection than construction sites with limited access.
- Must be used in combination with upslope BMPs.
- Verify applicable Municipal Separate Storm Sewer System (MS4) ordinances and product requirements.

MATERIAL SPECIFICATIONS

- Many materials are available depending on site conditions. All should be UV resistant.
  - Non-woven polyester filter fabric.
  - Natural fiber matting or roll.
  - Woven polypropylene.
  - High density polyethylene fabric.
  - Tightly rolled wood excelsior encased in polyethylene netting.

DESIGN STANDARDS

- Avoid ponding in travel lanes.
- Firmly anchor in place.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect for:
  - damage.
  - failure to filter sediment.
  - accumulation of sediment.
  - damage from temporary flooding after a storm event.
- Repair as necessary.

Sediment Control
Stabilized Construction Entrance/Exit SC-10

DEFINITION

Temporary placement of gravel or gravel in combination with shaker plates or rumble strips where traffic will enter and exit a construction site.

PURPOSE

- Remove mud and sediment from construction vehicle tires.
- Minimize amount of mud and sediment leaving the area on vehicle tires.
- Stabilize entry/exit area to prevent tire rutting.

AT A GLANCE

GENERAL INFORMATION

Key Design Considerations
- Stabilize all entrances prior to construction disturbance
- Size the gravel pad to accommodate all vehicles
- Install filter fabric between gravel and soil
- Multiple stabilized entrances/exits may be needed

Alternate BMPs to consider:
- GH-1 Vehicle and Equipment Cleaning

Use in combination with:
- GH-1 Vehicle and Equipment Cleaning
- GH-4 Street Sweeping and Vacuuming

Maintenance Needs:
- Add gravel or stone as needed
- Remove sediment regularly from shaker plates, rumble strips and corrugated steel
- Sweep soil tracked onto paved surfaces
- Construct new stabilized entrances/ exits as construction progresses and as necessary
- Equipment on-site to maintain entrance/ exit

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

Rumble strips and gravel provide more effective track-out control than gravel alone.

Fencing ensures vehicles enter / exit at trackout.

Stabilized Construction Entrance/Exit SC-10

APPROPRIATE APPLICATIONS

- Whenever traffic will be leaving a construction site and moving directly onto a public road or paved area.
- Entrance/exit should be constructed on level ground.
- Site specific, conditions will dictate need.

LIMITATIONS

- Entrance/exit must be planned and reviewed as part of the project traffic control plan.
- Does not remove all soil from vehicle tires; washing and street sweeping my be necessary.

PLANNING/DESIGN CONSIDERATIONS

- Consider soil type, rain conditions and type of construction traffic.
- Entrances are more effective if designed in conjunction with a tire wash area (prior approval is required and a water source must be provided).
- Dimensions of stabilized entrance/exit must be adequate and appropriate for all types of construction vehicles using it, and long enough for the largest vehicle tires to complete 4 revolutions.
- Make entrance wide enough for two vehicles to pass, if anticipated amount of traffic is heavy.
- Provide a bridge or culvert if entrance/exit crosses a depression, swale or stream. Refer to BMP *NS-4 Temporary Watercourse Crossing*.
- Install section of shaker plates or rumble strips or corrugated steel strips between gravel areas to increase effectiveness, particularly if exists/entrances need to be moved several times during construction. Shaker plates, rumble strips or corrugated steel strips may be used solely instead of gravel.

MATERIAL SPECIFICATIONS

- Adequately sized gravel placed at least 6” in thickness.
- Nonwoven, high survivability filter fabric.

DESIGN STANDARDS

- Refer to ADOT Erosion/Sediment and Water Quality Protection Detail: Stabilized Construction Entrance/Exit Gravel Pad.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect for sediment tracked onto roadway.
- Verify that gravel is clean and not filled with sediment.
- Add gravel over time to maintain effectiveness.
- Sweep soil, gravel, and other debris that is tracked onto paved surfaces. Refer to BMP *GH-4 Street Sweeping and Vacuuming*.
- Remove sediment from shaker plates, rumble stripes and corrugated steel strips to maintain maximum effectivity.
- Remove stabilized construction entrance/exit upon completion of construction and stabilize disturbed areas.

Stabilized Construction Roadway SC-11

DEFINITION

A temporary access road connecting existing public roads to a construction area.

PURPOSE

- Control dust, erosion and sediment transport created by vehicular tracking.
- Stabilize access roadways to prevent tire rutting.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Design to support heaviest vehicles and equipment • Use of this BMP may not be applicable to very short duration projects
Alternate BMPs to consider: • N/A
Use in combination with: • GH-4 Street Sweeping and Vacuuming
Maintenance Needs: • Keep all temporary roadway ditches clear • Periodically apply aggregate on gravel roads

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

Aggregate-stabilized roadway.

Stabilized Construction Roadway SC-11

APPROPRIATE APPLICATIONS

- Construction roadways and short-term detour roads:
  - Where mud tracking is a problem during wet weather.
  - Where dust is a problem during dry weather.
  - Adjacent to watercourses.
  - Where poor soils are encountered.

LIMITATIONS

- Remove prior to final project grading and stabilization.
- Site conditions will dictate design and need.
- May not be applicable to very short duration projects.

PLANNING/DESIGN CONSIDERATIONS

- Limit speed of vehicles to control dust.
- Properly grade roadway to prevent runoff from leaving the construction site.
- Design stabilized access to support heaviest vehicles and equipment that will use it.
- Stabilize roadway using aggregate, asphalt concrete, or concrete based on longevity, required performance, and site conditions.

MATERIAL SPECIFICATIONS

- The use of cold mix asphalt or asphalt concrete (AC) millings for stabilized construction roadway is not allowed.
- If aggregate is the chosen material, use crushed aggregate greater than 3 inches, but smaller than 6 inches.

DESIGN STANDARDS

- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 inches depth, or place aggregate to a depth recommended by a geotechnical engineer.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect for damage and repair as needed.
- Remove when no longer needed and regrade and repair disturbed areas.

Sediment Control
Compost Sock SC-12

DEFINITION

Tubular netting filled with composted material that is placed perpendicular to sheet-flow runoff to control erosion and retain sediment in disturbed areas.

PURPOSE

- Intercept runoff, reduce flow velocities, and promote infiltration.
- Release runoff as sheet flow.
- Reduce sediment transport from runoff.
- Improve soil quality from nutrients in compost.
- Prevent sediment and debris from entering the stormwater system by filtering runoff.

AT A GLANCE

GENERAL INFORMATION

Key Design Considerations

- Manufacturer's specifications for anchoring are minimum requirements - site conditions may mandate additional staking / securing of socks
- Place along contours of slope and/or perpendicular to stormwater runoff
- Compost must meet ADOT Project Specifications for compost material
- Trenching is not necessary
- Must maintain continuous contact with ground surface

Alternate BMPs to consider:

- Perimeter Applications:
  - SC-1 Sediment Control Berm
  - SC-2 Silt Fence
- Slope Protection:
  - SC-5 Sediment Wattle
  - SC-6 Sediment Log
- Check Dam:
  - RC-6 Check Dam
  - SC-6 Sediment Log
- Inlet Protection:
  - SC-8 Storm Drain Inlet Protection
  - SC-9 Curb Inlet Protection

Use in combination with:

- Refer to appropriate BMPs, above

Maintenance Needs:

- Inspect for rilling or erosion underneath and/or around socks
- Inspect to ensure socks are properly anchored
- Ensure there is adequate sediment capture area

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			

Compost socks used on slope face and as check dams (top), and as inlet protection (bottom).

NOTE: Compost Socks can be used effectively as perimeter controls, slope protection, check dams, and inlet protection. As each use requires different design standards, these have been identified in the following sections where required for clarity.

APPROPRIATE APPLICATIONS

PERIMETER CONTROL

- In place of silt fence at downslope perimeter of disturbed site.
- At toe of exposed slopes.
- Around temporary stockpiles.

SLOPE PROTECTION

- Place at regular intervals at the top, face and at grade breaks of exposed slopes.

CHECK DAMS

- For small runoff volumes in roadway ditches and channels downstream of disturbed soils.

INLET PROTECTION

- Drain Inlet /Curb Inlet Protection with proper anchoring and upslope BMPs.

LIMITATIONS

- Socks must have uniform contact with the ground.
- Proper staking/anchoring is critical to sock effectiveness and to reduce potential movement of sock by high velocity flows.
- Limited sediment capture area.
- Not for use in live streams.

PLANNING/DESIGN CONSIDERATIONS

- Greater surface area in contact with the ground than for silt fence and sediment logs, reducing the potential for rilling downslope of the sock.
- Can be used where other erosion control BMPs are not feasible, such as laid directly on pavement (no staking is required on pavement, although anchoring may be necessary).
- Anchoring method is dependent upon slope gradient and surface conditions. Refer to manufacturer specifications for minimum requirements. Additional anchoring may be necessary contingent on site conditions.
- Installation does not require trenching, thereby reducing soil surface disturbance.
- Soil surface to receive sock must be uniform to ensure continuous contact between the ground and compost sock.
- Consider using instead of silt fence where fencing may impede wildlife movement.

MATERIAL SPECIFICATIONS

- Compost must meet the requirements for compost contained in the seeding section of the Project Specifications.
- All compost material shall be free of seed.
- Particle size of compost material shall conform to the following:
  - 2 in. (51 mm) Screen, 100% passing
  - 0.375 in. (10 mm) Screen, 10% to 30% passing
- The material and color of the filter sock shall be selected based on required longevity and site conditions. Filter sock material shall be photodegradable or biodegradable and sock material must be of a thickness, strength, and material appropriate to selected use and project duration.

DESIGN STANDARDS

- Compost socks should be sized appropriately depending on use. Factors influencing diameter of sock to be used include slope ratio, anticipated flow volumes, and soil characteristics. Refer to manufacturer specifications for appropriate design diameter.

PERIMETER CONTROL

- When used in place of silt fence, place sock 5' or greater from toe of slope to maximize space available for sediment deposition between the toe of slope and the compost sock.

SLOPE PROTECTION

- Do not use where creeping, slumping, or sliding of the slope may occur.
- Spacing is dependent on the gradient of the slope, anticipated flow volumes, soil characteristics, and diameter of sock. Refer to manufacturer specifications for appropriate spacing.
- Place socks perpendicular to flow, aligned with slope contours.
- Turn terminal ends of sock upslope 45 degrees to prevent flow around ends of sock.
- Compost socks must be staked per manufacturer specifications.

DRAIN INLETS

- Compost sock should completely enclose drain inlet being protected.
- Always use in conjunction with upslope BMPs.
- Anchoring of compost sock may be necessary. Refer to manufacturer specifications.

CHECK DAMS

- Compost sock should extend sufficiently from either side of the flow line to ensure that water flows through the sock rather than around it.
- Diameter and spacing of compost socks to be per manufacturer specifications.
- Compost socks must be staked per manufacturer specifications.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect to ensure socks remain firmly anchored and have not been damaged by traffic.
- Inspect for tears and splits in socks.
- Repair rills or gullies promptly, reposition and/or re-anchor socks as necessary.
- For all applications EXCEPT slope protection, remove sediment from the upslope side of the compost sock when accumulation reaches one-third of the effective height of the sock.
- For inlet protection, check all storm drain inlets after each storm event; remove sediment or debris clogging inlet protection.
- When used as slope protection, compost socks shall be left in place as a post-construction BMP. Following final stabilization, the netting on the compost sock may be cut the length of the sock, allowing the compost material to spread. Care shall be taken not to disturb the adjacent soil.
- For all applications EXCEPT slope protection, remove socks after Final Stabilization.

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Rock Berm SC-13

DEFINITION

A stabilization method intended as a corrective measure on existing slopes exhibiting severe erosion, as well as new slopes with highly erosive soils. Rock berm consists of angular riprap trenched into the slope face parallel to slope contours.

PURPOSE

- Stabilization for slopes that are unlikely to respond to other sediment control methods.
- Can be used as a corrective measure on existing slopes to stabilize slope while limiting disturbance of established vegetation (as compared to re-grading / minibenching).
- Intercept runoff, reduce flow velocities, promote infiltration and vegetative cover.
- Release runoff as sheet flow, and reduce sediment transport from runoff.

AT A GLANCE

GENERAL INFORMATION

Key Design Considerations

- Use for steep slope/high flow volume situations where alternate BMPs are inadequate
- Use of rock berms must be approved by ADOT
- Spacing and size of berm depend on slope ratio and soil conditions
- Construct along contours of slope
- Riprap must be trenched into slope
- Use outside of clear zone

Alternate BMPs to consider:

- SC-5 Sediment Wattle
- EC-2 Minibenches/Slope Roughening

Use in combination with:

- Erosion Control BMPs: EC-1 through EC-7

Maintenance Needs:

- Inspect for rilling or erosion downslope of berm; repair as necessary

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			

Rock berms used as a corrective measure on an eroded slope. Due to vegetation establishment, areas with rilling were not regraded.

Berms run parallel to slope contours and are trenched into slope face.

APPROPRIATE APPLICATIONS

- Slopes with highly erosive (granitic, low plasticity) soils that cannot be adequately stabilized with alternate BMPs or methods. Rock berms could be used at the top, face and at grade breaks of exposed slopes.

LIMITATIONS

- Less effective for fine-particle sediment removal than sediment wattles, but able to withstand higher flows than wattles.
- Trenching-in of rock berm essential to effectiveness.

PLANNING/DESIGN CONSIDERATIONS

- Use of rock berms must be approved by ADOT prior to installation.
- Geotechnical report must be available for areas where rock berm use is proposed – use of rock berms is dependent on soil type.
- Not for use at toe of slope or within vehicle clear zone.
- Care should be taken to preserve existing vegetation in place on existing slopes.
- Especially suitable for slopes with granitic, or other highly erosive, soils due to the difficulty / length of time required for vegetation establishment.
- Color of riprap used for rock berms should be selected to blend in with adjacent landscape.
- Remain in place on slopes after Final Stabilization.
- Typically a less expensive treatment than re-grading an existing slope.

MATERIAL SPECIFICATIONS

- Rock berms shall be constructed of angular rock; river run material is not allowed.
- Rock size will vary based on height of slope and anticipated velocity and amount of water on slope face. Rock shall be sized as specified in the Project Plans or as stated in the Special Provisions.

DESIGN STANDARDS

- Refer to ADOT Erosion/Sediment Control and Water Quality Protection Detail: Rock Berm.
- Adjust berm spacing based on soil erosivity: decrease spacing if soils are more erosive, increase spacing if soils are less erosive.
- Slope preparation prior to installation of rock berms:
  - On existing slopes with established vegetation, vegetation should be preserved in place to mitigate erosion and slope treatments that would disturb the vegetation (such as minibenching / slope roughening) should not be used.
  - On new slopes, minibenching / slope roughening may be incorporated if appropriate for soil type. ADOT shall provide direction on compatible BMPs to be used with rock berms on a case-by-case basis.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect for rilling or erosion downslope of berms; repair rills or gullies promptly.
- Erosion caused by high flows around the edges of the berm should be corrected immediately.

Good Housekeeping (GH) BMPs

Good Housekeeping and Material Management BMPs are procedural and structural pollution prevention measures designed to prevent contamination of stormwater from a broad range of materials. Proper handling, storage and use of materials will ensure that construction site operations do not contribute to the degradation of stormwater runoff through added jobsite-related pollutants. These controls must be implemented for all applicable activities, material usage and site conditions.

- GH-1 Vehicle and Equipment Cleaning
- GH-2 Vehicle and Equipment Fueling
- GH-3 Vehicle and Equipment Maintenance
- GH-4 Street Sweeping and Vacuuming
- GH-5 Material Delivery and Storage
- GH-6 Material Use
- GH-7 Stockpile Management
- GH-8 Spill Prevention and Control
- GH-9 Portable Toilet

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Vehicle and Equipment Cleaning GH-1

DEFINITION

Procedures and practices used to clean vehicles and equipment prior to or during use on project site.

PURPOSE

- Minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning operations to storm drain or to watercourses.
- Reduce or eliminate spread of noxious weeds and invasive plant species from project site.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Location of cleaning pit • Capacity of cleaning pit
Alternate BMPs to consider: • N/A
Use in combination with: • Applicable Waste Management BMPs (WM-1 through WM-5)
Maintenance Needs: • Inspect designated cleaning areas for compliance • Verify that personnel are following proper procedures and practices

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

Cleaning prior to use on construction site.

Contained equipment cleaning.

Vehicle and Equipment Cleaning GH-1

APPROPRIATE APPLICATIONS

- All construction sites where vehicle and equipment cleaning is performed.

LIMITATIONS

- Cleaning vehicles and equipment generates liquid, semi-solid and solid wastes which must be contained on-site and/or treated to prevent pollution.

PLANNING/DESIGN CONSIDERATIONS

- On-site vehicle and equipment washing with detergent or steam is **not** allowed.
- Cleaning area shall be an excavated pit to contain wash waters and waste for proper disposal.
- Cleaning water shall not be discharged to storm drains or watercourses.
- Locate cleaning areas close to the active construction site, but away from storm drain inlets, drainage facilities, open ditches and/or watercourses.
- On-site vehicle and equipment cleaning must be consistent with the applicable Arizona Aquifer Protection Permit requirements.

MATERIAL SPECIFICATIONS

- Vehicle and equipment washing with soap, solvents or steam is **not** allowed on the project site unless the Engineer has approved in advance and the resulting wastes are fully contained and disposed of outside of the highway right-of-way in conformance with the Standard Specifications. Resulting wastes shall not be discharged or buried within the highway right-of-way. Obtain required applicable permits.

DESIGN STANDARDS

- The washout pit shall be sized to retain all cleaning and rinse water from vehicle cleaning operations.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Ensure appropriate practices are being implemented by personnel.

Good Housekeeping
Vehicle and Equipment Fueling GH-2

DEFINITION

Procedures and practices to minimize or eliminate fuel spills and leaks during fueling.

PURPOSE

- To prevent the pollution of storm drain systems or watercourses from fuel spills and leaks.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Location of fueling area • Design and size of fueling and containment area • Compliance with federal, state and local requirements
Alternate BMPs to consider: • N/A
Use in combination with: • GH-8 Spill Prevention and Control
Maintenance Needs: • Inspect vehicles and equipment daily for leaks • Spill clean up • Proper disposal of contaminated soil and clean up materials

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

Fueling site.

Is this containment area the correct size?

Vehicle and Equipment Fueling GH-2

APPROPRIATE APPLICATIONS

- These procedures are implemented on all construction sites where vehicle and equipment fueling takes place.

LIMITATIONS

- Only use on-site vehicle and equipment fueling when it is impractical to send vehicles and equipment off-site to be refueled.

PLANNING/DESIGN CONSIDERATIONS

- When fueling must occur on-site, the contractor shall select and designate an area to be used, subject to approval by the Engineer.
- Minimize mobile fueling of construction equipment throughout the site and use spill prevention containment methods wherever fueling occurs.

MATERIAL SPECIFICATIONS

- Absorbent spill clean-up materials and spill kits shall be available in fueling areas and on fueling trucks and shall be disposed of properly after use.

DESIGN STANDARDS

- Federal, state and local requirements shall be observed for any stationary above-ground storage tanks.
- Spill prevention, containment and countermeasures (SPCC) shall be included in the SWPPP if the volume of project-site fuel in a single container exceeds 660 gallons, or if the total fuel storage volume at any one site exceeds 1,320 gallons.
- Containment area must be sized to provide sufficient freeboard.
- Designated fueling areas shall be protected from stormwater runoff and shall be located at least 50 feet from downstream drainage facilities or watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and/or dikes to prevent runon, runoff and to contain spills.
- Drip pans or absorbent pads shall be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Nozzles used in vehicle and equipment fueling shall be equipped with an automatic shut-off to control drips. Fueling operations shall not be left unattended. Fuel tanks shall not be “topped off.”

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect vehicles and equipment daily for leaks.
- Repair vehicle and equipment leaks immediately or remove problem vehicle or equipment from the project site.
- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.
- Immediately put small quantities of fuel-contaminated soils in an on-site container, i.e a bucket, and dispose of properly.
- Keep an ample supply of spill cleanup material on the site.

Vehicle and Equipment Maintenance GH-3

DEFINITION

A program of equipment maintenance procedures and practices for the construction site.

PURPOSE

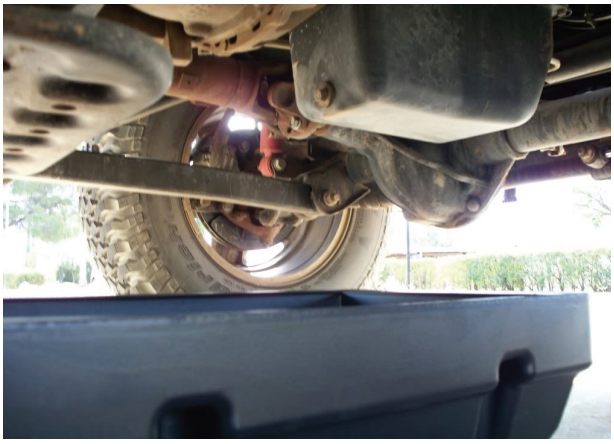
- To prevent the contamination of on-site soils and stormwater.
- To insure the proper disposal of equipment fluids, and other vehicle maintenance waste or debris.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Location of maintenance area • Design of maintenance area • Compliance with federal, state and local requirements
Alternate BMPs to consider: • N/A
Use in combination with: • GH-8 Spill Prevention and Control
Maintenance Needs: • Inspect vehicles and equipment for leaks • Spill clean up • Proper disposal of contaminated soil, waste and clean up materials

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

Practice routine maintenance.



Use drip pans or absorbent pads under equipment during maintenance that involves fluids.

Vehicle and Equipment Maintenance GH-3

APPROPRIATE APPLICATIONS

- On any construction site where heavy equipment and truck storage and maintenance yards are located on-site when approved by the Engineer.

LIMITATIONS

- Comply with local codes and ordinances regarding the disposal of fluids and consumable goods, and the on-site maintenance of equipment.

PLANNING/DESIGN CONSIDERATIONS

- Plan for the proper recycling or disposal of used oils, hydraulic fluids, gear lubricants, batteries, and tires.
- Equipment maintenance and wash-out areas should be located at least 50 feet away from watercourses.
- Provide a contained wash-out area to wash down heavy equipment. Refer to BMP *GH-1 Vehicle and Equipment Cleaning*.

MATERIAL SPECIFICATIONS

- Maintain Material Safety Data Sheets (MSDS) sheets for all oils, hydraulic fluids, lubricants and other substances kept on-site.

DESIGN STANDARDS

- Use appropriate, leak-proof containers for fuels, oils and lubricants to provide for proper disposal.
- Use high-pressure water instead of thinners and solvents to wash down equipment. Wash water and detergents can be disposed of in the sanitary sewer system after grit is removed, after checking with local authorities.
- Use drip pans or absorbent pads under equipment during maintenance that involves fluids.
- Provide spill containment areas around stored oil and chemical drums.
- Never clean or maintain vehicles over bare soil.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect for:
  - Damaged hoses.
  - Leaky gaskets.
  - Container leaks.
- Repair all damages and leaks immediately.

Good Housekeeping
Street Sweeping and Vacuuming GH-4

DEFINITION

Practices to remove sediment tracked from the project site onto public or private paved roads.

PURPOSE

- To prevent tracking of sediment outside the project limits.
- To prevent sediment from entering a storm drain or watercourse.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Consider incorporating removed sediment that is debris-free back into the project
Alternate BMPs to consider: • N/A
Use in combination with: • SC-10 Stabilized Construction Entrance/ Exit • SC-11 Stabilized Construction Roadway
Maintenance Needs: • Proper disposal of sweeper waste

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

Plan for proper disposal of waste collected.

Water minimizes dust generated by sweeping.

Street Sweeping and Vacuuming GH-4

APPROPRIATE APPLICATIONS

- Use where sediment is tracked from a project site onto paved public or private roads.

LIMITATIONS

- May be ineffective if soil is wet, sticky or compacted.

PLANNING/DESIGN CONSIDERATIONS

- If not mixed with debris or trash, consider incorporating removed sediment back into project.
- Sweepers must meet all federal, state and local air quality regulations.
- Some jurisdictions require vacuum sweepers.

MATERIAL SPECIFICATIONS

- N/A

DESIGN STANDARDS

- Operate at speeds and water application rates per manufacturer's recommendations.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable permit(s).
- Inspect construction entrances, exits and other paved areas daily for sediment accumulation.
- Sweep and vacuum as necessary or as required by the Engineer.
- Dispose of sweeper waste properly and provide documentation of proper disposal.

Good Housekeeping
Material Delivery and Storage GH-5

DEFINITION

Procedures and practices for the proper handling, delivery, and storage of construction materials at the construction site.

PURPOSE

- To minimize the risk of discharge from leaks and spills of construction site materials into storm drain system or watercourses.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Covered storage for materials that are potential stormwater contaminants • Location of storage areas • Compliance with federal, state and local requirements including building and fire codes for storage shed • Personnel training is important to successful material handling
Alternate BMPs to consider: • N/A
Use in combination with: • GH-6 Material Use • GH-8 Spill Prevention and Control
Maintenance Needs: • Inspect containers and storage areas for spills and damage • Up-to-date inventory of on-site materials

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

Covered materials.

Material delivery.

Material Delivery and Storage GH-5

APPROPRIATE APPLICATIONS

- Every construction site shall implement material delivery and storage methods (practices) to properly receive, store and handle construction site material at the project site.
- Materials stored on the construction site include:
  - Soil.
  - Pesticides.
  - Fertilizers.
  - Detergents.
  - Plaster.
  - Petroleum products such as fuel, oil and grease.
  - Asphalt and bitumens.
  - Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds.
  - Concrete compounds.
  - Other materials that may be detrimental if released to the environment.

LIMITATIONS

- Project site space limitations may preclude indoor storage.

PLANNING/DESIGN CONSIDERATIONS

- Train employees and subcontractors on the proper material delivery and storage practices.
- Temporary storage areas shall be located away from vehicular traffic.
- Storage sheds must meet building and fire code requirements.

MATERIAL SPECIFICATIONS

- Material Safety Data Sheets (MSDS) shall be supplied to the Engineer for all materials stored.

MATERIAL DELIVERY STANDARDS

- Employees trained in emergency spill clean-up procedures shall be present when hazardous materials or liquid chemicals are unloaded.
- Keep an accurate, up-to-date inventory of material delivered and stored on-site.
- Chemical and material storage areas shall be located away from low areas, drainages and stream banks, and outside the 100-year flood level.

MATERIAL STORAGE AREAS AND PRACTICES

- MSDS should be centrally located, accessible at all times and all personnel informed of that location.
- Liquids and petroleum products shall be stored in approved containers and drums and placed in temporary containment areas for storage.
- Storage, preparation, and mixing shall be accomplished in temporary containment facilities. Each temporary containment facility shall provide a spill containment volume equal to 1.5 times the volume of all containers therein and shall be impervious to the materials contained therein for a minimum contact time of 72 hours.
- Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.

- To provide protection from wind and rain, temporary containment facilities shall be covered during non-working days and prior to rain events.
- Temporary containment facilities shall be maintained free of accumulated rainwater and spills.
- Materials shall be stored in their original containers and the original product labels shall be maintained in place in a legible condition. Damaged or otherwise illegible labels shall be replaced immediately.
- Bagged and boxed materials shall be stored on pallets and shall not be allowed to accumulate on the ground.
- Stockpiles shall be protected in accordance with BMP *GH-7 Stockpile Management*.
- Minimize the material inventory stored on-site (e.g., only a few days supply).
- Have proper storage instructions posted at all times in an open and conspicuous location.
- Keep hazardous chemicals well labeled and in their original containers.
- Keep ample supply of appropriate spill clean up material near storage areas.
- Use proper devices to transfer chemicals from one container to another.
- Follow manufacturer's instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.

SPILL CLEAN-UP

- Contain and clean up any spill immediately.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose any hazardous material or contaminated soil.
- Refer to BMP *GH-8 Spill Prevention and Control.*

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Containers and storage areas shall be inspected weekly for spills and damage.
- Storage areas shall be maintained to prevent rainfall and runoff from coming in contact with chemicals or materials.
- Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.
- Clean areas where materials have been removed to insure that no dust or spillage remains to be washed into stormwater.

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Good Housekeeping
Material Use GH-6

DEFINITION

Procedures and practices for use of construction material in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or watercourse.

PURPOSE

- To minimize or prevent the discharge of construction material from the project site.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Personnel training is critical to ensure proper material handling • Compliance with federal, state and local material use requirements
Alternate BMPs to consider: • N/A
Use in combination with: • GH-5 Material Delivery and Storage • GH-8 Spill Prevention and Control
Maintenance Needs: • Verify use of proper practices by all employees

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

Material Safety Data Sheets should be available at the project site.

Pesticide Use Log Sheet

Date	Time of Application	Pesticide name	EPA Registration Number	Application method	Concentration and Quantity used	Specific area treated	Target pest

Pesticide logs must be maintained.

APPROPRIATE APPLICATIONS

- All construction sites.
- Procedures apply when the following materials are used or prepared on site:
  - Pesticides.
  - Fertilizers.
  - Detergents.
  - Plaster.
  - Petroleum products such as fuel, oil, and grease.
  - Asphalt and other concrete components.
  - Hazardous chemical such as acids, lime, glues, adhesives, paints, solvents, and curing compounds.
  - Concrete compounds.
  - Other materials that may be detrimental if released to the environment.

LIMITATIONS

- N/A

PLANNING/DESIGN CONSIDERATIONS

- Use recycled and safer alternative products when practical.

MATERIAL SPECIFICATIONS

- Material Safety Data Sheets (MSDS) shall be supplied to the Engineer for all materials used or stored on the project site.

MATERIAL USE PRACTICES

- MSDS should be centrally located, accessible at all times and all personnel informed of that location.
- Latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and no longer hazardous, may be disposed of with other construction debris.
- Do not remove the original product label, it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain or watercourse. Dispose of any paint thinners, residue and sludge(s), that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practical, and rinse to a drain leading to a sanitary sewer where permitted, or into a concrete washout pit or temporary sediment trap. For oil-based paints, clean brushes to the extent practical and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity.
- Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials on-site when practical.
- Do not over-apply fertilizers and pesticides. Prepare only the amount needed.
- Strictly follow the recommended usage instructions. Apply surface dressings in smaller applications, as opposed to large applications, to allow time for it to work in and to avoid excess materials being carried off-site by runoff.
- Application of pesticides shall be performed by a licensed applicator.
- Maintain logs for all pesticides applied, including brand name, formulation, EPA

registration number, amount and date applied, exact location of application, vehicle calibration, and name, address, and certification number of applicator.

- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.
- Comply with all pertinent Federal Regulations.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Spot check employees and subcontractors monthly throughout the job to ensure appropriate practices are being employed.

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Stockpile Management GH-7

DEFINITION

Procedures and practices to reduce or eliminate stormwater contact with all piled construction site material including: soil, sand and paving materials such as concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate subbase or premixed aggregate, and asphalt minder ("cold mix" asphalt).

PURPOSE

- To reduce or eliminate stormwater pollution from construction site stockpiles.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Location of stockpiles • Additional protection measures required if rain is predicted
Alternate BMPs to consider: • N/A
Use in combination with: • EC-6 Soil Binders • SC-1 Sediment Control Berm • SC-2 Silt Fence • SC-5 Sediment Wattles • SC-6 Sediment Log • WM-3 Contaminated Soil Management
Maintenance Needs: • Repair and/or replace stockpile controls as needed

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

Small stockpiles in an urban area.

Larger stockpiles in storage yard.

Stockpile Management GH-7

APPROPRIATE APPLICATIONS

- All projects that stockpile soil, paving and other materials.

LIMITATIONS

- None identified.

PLANNING/DESIGN CONSIDERATIONS

- Locate stockpiles a minimum of 50 feet away from concentrated flows of stormwater, drainage courses and inlets.

MATERIAL SPECIFICATIONS

- Bagged materials shall be placed on palettes and under cover.

DESIGN STANDARDS

- Protect all stockpiles from stormwater run-on using a temporary perimeter sediment barrier such as berms, dikes, silt fences, or gravel bags, compost logs.
- Cover or protect with soil stabilization measures if rain is predicted.
- Implement wind erosion control practices as appropriate; refer to BMP *EC-6 Soil Binders.*
- “Cold mix” stockpiles shall be placed and stored per the project Special Provisions.
- Comply with local jurisdiction air quality requirements.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Repair and/or replace perimeter controls and covers as needed or as directed by the Engineer.

Spill Prevention and Control GH-8

DEFINITION

Procedures and practices implemented to prevent and control spills.

PURPOSE

- To minimize or prevent discharges of spilled materials to the drainage system or watercourse.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Spill prevention and control is required whenever chemical and hazardous materials are stored • Contractor must prepare and implement a spill prevention and control plan • Employee education programs are key
Alternate BMPs to consider: • N/A
Use in combination with: • Waste Management BMPs (WM-1 through WM-5)
Maintenance Needs: • Verify weekly that spill control clean up materials are located properly • Update spill prevention and control plan as necessary.

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

Spills onto soil require clean-up.

Spill containment.

Spill Prevention and Control GH-8

APPROPRIATE APPLICATIONS

- Required for all construction activities.
- Spill control procedures are implemented wherever chemicals and/or hazardous substances are used and/or stored.

LIMITATIONS

- This BMP description is very general. The contractor must identify additional appropriate practices for the specific materials used or stored on-site.

PLANNING/DESIGN CONSIDERATIONS

- The contractor shall prepare and implement a spill prevention and control plan. The plan should include procedures for :
  - Storage and use that will prevent spills.
  - Spill clean up including minor and significant/hazardous spills.
  - The containment of spills.
  - The disposal of spilled materials and the material used for clean up.
  - Employee education programs.

MATERIAL SPECIFICATIONS

- Chemical and hazardous substances include, but are not limited to:
  - Soil stabilizers/binders.
  - Dust Palliatives.
  - Pesticides.
  - Fertilizers.
  - Deicing/anti-icing chemicals.
  - Fuels.
  - Lubricants.
  - Other petroleum distillates.
  - Blasting materials
  - Portable toilets.

DESIGN STANDARDS

- Water used for cleaning and decontamination shall not be allowed to enter storm drains nor watercourses and shall be collected and disposed of as described in BMP *WM-5 Liquid Waste Management*.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Verify weekly that spill control clean up materials are located near material storage, unloading and use areas.
- Perform regular preventive maintenance on tanks and fuel lines.
- Update spill prevention and control plan if changes occur in the types of chemicals on site.
- Notify applicable agencies of spills per the permit and all federal, state, and local requirements.

ADDITIONAL INFORMATION AND RESOURCES

- ADEQ Emergency Response Duty Office, (602)-771-2330 or (800)-234-5677.
- ADEQ Waste Management Programs Division, http://www.azdeq.gov/environ/waste/index.html

Portable Toilet

GH-9

DEFINITION AND PURPOSE

Procedures and practices to minimize or prevent the discharge of construction site sanitary/septic waste to the storm drain system or to receiving waters.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Place on a level surface • Stake or weight into place
Alternate BMPs to consider: • N/A
Use in combination with: • WM-1 Solid Waste Management • WM-5 Liquid Waste Management
Maintenance Needs: • Regular inspection for leaks and spills • Periodic service to ensure proper function • Regular waste collection by a licensed service

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

Location, location, location.

Staking is the preferred method for securing portable toilets.

Portable Toilet GH-9

APPROPRIATE APPLICATIONS

- All construction sites that use temporary and/or portable sanitary/septic systems.

LIMITATIONS

- None identified

PLANNING/DESIGN CONSIDERATIONS

- Locate sanitary facilities in a convenient location.
- Educate employees, subcontractors and other users on sanitary/septic waste storage and disposal systems.

MATERIAL SPECIFICATIONS

- N/A

DESIGN STANDARDS

- Locate temporary sanitary facilities away from drainage facilities, watercourses, and from traffic circulation.
- Do not locate temporary sanitary facilities in areas that will collect water.
- Prepare level, gravel surface or place on concrete, and provide clear access for servicing and on-site personnel.
- Provide containment for spill or leak protection.
- Ensure that temporary septic systems treat wastes to appropriate levels before discharging.
- If using an on-site disposal system (OSDS) such as a septic system, comply with local health agency requirements.
- Properly connect temporary sanitary facilities that discharge to the sanitary sewer system.
- If discharging to the sanitary sewer, contact the local wastewater treatment plant for their requirements.
- Ensure that a licensed service maintains sanitary/septic facilities in good working order.
- Stake portable toilets or secure to a sturdy object (such as a fence or post) to create a stable environment and prevent overturning.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect regularly for leaks or spills.
- Repair leaks or replace facility immediately.
- Arrange for regular waste collection.

Non-Stormwater (NS) BMPs

Non-stormwater management BMPs are source control measures intended to prevent pollution by limiting or reducing potential pollutants at the source before they come in contract with stormwater. These practices involve day-to-day operations of the construction site and are usually under the control of the contractor.

- NS-1 Water Conservation Practices
- NS-2 Dewatering Operations
- NS-3 Paving and Milling Operations
- NS-4 Temporary Watercourse Crossing
- NS-5 Water Diversion
- NS-6 Structure Demolition/Removal Over or Adjacent to Water
- NS-7 Material and Equipment Use Over Watercourses

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Non-Stormwater
Water Conservation Practices NS-1

DEFINITION

Procedures and practices that use water during construction in a manner to minimize erosion and the transport of pollutants.

PURPOSE

- To conserve water and reduce or eliminate non-stormwater discharges.
- To conserve a critical resource.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Avoid using water to clean construction areas
Alternate BMPs to consider: • N/A
Use in combination with: • Many Erosion, Sediment and Run-off Control are appropriate for use with this BMP
Maintenance Needs: • Regularly inspect and repair water delivery equipment and systems for leaks

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

Check dams slow the flow, allowing water to percolate into the ground, and enhancing seed germination.

Don't let this happen!

Water Conservation Practices NS-1

APPROPRIATE APPLICATIONS

- Water conservation practices are implemented on all construction sites where water is used.
- Applies to all construction projects and use of water including piped, metered and trucked water.

LIMITATIONS

- None identified.

PLANNING/DESIGN CONSIDERATIONS

- Avoid using water to clean construction areas.
- Direct construction water to areas where it can infiltrate into the ground or be collected or reused.
- Use water harvesting techniques to water areas that are being revegetated.
- Authorized non-stormwater discharges to storm drain systems, channels or receiving waters are acceptable with the implementation of appropriate BMPs.
- Verify allowable non-stormwater discharges applicable in each permit.
- Comply with Arizona Aquifer Protection Permit requirements.

MATERIAL SPECIFICATIONS

- N/A

DESIGN STANDARDS

- N/A

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect and repair water delivery equipment and systems regularly.
- Verify that appropriate BMPs are in place to assist with water conservation.

Non-Stormwater
Dewatering Operations NS-2

DEFINITION

Practices that manage the discharge of pollutants, in this case sediment, when accumulated precipitation (stormwater) and non-stormwater must be removed from a work location and or construction site.

PURPOSE

- Prevent discharge of sediment from the construction site during water removal.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Site conditions will dictate design and use of dewatering operations • Discharges must comply with regional and watershed-specific discharge requirements
Alternate BMPs to consider: • N/A
Use in combination with: • Several Erosion, Sediment and Run-off Control may be appropriate for use with this BMP
Maintenance Needs: • Inspect filtering device frequently and repair/replace to ensure proper operation

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	X		
Waste Management			

Dewatering during bridge work.

Sediment is retained in the basin during this dewatering operation.

APPROPRIATE APPLICATIONS

- Controlling sediment from dewatering operations is required on all projects that pump sediment-laden water from work areas and plan to discharge the pumped water into a conveyance system or watercourse. Dewatering discharges include but are not limited to:
  - Removal of uncontaminated groundwater.
  - Removal of accumulated rainwater from work areas.
  - Removing water from cofferdams or diversions.

LIMITATIONS

- Site conditions will dictate design and use of dewatering operations.
- The controls discussed in this BMP address sediment only. If the presence of polluted water is identified in the contract, the contractor shall implement dewatering pollution controls as required by the contract documents. If the quality of water to be removed by dewatering is not identified as polluted in the contract documents, but is later determined by observation or testing to be polluted, the contractor shall notify the Engineer and comply with Standards Specifications, “Differing Site Conditions.”
- The controls detailed in this BMP only allow for minimal settling time for sediment particles. Use only when site conditions restrict the use of the other control methods.
- Dewatering operations will require and must comply with applicable federal, state and local permits.
- Avoid dewatering discharges where possible by infiltration in appropriate areas.

PLANNING/DESIGN CONSIDERATIONS

- Contractor shall notify the Engineer of planned discharges.
- The Engineer will coordinate monitoring and permit compliance.
- Discharges must comply with regional and watershed-specific discharge requirements.

MATERIAL SPECIFICATIONS

- N/A

DESIGN STANDARDS

- Ensure that dewatering discharges do not cause erosion at the discharge point.
- Sediment Control Treatment: Dewatering effluent (groundwater and accumulated precipitation) that is laden with suspended solids shall be treated to remove soil particles. Sediment basins are an example of a temporary treatment device.
- Filter bags may be used for small-scale dewatering operations.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect filtering device frequently and repair or replace when sediment build-up prevents the structure from functioning as designed.
- If adequate freeboard is not present, monitor weather forecast and discharge prior to the next event.
- Accumulated suspended solids removed from a dewatering device shall be spread on the project site and stabilized at locations designated by the Engineer.

Non-Stormwater
Paving and Milling Operations NS-3

DEFINITION

Procedures implemented during paving surfacing, resurfacing, or saw-cutting to prevent pollutants from entering stormwater systems, drainage ways or watercourses.

PURPOSE

- Prevent water used during paving and milling operations from entering stormwater systems or drainage ways.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Cleaning of vehicles and equipment • Proper disposal of paving and milling debris
Alternate BMPs to consider: • N/A
Use in combination with: • GH-1 Vehicle and Equipment Cleaning • GH-8 Spill Prevention and Control • WM-1 Solid Waste Management • WM-5 Liquid Waste Management
Maintenance Needs: • Inspect and maintain machinery regularly to minimize leaks and drips. • Ensure that employees and subcontractors are implementing appropriate measures during paving operations.

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

Saw-cutting.

Asphalt paving operation.

Paving and Milling Operations NS-3

APPROPRIATE APPLICATIONS

- Everywhere paving, surfacing, resurfacing, or saw-cutting operations may pollute stormwater runoff or discharge to the storm drain system or watercourses.

LIMITATIONS

- Finer solids are not effectively removed by filtration systems.
- Paving opportunities may be limited during wet weather to minimize discharge of pollutants.

PLANNING/DESIGN CONSIDERATIONS

- Clean equipment off-site whenever possible.
- If on-site cleaning is necessary follow BMP *GH-1 Vehicle and Equipment Cleaning*
- If on-site cleaning is necessary manage debris per BMP *WM-1 Solid Waste Management.*
- Disposal of Portland Concrete Cement and Asphaltic Concrete waste will be in conformance with the Standard Specifications.

MATERIAL SPECIFICATIONS

- Material used to coat asphalt transport trucks, asphalt trucks and asphalt spreading equipment shall not contain soap and be non-foaming and non-toxic.
- Reuse of saw-cutting water is permissible if settled and pH levels test in the normal range (6-9 pH) and water is not allowed to runoff the project site.

DESIGN STANDARDS

ASPHALTIC CONCRETE PAVING

- Place drip pans or absorbent materials under paving equipment while not in use to catch or contain drips and leaks.
- Minimize the washing of sand or gravel from new asphalt into storm drains, streets, and receiving waters by sweeping where practical.
- Cover drainage inlet structures and manholes with filter fabric during application of seal coat, tack coat, slurry seal and/or fog seal.
- Do not apply seal coat, tack coat, slurry seal, or fog seal if rainfall is predicted to occur during the application or curing period.
- Dispose old or spilled asphalt as approved by the Engineer. Do not allow AC millings, pieces or chunks used in embankments or shoulder backing to enter any storm drains or watercourses. Apply temporary BMP perimeter controls until structure is stabilized or permanent controls are in place.
- Collect and remove all broken asphalt and recycle when practical; otherwise, dispose in accordance with special provisions or as directed by the Engineer.
- Place any AC chunks and pieces used in embankments above the water table and cover by at least 1 foot of material.
- Use only non-toxic substances to coat asphalt transport trucks and asphalt spreading equipment.

PORTLAND CEMENT CONCRETE PAVING

- Do not wash sweepings from exposed aggregate concrete into storm drain systems. Collect and return to aggregate base stockpile or dispose of properly.
- Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in BMP *WM-4 Concrete Waste Management* or dispose of properly.
- Do not allow saw-cut Portland Concrete Cement (PCC) slurry to enter storm drains or watercourses.

- Residue from milling operations must not flow across pavement and nor be left on the surface of pavement. Refer to BMPs *WM-4 Concrete Waste Management and WM-5 Liquid Waste Management.*

THERMOPLASTIC STRIPING

- Inspect all thermoplastic striper and pre-heater equipment shutoff valves to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the stormwater drainage system, or watercourses.
- Fill the pre-heater carefully to prevent splashing or spilling of hot thermoplastic. Leave 6 inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move when the vehicle is deadheaded.
- Do not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.
- Clean truck beds daily of loose debris and melted thermoplastic. When possible recycle thermoplastic material. Thermoplastic waste shall be disposed of in accordance with project specifications.

RAISED/RECESSED PAVEMENT MARKER APPLICATION AND REMOVAL

- Do not transfer or load bituminous material near drain inlets, the stormwater drainage system or watercourses.
- Load melting tanks with care and do not fill beyond six inches from the top to leave room for splashing when vehicle is deadheaded.
- When servicing or filling melting tanks ensure all pressure is released before removing lids to avoid spills.
- On large-scale projects use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.
- Waste shall be disposed of in accordance with Standard Specifications.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect and maintain machinery regularly to minimize leaks and drips.
- Ensure that employees and subcontractors are implementing appropriate measures during paving operations.
- Keep ample supplies of drip pans and absorbent materials on-site.

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Non-Stormwater
Temporary Watercourse Crossing NS-4

DEFINITION

A structure placed across a watercourse allowing vehicles to cross during construction.

PURPOSE

- To provide a safe, stable way for construction vehicle traffic to cross a watercourse.
- To provide streambank stabilization.
- To reduce the risk of damage to the streambed or channel.
- To eliminate erosion and downstream sedimentation caused by vehicles moving through the streambed.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • May require additional permitting • Design and install under direction of registered Civil or Structural Engineer • Select a location where erosion potential is low • Construct at natural elevation of the streambed
Alternate BMPs to consider: • N/A
Use in combination with: • SC-3 Sediment Trap • NS-2 Dewatering Operations • NS-5 Water Diversion • NS-7 Material and Equipment Use Over Water
Maintenance Needs: • Inspect and maintain to ensure crossing, watercourse and banks are stable

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

Temporary bridge.

Design must consider the heaviest loads.

APPROPRIATE APPLICATIONS

- In all cases where construction equipment or vehicles need to cross a waterway or as specified in ADOT Stored Specification 104SWDEQ or 104SWEPA.
- When alternative access routes are not feasible.
- When crossing perennial streams or waterways causes significant erosion.

ADOT Specification Section 104SWEPA: Unless otherwise approved in writing by the Engineer, fording of running streams with construction equipment will not be permitted; therefore, temporary bridges or other structures shall be used whenever an appreciable number of crossings is necessary.

LIMITATIONS

- Installation and removal will disturb the waterway.
- May require additional permitting such as U.S. Army Corps of Engineers 404 permit and environmental clearance.
- Installation may require dewatering or temporary diversion of the stream. Refer to BMP *NS-2 Dewatering Operations*.
- Crossing structure may become a constriction in the waterway, which can obstruct flood flow and cause flow backups or washouts. If improperly designed, flow backups can increase the pollutant load through washouts and scouring.

PLANNING/DESIGN CONSIDERATIONS

- Consult with ADOT Office of Environmental Services, Water Quality Section, prior to installation of any temporary watercourse crossing.
- Select crossing site where erosion potential is low.
- Select areas where the runoff from highway side slopes will not spill into the crossing side slopes.
- All crossing designs must consider storm event-generated runoff.
- Design and installation require knowledge of stream flows and soil strength. Designs shall be under the direction of, and approved by, a registered civil and/or structural engineer. Both hydraulic and construction loading requirements shall be considered with the following:
  - Comply with the requirements for culvert and bridge crossings, as contained in the ADOT Highway Design Manual, particularly if the temporary stream crossing will remain through the rainy season.
  - Provide stability in the crossing and adjacent areas to withstand the design flow. The design flow and safety factor shall be selected based on careful evaluation of the risks due to over topping, flow backups, or washout.
  - Install sediment traps immediately downstream of crossings outside of the drainage in order to capture sediments. Refer to BMP *SC-3 Sediment Trap*.
  - Avoid oil or other potentially hazardous waste materials for surface treatment.
- Types of temporary crossings to consider:
  - Culverts
    - Use on perennial and intermittent streams
    - Relatively easy to construct
    - Able to support heavy loads
  - Fords
    - Use on dry streams washes and ephemeral stream and low flow perennial streams during the dry season in arid areas.
    - Least expensive of the crossing types with the maximum load limits.

    - Temporary fords are not appropriate if construction will continue through the rainy season, if thunderstorms are likely or if the stream is perennial.
  - Bridges
    - Use on streams with high flow velocities, steep gradients and/or where temporary restrictions in the channel are not allowed.
    - Generally more expensive to design and construct
    - Least disturbance to the stream bed
    - Least constrictive of waterway flows

MATERIAL SPECIFICATIONS

- N/A

DESIGN AND CONSTRUCTION STANDARDS

- Stabilize construction roadways, adjacent work area and stream bottom against erosion.
- Construct during dry periods to minimize stream disturbance and reduce costs.
- Construct at or near the natural elevation of the streambed to prevent potential flooding upstream of the crossing.
- Vehicles and equipment shall not be driven, operated, fueled, cleaned, maintained, or stored in the wet or dry portions of a water body where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed, except as authorized by the Engineer as necessary to complete the work.
- Temporary water body crossings and encroachments shall be constructed to minimize scour. Cobbles used for temporary water body crossings or encroachments shall be clean, rounded river cobble.
- The exterior of vehicles and equipment that will encroach on the watercourse within the project shall be maintained free of grease, oil, fuel, and residues.
- Disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations. Precautions shall be taken to avoid damage to vegetation by people or equipment.
- Riparian vegetation, when removed pursuant to the provisions of the work, shall be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation shall be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure. The cobble shall be removed upon completion of project activities.
- Any temporary artificial obstruction placed within flowing water shall only be built from material, such as clean gravel bags, which will cause little or no siltation.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect periodically to ensure that the bridge, streambed, and banks are maintained and not damaged.
- Maintenance shall be performed, as needed to ensure that the structure, streambed and banks are stable.

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Non-Stormwater
Water Diversion NS-5

DEFINITION

A system of structures and measures that intercept clear surface water runoff upstream of a project site, transport it around the site, and discharge it downstream with minimal water quality degradation for either the project construction operations or the construction of the diversion. Structures commonly used as part of this system include diversion ditches, berms, dikes, slope drains, drainage, and interceptor swales.

PURPOSE

- Reduce sediment pollution from construction work in or adjacent to the watercourse.

AT A GLANCE

GENERAL INFORMATION

Key Design Considerations
- Requires additional permitting
- Design to accommodate fluctuations in water depth or flow
- Avoid damage to nearby vegetation
- Protect adjacent slopes from erosion
- Provide for velocity dissipation at transition areas

Alternate BMPs to consider:
- RC-1 Earth Dikes/Drainage Swales and Lined Ditches
- RC-4 Rock Outlet Protection/Velocity Dissipation Devices
- NS-4 Temporary Watercourse Crossing

Use in combination with:
- CP-1 Construction Sequencing
- NS-2 Dewatering Operations
- NS-4 Temporary Watercourse Crossing

Maintenance Needs:
- Inspect diversion structures before and after storms and at least once a week

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

A flow bypass channel is used during placement of a multi-section culvert. Note the clear water in the diversion channel.

APPROPRIATE APPLICATIONS

- Implement where work must be performed in a running stream or watercourse after appropriate permits have been secured.

LIMITATIONS

- Diversion/encroachment activities will usually disturb the waterway during installation and removal of diversion structures.
- Diversion/encroachment activities may constrict the waterway, which can obstruct flood flows and cause flooding or washouts.
- Specific permit requirements or mitigation measures, such as Corps, Arizona Game and Fish Department, Federal Emergency Management Agency (FEMA), etc. may be included in contract documents because of clear water diversion/ encroachment activities.

PLANNING/DESIGN CONSIDERATIONS

GENERAL

- Where working areas encroach on live streams, barriers adequate to prevent the flow of muddy water into streams shall be constructed and maintained between working areas and streams. During construction of the barriers, muddying of streams shall be held to a minimum.
- Diversion structures must be adequately designed to accommodate fluctuations in water depth or flow volume due to storms, flash floods, etc.
- Heavy equipment driven in wet portions of a watercourse to accomplish work shall be completely clean of petroleum residue, and water levels are below the gear boxes of the equipment in use, or lubricants and fuels are sealed such that inundation by water shall not result in leaks.
- Mechanical equipment operated in the water shall not be submerged to a point above any axle of said mechanical equipment.
- Excavation equipment buckets may reach out into the water for the purpose of removing or placing fill materials. Only the bucket of an excavator/backhoe may operate in a water body. The main body of the crane/excavator/backhoe shall not enter water-covered portions of a water body, except as necessary to cross the stream to access the work site.
- Stationary equipment such as motors and pumps, located within or adjacent to a watercourse, shall be positioned over drip pans.
- When any artificial obstruction is being constructed, maintained, or placed in operation, sufficient water shall, at all times, be allowed to pass downstream to maintain aquatic life downstream.
- The exterior of vehicles and equipment that will encroach on a water body within the project shall be maintained free of grease, oil, fuel, and residues.
- Disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations. Precautions shall be taken to avoid damage to vegetation by people or equipment.
- Riparian vegetation, when removed pursuant to the provisions of the work, shall be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation shall be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure. The cobble shall be removed upon completion of project activities. Drip pans shall be placed under all vehicles and equipment placed on structures over watercourses when the vehicle or

equipment is planned to be idle for more than one hour.

- Where possible, avoid or minimize diversion/encroachment impacts by scheduling construction during periods of low flow or when the stream is dry. Refer also to the project Special Provisions for scheduling requirements.
- Scheduling shall also consider seasonal releases of water from dams, wastewater treatment plants, seasonal riparian wildlife, and water demands due to crop irrigation.
- Construct diversion structures with materials free of potential pollutants such as soil, silt, sand, clay, grease, or oil. If gravel bags are used, they shall be filled with clean materials free of silt, clay, and organic substances.

TEMPORARY DIVERSIONS/ENCROACHMENTS

- Construct diversion channels in accordance with BMP *RC-1 Earth Dikes/Drainage Swales and Lined Ditches*.
- In high flow velocity areas, stabilize slopes of embankments and diversion ditches using an appropriate liner, in accordance with BMP *EC-5 Geotextiles/Erosion Control Blankets*, or, use rock slope protection, as described in the Standard Specifications Section.
- Where appropriate, use natural streambed materials such as large cobbles and boulders for temporary embankment/slope protection, or other temporary soil stabilization methods.
- Provide for velocity dissipation at transitions in the diversion, such as the point where the stream is diverted to the channel and the point where the diverted stream is returned to its natural channel. Refer also to BMP *RC-4 Rock Outlet Protection/Velocity Dissipation Devices*.

TEMPORARY DRY CONSTRUCTION AREAS

- When dewatering behind temporary structures to create a temporary dry construction area, such as coffer dams, pass pumped water through a sediment settling device, such as a portable tank or settling basin, before returning water to the water body. Refer also to BMP *NS-2 Dewatering Operations*.
- If the presence of polluted water or sediment is identified in the contract, the contractor shall implement dewatering pollution controls as required by the contract documents. If the quality of water or sediment to be removed while dewatering is not identified as polluted in the contract documents, but is later determined by observation or testing to be polluted, the contractor shall notify the Engineer and comply with the Standard Specifications.
- Any substance used to assemble or maintain diversion structures, such as form oil, shall be non-toxic and non-hazardous.
- Any material used to minimize seepage underneath diversion structures, such as grout, shall be non-toxic, non-hazardous, and as close to a neutral pH as possible.

MATERIAL SPECIFICATIONS

- N/A

DESIGN STANDARDS

- N/A

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- At a minimum inspect diversion/encroachment structures before and after significant storms and at least once per week while in service.

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Non-Stormwater
Structure Demolition/Removal Over or Adjacent to Water NS-6

DEFINITION

Procedures to protect watercourses from debris and wastes associated with structure demolition or removal operations over or adjacent to them.

PURPOSE

- Ensure prevention of pollution to waterways beneath or adjacent to structures during all demolition or removal activities.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Acquire applicable permits prior to structure demolition or removal
Alternate BMPs to consider: • N/A
Use in combination with: • GH-7 Stockpile Management • NS-7 Material and Equipment Use Over Water
Maintenance Needs: • Inspect equipment and debris catching devices daily • Inspect stockpile protection measures and repair as needed

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

The demolition of the Guthrie Bridge over the Gila River presented multiple sediment and pollution control challenges.

Structure Demolition/Removal Over or Adjacent to Water NS-6

APPROPRIATE APPLICATIONS

- All construction projects with full or partial structure demolition or removal including, but not limited to bridge widening projects and concrete channel removal.

LIMITATIONS

- Specific permit requirements may be included in the contract documents.

PLANNING/DESIGN CONSIDERATIONS

- Refer to the BMP *NS-5 Clear Water Diversion* to direct water away from the work area.
- Plan for and ensure the safe passage of wildlife.
- Demolition triggers National Emission Standards for Hazardous Air Pollutants (NESHAPS).

STANDARDS

- Do not allow demolished material to enter the watercourse.
- Use attachments on construction equipment such as backhoes to catch debris from small demolition operations.
- Use covers or platforms approved by the Engineer to collect debris.
- Stockpile accumulated debris and waste generated during demolition away from watercourses and per the BMP *GH-7 Stockpile Management*.
- Report discharges to watercourses to the Engineer immediately upon discovery and a written discharge notification must follow within the time frame specified in the applicable permit.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect demolition areas over or near adjacent watercourses on a daily basis.
- Empty debris-catching devices regularly. Remove collected debris and store debris away from the watercourse and protect debris from run-on and runoff.

Non-Stormwater
Material & Equipment Use In/Over Watercourses NS-7

DEFINITION

Procedures for the proper use, storage, and disposal of materials and equipment on barges, boats, temporary construction pads, or similar locations.

PURPOSE

- Minimize or eliminate the discharge of potential pollutants to a watercourse.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Acquire and comply with all necessary permits
Alternate BMPs to consider: • N/A
Use in combination with: • GH-3 Vehicle and Equipment Maintenance • GH-5 Material Delivery and Storage • GH-8 Spill Prevention and Control • NS-6 Structure Demolition/Removal Over or Adjacent to Water
Maintenance Needs: • Inspect equipment for leaks and spills daily; repair as necessary • Inspect and maintain all associated BMPs

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

Bridge repair.

Material & Equipment Use In/Over Watercourses NS-7

APPROPRIATE APPLICATIONS

- Implement for construction materials and wastes (solid and liquid) and any other materials that may be detrimental if released.
- Applicable where materials and equipment are used on barges, boats, docks, and other platforms over or adjacent to a watercourse.

LIMITATIONS

- N/A

PLANNING/DESIGN CONSIDERATIONS

- Comply with all necessary permits required for construction within or near the watercourse.
- Secure all materials to prevent discharges to receiving waters via wind.
- Identify types of spill control measures to be employed, including the storage of such materials and equipment.
- Ensure that staff are trained regarding the deployment and access of control measures and that measures are being used.
- Prepare an Emergency Evacuation Plan that defines implementation procedures in the event of a sudden flood event.

STANDARDS

- Use drip pans and absorbent materials for equipment and vehicles and ensure that an adequate supply of spill cleanup materials is available.
- Drip pans shall be placed under all vehicles and equipment placed on docks, barges, or other structures over watercourses when the vehicle or equipment is expected to be idle for more than one hour.
- Discharges to waterways shall be reported to the Engineer immediately upon discovery. A written discharge notification must follow within the time frame specified in the applicable permit.
- Provide watertight curbs or toe boards to contain spills and prevent materials, tools, and debris from leaving the barge, platform, dock, etc.
- Ensure the timely and proper removal of accumulated wastes. Refer to BMPs *WM-1 Solid Waste Management* and *WM-2 Hazardous Waste Management*.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Inspect equipment for leaks and spills daily, repair as necessary.
- Ensure that employees and subcontractors implement appropriate measures for storage and use of materials and equipment.
- Inspect and maintain all associated BMPs and perimeter controls to ensure continuous protection of the watercourse.

Waste Management (WM) BMPs

Waste management BMPs are also source control measures to prevent pollution by limiting or reducing potential pollutants at the source before they come in contract with stormwater. These BMPs involve day-to-day operations of the construction site, are under the control of the contractor, and are additional “good housekeeping practices” that involve keeping a clean, orderly construction site.

- WM-1 Solid Waste Management
- WM-2 Hazardous Waste Management
- WM-3 Contaminated Soil Management
- WM-4 Concrete Waste Management
- WM-5 Liquid Waste Management

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Waste Management
Solid Waste Management WM-1

DEFINITION

Practices to use to minimize and prevent waste associated with construction activities from entering storm drains and watercourses.

PURPOSE

- Control a major cause of pollution on construction sites.
- Prevent the contamination of stormwater from stockpiled waste materials.
- Prevent the clogging of storm drain systems.

AT A GLANCE

GENERAL INFORMATION

Key Design Considerations
- Clearly post guidelines on site
- Plan the frequency of disposal
- Properly store and cover in a convenient location
- Separate green waste for use as compost or mulch
- Recycle where possible

Alternate BMPs to consider:
- N/A

Use in combination with:
- GH-6 Material Use
- GH-7 Stockpile Management
- NS-6 Structure Demolition/Removal Over or Adjacent to Water
- NS-7 Material and Equipment Use Over Water

Maintenance Needs:
- Regularly check for and remove litter and debris from drainage grates and other drainage structures
- Adhere to a regular, scheduled maintenance plan

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	X		
Non-Stormwater	X		
Waste Management	X		

This waste container should be emptied soon.

Dumpsters must be watertight. If there is a drain, it must be plugged.

Solid Waste Management WM-1

APPROPRIATE APPLICATIONS

- Required for all construction projects that generate solid waste such as construction wastes (brick, pavement, timber), vegetative material and litter.

LIMITATIONS

- May require extra management time to ensure all workers are following proper procedures.

PLANNING/DESIGN CONSIDERATIONS

- Proper solid waste procedures and practices are overseen and enforced by the Contractor's Erosion Control Coordinator.
- Plan the frequency of disposal to remove solid waste before it accumulates beyond the capacity of the on-site facilities.
- Place on-site facilities in convenient locations for ease of maintenance.
- Prohibit littering by employees, subcontractors and visitors. Collect litter from work areas within the construction limits of the project and place in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public or others.
- Notify trash-hauling contractors that only watertight dumpsters are permitted for use on project site.
- Coordinate disposal of construction debris and all domestic garbage with the local jurisdiction.
- Consider using inert waste material as fill, as directed by the Engineer.
- Consider separating green waste for compost or mulch.

MATERIAL SPECIFICATIONS

- Material that is to be stockpiled or disposed of offsite shall be in accordance with ADOT Standard Specifications for Road and Bridge Construction Section 107.11.

DESIGN STANDARDS

- Locate solid waste storage areas at least 50 feet from drainages and do locate in areas prone to flooding or ponding.
- Divert stormwater away from stored solid waste with temporary berms or dikes or by other means.
- Provide watertight trash receptacles in the contractor's yard, field trailer areas and other locations where workers congregate for lunch and break periods.
- Provide cover for dumpsters and waste containers.
- Dumpster washout on the project site is not permitted.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Check for and remove litter and debris from drainage grates and other drainage structures.
- Provide regular on-site trash collection.
- Provide regular maintenance of trash containers and dumpsters.
- Provide cover for dumpsters and waste containers to prevent entry of rainwater and loss of contents by high winds.

Waste Management
Hazardous Waste Management WM-2

DEFINITION

The planning and practice to meet the requirements for handling hazardous waste materials on a construction site.

PURPOSE

- Control the release of hazardous materials.
- Prevent the contamination of stormwater.
- Prevent a delay in the project schedule and additional costs and fees due to environmental investigations/enforcement actions.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Clearly post guidelines on site • Comply with all federal, state and local laws • Identify hazardous materials to be used on the construction site • Maintain careful records of storage, handling and disposal of hazardous materials • Locate away from storm drains or watercourses and away from moving vehicles and equipment; keep in appropriate containers
Alternate BMPs to consider: • N/A
Use in combination with: • GH-8 Spill Prevention and Control • WM-1 Solid Waste Management • WM-3 Contaminated Waste Management
Maintenance Needs: • Inspect all perimeter controls, containment structures, covers and liners; immediately repair and replace • Dispose of waste material as directed by the Engineer and as specified in the project specifications and the applicable permits

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	X		
Non-Stormwater	X		
Waste Management	X		

These waste containers are a good example of clear labeling and covered storage.

APPROPRIATE APPLICATIONS

- Required for all construction activities that use hazardous materials and generate hazardous waste.

LIMITATIONS

- May require extra management time to ensure all workers are following proper procedures.
- Lifespan of the cover or structure.

PLANNING/DESIGN CONSIDERATIONS

- Contractor must comply with all federal, state and local laws regarding hazardous materials on a construction site.
- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Identify hazardous materials that will be needed on the construction site and plan for storage, use and disposal.
- Maintain careful records of the storage, handling and disposal of hazardous materials.

MATERIAL SPECIFICATIONS

- Hazardous wastes include waste generated from the use of:
  - Petroleum products.
  - Septic wastes.
  - Paints and stains.
  - Wood preservatives.
  - Asphalt products.
  - Pesticides.
  - Acids.
  - Solvents.
  - Roofing tar.
  - Any materials deemed hazardous waste in the state of Arizona.
- In the event of a spill of a hazardous material, the contractor shall follow the provisions of the ADOT Standard Specifications for Road and Bridge Construction Section 107.07.

DESIGN STANDARDS

- Designate hazardous waste storage areas on site away from storm drains or watercourses and away from moving vehicles and equipment.
- Segregate hazardous waste from non-hazardous construction site debris.
- Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drum or similar), under cover, and within secondary containment.
- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- Never mix waste types or combine container contents.
- In the event of a hazardous material spill, the Erosion Control Coordinator shall modify the SWPPP as necessary within 14 calendar days to include a description of the release, the circumstances leading to the release, and the date of the release.
- Maintain a clean and orderly work environment.
- Dispose of waste within 90 days of being generated or as directed by the Engineer.
- The contractor shall assist in any efforts to clean up hazardous material spills, as directed by the Engineer or other authorities.
- Dispose of soil contaminated from spills according to applicable state and federal

regulations.
- Notify the National Response Center (800-424-8802) of spills of Federal reportable quantities.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- The contractor's Erosion Control Coordinator monitors on-site hazardous waste storage and disposal procedures.
- Inspect perimeter controls, containment structures, covers and liners on a weekly basis and immediately repair or replace as needed.

ADDITIONAL INFORMATION AND RESOURCES

- Information about the requirements for the handling of hazardous waste on construction sites is available from the Arizona Department of Environmental Quality (ADEQ) Waste Management Program, (602) 771-4153.
- 24-hour ADEQ Emergency Response Duty Office, (602)-771-2330 or (800)-234-5677.
- ADEQ Waste Management Programs Division: Hazardous Waste Management, http://www.azdeq.gov/environ/waste/hazwaste/index.html

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Waste Management
Contaminated Soil Management WM-3

DEFINITION AND PURPOSE

Procedures and practices to minimize or eliminate the discharges of pollutants to drainage systems or to watercourses from contaminated soil.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Clearly post guidelines on site • Follow appropriate agency practices and regulations • Identify contaminated soils in planning stages • Test suspected areas at a certified lab • Require employees and subcontractors complete a safety training program
Alternate BMPs to consider: • N/A
Use in combination with: • WM-2 Hazardous Waste Management
Maintenance Needs: • Monitor on-site contaminated soil storage and disposal procedures • Inspect hazardous waste receptacles and areas regularly

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	X		
Non-Stormwater	X		
Waste Management	X		

Evidence of contaminated soils.

Contaminated soils are not always readily apparent. Past site uses and activities should be researched early in the design process.

APPROPRIATE APPLICATIONS

- Construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, and leaks from underground storage tanks.
- Highway widening projects in older areas where median and shoulder soils may have been contaminated by aerially deposited lead (ADL).

LIMITATIONS

- The procedures and practices presented in this BMP are general. The contractor needs to identify appropriate practices and procedures for the specific contaminants known to exist or discovered on site.
- May require extra management time to ensure all workers are following proper procedures.

PLANNING/DESIGN CONSIDERATIONS

- Contaminated soils are often identified during project planning and development with known locations identified in the plans and specifications. The contractor shall review applicable reports and investigate appropriate call-outs in the plans and specifications.
- The contractor may further identify contaminated soils by investigating:
  - Past site uses and activities.
  - Detected or undetected spills and leaks.
  - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements.
- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris. Test suspected soils at a certified laboratory.
- Prior to performing any excavation work at the locations containing material classified as hazardous, employees and subcontractors shall complete a safety training program covering the potential hazards as identified.
- Educate employees and subcontractors in identification of contaminated soil and on contaminated soil handling and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

HANDLING PROCEDURES

MATERIAL AND AERIALLY DEPOSITED LEAD (ADL)

- Materials from areas designated as containing (ADL) may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.
- Excavation, transportation, and placement operations shall result in no visible dust.
- Use caution to prevent spillage of lead containing material during transport.
- Monitor the air quality during excavation of soils contaminated with lead.

CONTAMINATED SOILS

- Test suspected soils at an approved certified laboratory.
- If the soil is contaminated, work with the local regulatory agencies to develop options for treatment and/or disposal.
- Avoid temporary stockpiling of contaminated soils or hazardous material.
- If temporary stockpiling is necessary:
  - Cover the stockpile with tarps.
  - Install a berm around the stockpile to prevent runoff from leaving the area.

  - Do not stockpile in or near storm drains or watercourses.
- Remove and place contaminated material and hazardous material on exteriors of transport vehicles either into the current transport vehicle or the excavation prior to the vehicle leaving the exclusion zone.
- Monitor the air quality continuously during excavation operations at all locations containing hazardous material.
- Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.
- Collect water from decontamination procedures and treat and/or dispose of it at appropriate disposal site.
- Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.
- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.
- Excavation, transport, and disposal of contaminated material and hazardous material shall be in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):
  - U.S. Department of Transportation (USDOT).
  - U.S. Environmental Protection Agency (USEPA).
  - Arizona Department of Environmental Quality (ADEQ).
  - Arizona Division of Occupation Safety and Health Administration.
  - Local regulatory agencies.

PROCEDURES FOR UNDERGROUND STORAGE TANK REMOVALS

- Obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies which have jurisdiction over such work prior to commencing tank removal operations.
- Arrange to have tested, as directed by the Engineer, any liquid or sludge found in the underground tank prior to its removal to determine if it contains hazardous substances.
- Take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s) following the tank removal.
- Transport the underground storage tank, any liquid and/or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal to disposal facilities permitted to accept such waste.

WATER CONTROL

- Take all necessary precautions and preventive measures to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to: berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.
- Discharge contaminated water to clean, closed top, watertight holding tanks; treat, and dispose of in accordance with federal, state, and local laws.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- The Contractor's Erosion Control Coordinator and/or construction supervisor shall monitor on-site contaminated soil storage and disposal procedures.
- Monitor air quality continuously during excavation operations at all locations containing

hazardous material.

- Coordinate contaminated soils and hazardous substances/waste management with the appropriate federal, state, and local agencies.
- Inspect hazardous waste receptacles and areas regularly.

Waste Management
Concrete Waste Management WM-4

DEFINITION

Methods and procedures for the management of concrete waste including concrete slurry, mortar mixing stations and on-site concrete washout facilities.

PURPOSE

- Prevent fresh concrete or cement-laden mortar from entering a storm drainage system and/or receiving water.

AT A GLANCE

GENERAL INFORMATION

Key Design Considerations
- Clearly post guidelines on site
- Locate for convenient truck access, near pour site; not within 50' of storm drains
- Multiple washout facilities may be needed on sites with extensive concrete work

Alternate BMPs to consider:
- SC-1 Sediment Control Berm
- SC-7 Gravel Bag Protection

Use in combination with:
- SC-4 Sediment Basin
- SC-10 Stabilized Construction Entrance/ Exit
- SC-11 Stabilized Construction Roadway
- WM-1 Solid Waste Management
- WM-5 Liquid Waste Management

Maintenance Needs:
- Monitor on-site concrete waste per applicable permit requirements
- Remove and dispose of hardened concrete in washout areas

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	X		
Non-Stormwater	X		
Waste Management	X		

This simple containment system is appropriate for small jobs.

Slurry residue most be properly captured and contained.

Concrete Waste Management WM-4

APPROPRIATE APPLICATIONS

- Where concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Where slurries containing Portland cement concrete (PCC) or asphalt concrete (AC) are generated, such as from saw-cutting, coring, grinding, milling, grooving, and hydro-concrete demolition.
- Where concrete trucks and other concrete-coated equipment are washed on site, when approved by the Engineer.
- Coring and saw-cutting operations/locations.
- Mortar mixing stations.

LIMITATIONS

- May require extra management time to ensure all workers follow proper procedures.

PLANNING/DESIGN CONSIDERATIONS

- Locate concrete washout facilities a minimum of 50 feet from storm drains, open ditches, or watercourses.
- Locate concrete washout facilities for convenient truck access, near the pour site if possible.
- Provide multiple washout facilities on sites with extensive concrete work.
- Designate and post signage for each washout area.
- Educate employees, subcontractors and suppliers on the concrete waste management techniques described herein.

MATERIAL SPECIFICATIONS

- N/A

DESIGN STANDARDS

- Temporary pit or bermed area or for washout of concrete trucks, tools, mortar mixers, etc.
- Concrete slurry waste.
    - Place berms or sandbags or other BMPs around coring and saw-cutting locations to capture and contain slurry.
    - Vacuum slurry waste or collect it in a temporary lined pit and allow to dry.
    - Properly dispose of slurry residue.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- The contractor's Erosion Control Coordinator shall monitor on-site concrete waste storage and disposal procedures at least weekly.
- Maintain temporary concrete washout facilities to provide adequate holding capacity with a minimum freeboard of 4 inches for above grade facilities and 12 inches for below grade facilities. Maintenance shall include removing and disposing of hardened concrete and returning the facilities to a functional condition.

Waste Management
Liquid Waste Management WM-5

DEFINITION AND PURPOSE

Procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

AT A GLANCE

GENERAL INFORMATION
Key Design Considerations • Clearly post guidelines on site • Verify allowable non-stormwater discharges in applicable PDES permit • Additional permits may apply
Alternate BMPs to consider: • N/A
Use in combination with: • SC-3 Sediment Trap • GH-1 Vehicle and Equipment Cleaning • GH-8 Spill Prevention and Control • WM-2 Hazardous Waste Management • WM-4 Concrete Waste Management
Maintenance Needs: • Check employees and subcontractors monthly to ensure appropriate practices are employed • Inspect containment areas and capturing devices frequently for damage and repair as needed

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	X		
Non-Stormwater			X
Waste Management	X		

Clear and appropriate signage can help achieve project goals.

Training is a key part of ensuring compliance.

APPROPRIATE APPLICATIONS

- Construction projects that generate any of the following non-hazardous by-products, residuals or wastes:
  - Drilling slurries and drilling fluids.
  - Grease-free and oil-free wastewater and rinse water.
  - Dredgings.
  - Concrete or stucco.
  - Paint or release oils or agents.
  - Curing compounds.
  - Other non-stormwater liquid discharges not permitted by separate permits.

LIMITATIONS

- Disposal of some liquid wastes may be subject to specific laws and regulations or to requirements of other permits secured for the construction project.
- Does not apply to dewatering operations, solid wastes, hazardous wastes, or concrete slurry residue. Refer to BMPs *NS-2 Dewatering Operations*, *WM-1 Solid Waste Management*, *WM-2 Hazardous Waste Management* and *WM-4 Concrete Waste Management*.
- Does not apply to non-stormwater discharges permitted by any ADEQ permit held by the pertinent ADOT District, unless the discharge is determined by ADOT to be a source of pollutants. Typical permitted non-stormwater discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated pumped ground water; discharges from potable water sources; foundation drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and, discharges or flows from emergency fire fighting activities.
- May require extra management time to ensure all workers follow proper procedures.

PLANNING CONSIDERATIONS AND GENERAL PRACTICES

- The Contractor's Erosion Control Coordinator shall oversee and enforce proper liquid waste management procedures and practices.
- Instruct employees and subcontractors how to safely differentiate between nonhazardous liquid waste and potential or known hazardous liquid waste.
- Instruct employees, subcontractors, and suppliers that it is unacceptable for any liquid waste to enter any storm drainage device, waterway, or receiving water.
- Educate employees and subcontractors on liquid waste generating activities, and liquid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Verify which non-stormwater discharges are permitted by the ADOT Statewide AZPDES permit; different regions might have different requirements not outlined in this permit. Some listed discharges may be prohibited if ADOT determines the discharge to be a source of pollutants.
- Apply BMP *GH-1 Vehicle and Equipment Cleaning* for managing wash and rinse water from vehicle and equipment cleaning operations.

CONTAINING LIQUID WASTES

- Drilling residue and drilling fluids are not allowed to enter storm drains and watercourses and shall be properly disposed of outside the highway right-of-way.
- Drilling residue and drilling fluids may be dried by infiltration and evaporation in a

containment facility constructed in conformance with the provisions concerning the Temporary Concrete Washout Facilities detailed in BMP *WM-4 Concrete Waste Management* if an appropriate location is available, as determined by the Engineer.

- Contain liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud; do not allow to flow into drainage channels or receiving waters prior to treatment.
- Contain liquid wastes in a controlled area, such as a holding pit, sediment basin, roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.
- Take precautions to avoid spills or accidental releases of contained liquid wastes. Apply the education measures and spill response procedures outlined in BMP *GH-8 Spill Prevention and Control*.
- Do not locate containment areas or devices where accidental release of the contained liquid can threaten health or safety, or discharge to watercourses, channels, or storm drains.

CAPTURING LIQUID WASTES

- Capture all liquid wastes running off a surface which has the potential to affect the storm drainage system such as wash water and rinse water from cleaning walls or pavement.
- Do not allow liquid wastes to flow or discharge uncontrolled. Use temporary dikes or berms to intercept flows and direct them to a containment area or device for capture.
- If the liquid waste is sediment laden, use a sediment trap (refer to BMP *SC-3 Sediment Trap*) for capturing and treating the liquid waste stream, or capture in a containment device and allow sediment to settle.

DISPOSING OF LIQUID WASTES

- Dewater the contained liquid waste using procedures such as described in BMPs *NS-2 Dewatering Operations* and *SC-4 Sediment Basin* and dispose of resulting solids per BMP *WM-1 Solid Waste Management* or per Standard Specifications for off-site disposal.
- Method of disposal for some liquid wastes may be prescribed in Water Quality Reports, AZPDES permits, Environmental Impact Reports, 401 or 404 permits, local agency discharge permits, etc., and may be defined elsewhere in the Special Provisions.
- Liquid wastes, such as from dredged material, may require testing and certification whether it is hazardous or not before a disposal method can be determined. For disposal of hazardous waste, refer to BMP *WM-4 Hazardous Waste Management*.
- If necessary, further treat liquid wastes prior to disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.

INSPECTION AND MAINTENANCE REQUIREMENTS

- Follow inspection schedule specified in the applicable stormwater discharge permit.
- Spot check employees and subcontractors at least monthly throughout the job to ensure appropriate practices are being employed.
- Remove deposited solids in containment areas and capturing devices as needed, and at the completion of the task. Dispose of any solids as described in the BMP *WM-1 Solid Waste Management*.
- Inspect containment areas and capturing devices frequently for damage, and repair as needed.

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APPENDIX A

ABBREVIATIONS AND ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
APP	Aquifer Protection Permit
ARS	Arizona Revised Statutes
AZCGP	Arizona Construction General Permit
AZGFD	Arizona Game and Fish Department
AZPDES	Arizona Pollutant Discharge Elimination System
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	Best Management Practice
CFR	Code of Federal Regulations
CGP	Construction General Permit
CORPS	United States Army Corps of Engineers
CWA	Clean Water Act
DMGP	De Minimis General Permit
ECC	Erosion Control Coordinator
EPA	Environmental Protection Agency
EPCM	ADOT Erosion and Pollution Control Manual
EPCP	Erosion and Pollution Control Plan (ESCP Erosion and Sediment Control Plans-2005 manual)
EPG	Environmental Planning Group (ADOT)
ENGINEER	ADOT Resident Engineer or Resident Landscape Architect
FCGP	Federal Construction General Permit
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
LID	Low Impact Development
MAG	Maricopa Association of Governments

A

ABBREVIATIONS AND ACRONYMS

MOU	Memorandum of Understanding
MS4	Municipal Separate Storm Sewer System
MSDS	Material Safety Data Sheet
MSGP	Multi-Sector General Permit
NPS	National Park Service
NESHAPS	National Emission Standard for Hazardous Air Pollutants
NOI	Notice of Intent
NOT	Notice of Termination
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
OES	Office of Environmental Services (ADOT)
PAG	Pima Association of Governments
ROW	Right-of-Way
SPCC	Spill Prevention, Containment and Countermeasures
SSWMP	Statewide Stormwater Management Plan
SWPPP	Stormwater Pollution Prevention Plan
SWAT	Stormwater Advisory Team
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
USDA	United States Department of Agriculture
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USDOT	United States Department of Transportation
USFS	USDA Forest Service
WMAR	White Mountain Apache Reservation

APPENDIX B

DEFINITIONS OF TERMS

Arizona Construction General Permit (AZCGP)

Provides authorization to discharge under the Arizona Discharge Elimination System; specifically authorizes only discharges from construction activities in Arizona by those owners and operators who meet eligibility requirements and comply with the general permit terms and conditions.

ADOT

The Arizona Department of Transportation as the permittee, owner/operator and project manager of all its contractors and sub-contractors.

Arizona Pollutant Discharge Elimination System (AZPDES)

The Arizona Department of Environmental Quality Program by which permits are issued for allowable discharges to waters of the United States and authorization is granted to qualified candidates for coverage under the Arizona Construction General Permit.

Aquifer Protection Permit (APP)

The Arizona Department of Environmental Quality permit that covers discharge of pollutants directly or indirectly to an aquifer or to the land surface or vadose (the areas between the aquifer and the land surface) zone in such a manner that there is a reasonable probability that the pollutant will reach an aquifer.

Arizona Revised Statutes

Statutory laws in the state of Arizona.

Best Management Practice (BMP)

A technique, process, activity, or structure used to reduce the pollutant content of a storm water discharge minimizing the potential impacts upon receiving waters.

Clean Water Act (CWA)

Establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The basis of the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act, but the Act was significantly reorganized and expanded in 1972. “Clean Water Act” became the Act’s common name with amendments in 1977.

Code of Federal Regulations (CFR)

The codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government.

Concentrated Flow

Runoff that accumulates or converges into well-defined channels with greater velocity than Sheet Flow.

Construction Site

The land or water area where construction activities will occur and where stormwater controls will be installed and maintained. The construction site includes construction support activities, which may be located at a different part of the property from where the primary construction activity will take place, or on a different piece of property altogether. The construction site is often a smaller subset of the lot or parcel within which the project is taking place. (NPDES definition)

B

DEFINITIONS OF TERMS

Construction BMP

Temporary measures to manage (control) storm water quality during the construction process.

Construction Support Activities

A construction-related activity that specifically supports the construction activity and involves earth disturbance or pollutant-generating activities of its own, and can include activities associated with concrete or asphalt batch plants, equipment staging yards, materials storage areas, excavated material disposal areas, and borrow areas. (NPDES definition)

Contractor

The individual, partnership, firm, corporation, or any acceptable combination thereof, or joint venture, contracting with ADOT for performance of the work.

Crown Ditch

A swale installed at the tops of slopes to divert sheet flow from adjacent undisturbed slopes onto newly constructed cut slopes.

Cut Slope

A slope that is excavated. Contrast with Fill Slope.

De Minimis General Permit

Designed to cover point source discharges released to a stormwater sewer system. Discharges from potable or reclaimed water systems, subterranean dewatering, well development, aquifer testing, hydrostatic testing of pipelines, fire hydrants and tanks, residential cooling water, charitable car washes, building and street washing and dechlorinated swimming pool drainage are covered under this permit.

Detention / Retention Basin

Facilities typically constructed below the roadway shoulder where the appropriate footprint is available to hold runoff, and are also referred to as pond-in-place practices. Retention and detention basins are excavated in most any configuration to meet footprint restrictions and can be vegetated.

Discharge

Any addition of any pollutant to waters of the United States from any point source.

Embankment Curb

Installed on fill slopes at the edge of the roadway to intercept flow from paved surfaces. Openings in the curb are constructed to drain into a spillway of downdrain.

Environmental Clearance

Documentation that all relevant environmental factors have been appropriately addressed and mitigated in accordance with the National Environmental Policy Act. Primary documents include Categorical Exclusions, Environmental Assessments, or Environmental Impact Statements depending on the environmental impacts of the project.

Erosion

The process by which solids (sediment, soil, rock or other particles) are removed from the surface of the earth by the action of water, wind, glaciers or waves, etc.

Erosion Control Coordinator (ECC)

Hired by the contractor and approved by ADOT. The ECC shall be responsible for preparing, implementing, monitoring, and revising the approved SWPPP throughout the project, and for implementing any other permit requirements stipulated in the AZPDES general permit. The ECC shall be knowledgeable in the principles and practice of erosion and sediment controls, and possess the skills to assess conditions at the site that could impact stormwater quality and the effectiveness of the contractor's erosion control measures used to control the quality of the stormwater discharges. Specific required qualifications for the erosion control coordinator are specified in the ADOT Stored Specification 104SWDEQ and 104SWEPA.

Fascine

A bundle of live sticks or branches tied together into sausage like structures and then placed to provide slope stability or prevent erosion.

Final Stabilization

All soil disturbing activities at the site have been completed and the criteria specified in the *ADOT Methodology for Determining Final Stabilization* document have been met.

Federal Construction General Permit (FCGP)

Issued by the EPA this permit provides authorization to discharge from construction activities in Indian Country in Arizona.

Federal Highway Administration (FHWA)

Part of the U.S. Department of Transportation whose mission is to 'improve mobility on our nation's highways through leadership, innovation and program delivery'.

Fill Slope

An embankment created with excavated (borrow) material. Contrast with Cut Slope.

Impaired Water

A surface water that has been assessed by ADEQ of EPA under section 303(d) of the Clean Water Act, as not attaining a water quality standard for at least one designated use and is listed in Arizona's 2006/2008 303(d) and Other Impaired Waters List.

Indian Country

All the land under supervision of the United States Government that has been set aside for the use of Native Americans including reservations and other areas under Federal jurisdiction and designated for Native Americans' use.

Low Impact Development

A stormwater strategy concerned with maintaining or restoring the natural hydrologic functions of a site to achieve natural resource protection objectives and fulfill environmental regulatory requirements. (Center for Environmental Excellence, AASHTO)

Municipal Separate Storm Sewer System (MS4)

A conveyance or system of conveyances that transport stormwater and are owned by a state, city, town, village or other public entity.

Multi-Sector General Permit (MSGP)

Specifically authorizes stormwater discharges associated with industrial activities by those owners and operators who meet the eligibility requirements of the permit and who comply with the general permit requirements and conditions.

B

DEFINITIONS OF TERMS

National Pollutant Discharge Elimination System (NPDES)

The National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

Non-point Source Pollution

Occurs when rainfall, snow melt or irrigation runs over land or through the ground, picks up contaminants and deposits then into rivers, lakes and coastal waters or introduces them into ground water.

Notice of Intent (NOI)

The application to operate under the Arizona or Federal Construction General Permit.

Notice of Termination (NOT)

The application to terminate coverage under the Arizona or Federal Construction General Permit.

Operator

Operator means any person associated with a construction project that meets one or both of the following two criteria:

1. The person has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or
2. The person has day-to-day operational control of those activities at a project which are necessary to ensure compliance with a SWPPP for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the SWPPP or comply with other permit conditions).

Outstanding Arizona Water (OAW)

A surface water that is classified as an outstanding state resource water under Arizona Administrative Code R18-11-112.

Point Source Pollution

Pollution that can be traced back to a single origin or source such as a pipe, culvert or sewage treatment plant discharge.

Pollutant

Sediment, fluids, contaminants, toxic wastes, toxic pollutants, dredged spoil, solid waste,substances and chemicals, pesticides, herbicides, fertilizers and other agricultural chemicals, incinerator, residue, sewage, garbage, sewage sludge, munitions, petroleum products, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt (e.g., overburden material), and mining, industrial, municipal and agricultural wastes or any other liquid, solid, gaseous or hazardous substances. [A.R.S. § 49-201(29)]

Post-Construction BMP

Permanent measures to manage storm water quality both during and after construction of the project.

Receiving Waters
A water of the United States as defined in 40 CFR 122.2 into which the stormwater discharges.

Runoff
That portion of precipitation, snow melt or irrigation water that flows off the land into streams or other surface waters. It can carry pollutants from air and land into the receiving waters.

Section 401 of the Clean Water Act
Allows states to certify that the draft 404 permit complies with state law.

Section 402 of the Clean Water Act
Establishes the NPDES Permit Program by which authorization is granted for allowable discharges to waters of the United States.

Section 404 of the Clean Water Act
Regulates discharge of dredged or fill material to waters of the United States and establishes a permit program to authorize approved discharges.

Sediment
Soil, sand and minerals washed from land into water, usually after rain or snow melt.

Sedimentation
The process that deposits soils, sand, minerals and other materials either on the ground surface or in bodies of water or watercourses.

Sensitive Project
To be deemed “sensitive” a project must include at least 20 acres of ground disturbance AND must discharge into the waters of the U.S. AND must meet at least one of the following conditions: -the project requires an Environmental Impact Statement, -the project is primarily on Federal lands, -the project construction has significant work requiring an individual 404 permit from the Corps of Engineers or an individual 401 water quality certification from ADEQ, -the project requires a Section 7 consultation with the U.S. Fish and Wildlife Service for potential impacts to aquatic endangered species.

Sheet Flow
Runoff that flows over the ground surface as a relatively thin and uniform layer, not concentrated in channels or pipes; also referred to as Overland flow.

Slope Ditch
Installed between the top and toe of a slope to intercept and carry sheet flow and convey concentrated flows.

Statewide Stormwater Management Plan (SSWMP)
A program to reduce the discharge of pollutants associated with the stormwater drainage systems that serve highways and transportation-related properties, facilities and activities. The plan identifies how ADOT complies with the Arizona Pollutant Discharge Elimination System stormwater program.

Stormwater
Stormwater runoff, snow melt runoff, and surface runoff and drainage; rainfall that does not infiltrate the ground or evaporate because of impervious land surfaces but instead flows onto adjacent land or watercourses or is routed into drain/sewer systems.

B

DEFINITIONS OF TERMS

Stormwater Pollution Prevention Plan (SWPPP)

A site-specific, written document that identifies potential sources of stormwater pollution at the construction site; describes practices to reduce pollutants in stormwater discharges from the construction site; and identifies procedures the operator will implement to comply with the terms and conditions of a construction general permit.

Top Soil

The upper, outermost layer of soil containing the highest concentration of organic matter.

Turbidity

A measure of the amount of material suspended in water expressed in Nephelometric Turbidity Units (NTU) as determined with a calibrated turbidimeter.

Vadose Zone

The area between an aquifer and the land surface.

Waters of the United States

40 CFR 230.3(s) The term waters of the United States means:

1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
2. All interstate waters including interstate wetlands;
3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
    a. Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
    b. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
    c. Which are used or could be used for industrial purposes by industries in interstate commerce;
4. All impoundments of waters otherwise defined as waters of the United States under this definition;
5. Tributaries of waters identified in paragraphs (1) through (4) of this section;
6. The territorial sea;
7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (1) through (6) of this section; waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the United States.

Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

PART 1 - To be completed by the Landscape Architect or Design Engineer

I. PROJECT DESCRIPTION

A. Owner Name and Address:

Arizona Department of Transportation
205 South 17th Avenue
Phoenix, Arizona 85007-3213

B. Project TRACS Number: _____

C. Project Location: _____

City: _____ County: _____

Beginning Latitude (NAD 83): ___° ___' ____"
Beginning Longitude (NAD 83): ___° ___' ____"

Ending Latitude (NAD 83): ___° ___' ____"
Ending Longitude (NAD 83): ___° ___' ____"

To obtain the project latitude/longitude data, refer to the Flash Earth web link below (Bing Maps with labels): *http://www.flashearth.com/*

D. Project Description: _____

II. HYDROLOGIC INFORMATION

A. Project Size:
Length (Mi.) _____
Area (Ac.) _____

B. Area to be Graded (Ac.) *: _____

* Blading of the shoulder build-up area is considered as grading and ground disturbance and should be covered by stormwater and/or other environmental regulations.

C. Percentage of the site that is impervious before and after construction:
Percentage before Construction: _____
Percentage after Construction: _____

D. Receiving Water(s), refer to the Arizona Department of Water Resources Web Link below (USGS Topo) :
https://gisweb.azwater.gov/WellRegistry/Default.aspx

III. PRESERVATION OF EXISTING VEGETATION

A. In accordance with the specifications, existing vegetation will be preserved. Clearing limits shall be confined to areas that require grading. Existing vegetation outside the boundaries of the cleared area shall be protected from damage by construction activities. Existing trees within the area to be cleared shall be preserved and protected, wherever possible.

IV. SOIL STABILIZATION MEASURES

A. All disturbed soil, which will not be paved, riprapped or otherwise covered to prevent erosion, will be revegetated and/or landscaped in accordance with the project plans and specifications.

B. Scheduling of the revegetation effort can be found on PART 2 of this sheet under SCHEDULE OF MAJOR ACTIVITIES.

V. MEASURES TO CONTROL EROSION AND SEDIMENT

A. Temporary Erosion and Sediment Controls: (Refer to the Following SWPPP Site Plan and Specifications)

_____ Erosion Control Mattings
_____ Temporary Diversion Dikes
_____ Check Dams
_____ Rock Inlet/Outlet Protection
_____ Sediment Control Berms
_____ Silt Fences
_____ Wattles (Excelsior/Straw)
_____ Excelsior Logs / Sediment Logs
_____ Seeding (Class II with mulch)
_____ Others Describe: _____

B. Permanent Erosion and Sediment Controls and Post-construction Storm Water Management Measures: (Refer to SWPPP Site Plan and Specifications)

_____ Crown Ditch/Dike
_____ Rock Protection
_____ Rock Riprap Channel Lining
_____ Sediment Basin
_____ Embankment Curb
_____ Spillways and Downdrains
_____ Minibenching
_____ Seeding established as a perennial vegetative cover with a density of 70% of the native background vegetative cover.
_____ Others Describe: _____

VI. MAINTENANCE AND INSPECTIONS

A. Frequency of Inspections:

___ At least once every 7 calendar days, OR
___ Every 14 calendar days and within 24 hours after a rainfall of 0.5 inches (12.7 mm) or more.

NOTE: RAINFALL GAUGE TO BE KEPT ON-SITE TO DETERMINE DEPTH OF RAINFALL

B. Inspection Procedure:

ADOT's Contractor's Inspection Log and Compliance Evaluation Report (CER) will be completed by the contractor or his representative and will be kept on file for 3 years. A signed copy of the CER will be sent to the ADOT resident engineer. If repairs are necessary, they shall be initiated within 24 hours of the inspection report.

PART 2 - To be completed by ADOT & CONTRACTOR

http://www.azdot.gov/inside_adot/OES/Water_Quality/Stormwater/Docs/swppp_construction_template.dot

I. SCHEDULE OF MAJOR ACTIVITIES

A. Project Schedule: _____

Start Date: _____

End Date: _____

B. Construction Sequencing Schedule: (Attach Additional Sheets)
Construction Activities _____

II. INVENTORY OF POLLUTANTS

A. The materials or substances checked below are expected to be onsite during construction:

___Concrete ___Asphalt
___Paints ___Fertilizer
___Herbicides ___Wood
___Fuel ___ Oil
___Others, List: _____

III. POLLUTION CONTROL MEASURES

A. Other Best Management Practices:

___Wind Erosion and Dust Control
___Solid Waste Management
___Equipment Maintenance Procedures
___Designated Washout Areas
___Stabilized Construction Entrance
___Protected Chemical and Material Storage Area
___Other, Describe: _____

IV. SPILL PREVENTION AND RESPONSE

A. Spill Prevention:
The procedures outlined in the Best Management Practices listed under Pollution Control Measures will be followed to prevent and contain spills of hazardous material. These preventative action include BMP's on equipment maintenance and proper handling, storage and disposal of chemicals and materials. All manufacturer's recommendations for usage, clean-up and disposal shall be followed.

B. Spill Response:
In the event of any accidental spill of chemicals or hazardous materials, contact the ADOT Traffic Operations Center at 800-379-3701. If a reportable quantity is discharged into the storm water, ADOT shall contact the National Response Center and document the spill to the EPA. ADOT's Hazardous Materials Specialist shall provide instructions.

V. CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

A. This Storm Water Pollution Prevention Plan (SWPPP) has been prepared in accordance with the latest updated version of ADOT's EROSION AND POLLUTION CONTROL MANUAL FOR HIGHWAY DESIGN AND CONSTRUCTION, published by ADOT Intermodal Transportation Division.

____SWPPP is in compliance with other Federal, State Laws, or Local Regulations.

VI. POLLUTION PREVENTION PLAN CERTIFICATION

A. I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Applies to VI. B., C., and D)

B. The operator/contractor as defined in AZPDES should sign the SWPPP in accordance with CGP Part VIII. J, and retain the SWPPP on-site at the construction site or other location easily accessible during normal business hours.

Signature: (operator/contractor) _____
Date: _____
Name: _____
Title: _____
Company: _____

C. ADOT Resident Engineer
Signature: (owner) _____
Date: _____
Name: _____
Title: _____
ADOT District: _____

D. MUNICIPALITY for Municipal Separate Storm Sewer System (MS4)
Signature: _____
Date: _____
Name: _____
Title: _____
MS4 Name: _____

VII. OTHER REQUIREMENTS

A. A copy of the General Permit and NOI are attached in accordance to AZPDES General Permit for Storm Water Discharges From Construction Activities To The Water Of The United States.

B. Projects that are within ¼ mile of impaired or unique waters require the SWPPP to be sent to ADEQ in combination with the NOI. Refer to the Arizona Outstanding, Impaired and Not-Attaining Waters *.PDF Maps by County web link:
https://www.azdot.gov/inside_adot/OES/Water_Quality/Stormwater/outstanding_unique_waters_maps_by_county.asp

C. For further requirements, check the ADEQ's Smart NOI Web Page: *https://az.gov/app/smartnoi/*

	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION ROADSIDE DEVELOPMENT SECTION	
DESIGN				
DESIGN				
DRAWN				
DRAWN			AZPDES SWPPP INDEX SHEET	
CHECKED				
TEAM LEADER				
ROUTE	MP	LOCATION		SHEET OF
TRACS NO.				___ OF ___

NO. | DESCRIPTION OF REVISION | DATE | MADE BY

Sample

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C

REFERENCE FORMS AND CHECKLISTS

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F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

PART 1 - To be completed by the Landscape Architect or Design Engineer

I. PROJECT DESCRIPTION

A. Owner Name, Address and IRS Employee Identification Number (EIN):

Arizona Department of Transportation
205 South 17th Avenue
Phoenix, Arizona 85007-3213

IRS Employee Identification Number (EIN) for ADOT: 86-6004791

B. Project TRACS Number: _____

C. Project Location: _____

City: _____ County: _____

Beginning Latitude (NAD 83): ___° ___' ____"
Beginning Longitude (NAD 83): ___° ___' ____"
Ending Latitude (NAD 83): ___° ___' ____"
Ending Longitude (NAD 83): ___° ___' ____"

To obtain the project latitude/longitude data, refer to the EPA's eNOI System (Central Data Exchange) : https://cdx.epa.gov/ or Flash Earth Web Link below (Bing Maps with labels) : http://www.flashearth.com/

D. Project Description: _____

II. HYDROLOGIC INFORMATION

A. Project Size:
Length (Mi.) _____
Area (Ac.) _____

B. Area to be Graded (Ac.) *: _____

* Blading of the shoulder build-up area is considered as grading and ground disturbance and should be covered by stormwater and/or other environmental regulations.

C. Percentage of the site that is impervious before and after construction:
Percentage before Construction: _____
Percentage after Construction: _____

D. Receiving Water(s), refer to the AZ Department of Water Resources Web Link below (USGS Topo):
https://glsweb.azwater.gov/WellRegistry/Default.aspx

III. PRESERVATION OF EXISTING VEGETATION

A. In accordance with the specifications, existing vegetation will be preserved. Clearing limits shall be confined to areas that require grading. Existing vegetation outside the boundaries of the cleared area shall be protected from damage by construction activities. Existing trees within the area to be cleared shall be preserved and protected, wherever possible.

IV. SOIL STABILIZATION MEASURES

A. All disturbed soil, which will not be paved, riprapped or otherwise covered to prevent erosion, will be revegetated and/or landscaped in accordance with the project plans and specifications.

B. Scheduling of the revegetation effort can be found on PART 2 of this sheet under SCHEDULE OF MAJOR ACTIVITIES.

V. MEASURES TO CONTROL EROSION AND SEDIMENT

A. Temporary Erosion and Sediment Controls: (Refer to the SWPPP Site Plan and Specifications)

_____ Erosion Control Mattings
_____ Temporary Diversion Dikes
_____ Check Dams
_____ Rock Inlet/Outlet Protection
_____ Sediment Control Berms
_____ Silt Fences
_____ Wattles (Excelsior/Straw)
_____ Excelsior Logs / Sediment Logs
_____ Seeding (Class II with mulch)
_____ Others Describe: _____

B. Permanent Erosion and Sediment Controls and Post-construction Storm Water Management Measures: (Refer to SWPPP Site Plan and Specifications)

_____ Crown Ditch/Dike
_____ Rock Protection
_____ Rock Riprap Channel Lining
_____ Sediment Basin
_____ Embankment Curb
_____ Spillways and Downdrains
_____ Minibenching
_____ Seeding established as a perennial vegetative cover with a density of 70% of the native background vegetative cover.
_____ Others Describe: _____

VI. MAINTENANCE AND INSPECTIONS

A. Frequency of Inspections:

Regular Inspection Frequency:

____ At least once every 7 calendar days (weekly), OR

____ At least 14 calendar days (biweekly) and within 24 hours of a rainfall of 0.25 in. or greater.

Impaired (Sensitive) Waters Inspection:

____ Every 7 calendar days and within 24 hours of a rainfall of 0.25 in. or greater.

NOTE: RAINFALL GAUGE TO BE KEPT ON-SITE TO DETERMINE DEPTH OF RAINFALL

B. Inspection Procedure:
ADOT's Contractor's Inspection Log and Compliance Evaluation Report (CER) will be completed by the contractor or his representative and will be kept on file for 3 years. A signed copy of the CER will be sent to the ADOT resident engineer. If repairs are necessary, they shall be initiated within 24 hours of the inspection report.

PART 2 - To be completed by ADOT & CONTRACTOR

Refer to: http://cfpub.epa.gov/npdes/stormwater/msgpenoi.cfm
http://cfpub.epa.gov/npdes/stormwater/swppp.cfm#guide

I. SCHEDULE OF MAJOR ACTIVITIES

A. Project Schedule: _____

Start Date: _____

End Date: _____

B. Construction Sequencing Schedule: (Attach Additional Sheets)
Construction Activities _____

II. INVENTORY OF POLLUTANTS

A. The materials or substances checked below are expected to be onsite during construction:

__ Concrete __ Asphalt
__ Paints __ Fertilizer
__ Herbicides __ Wood
__ Fuel __ Oil
__ Others, List: _____

III. POLLUTION CONTROL MEASURES

A. Other Best Management Practices:
__ Wind Erosion and Dust Control
__ Solid Waste Management
__ Equipment Maintenance Procedures
__ Designated Concrete Washout Areas (Leak proof pits/containers are included.)
__ Stabilized Construction Entrance
__ Protected Chemical and Material Storage Area
Other, Describe: _____

IV. SPILL PREVENTION AND RESPONSE

A. Spill Prevention:
The procedures outlined in the Best Management Practices listed under Pollution Control Measures will be followed to prevent and contain spills of hazardous material. These preventative action include BMP's on equipment maintenance and proper handling, storage and disposal of chemicals and materials. All manufacturer's recommendations for usage, clean-up and disposal shall be followed.

B. Spill Response:
In the event of any accidental spill of chemicals or hazardous materials, contact the ADOT Traffic Operations Center at 800-379-3701. If a reportable quantity is discharged into the storm water, ADOT shall contact the National Response Center and document the spill to the EPA. ADOT's Hazardous Materials Specialist shall provide instructions.

V. CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

A. This Storm Water Pollution Prevention Plan (SWPPP) has been prepared in accordance with the latest updated version of ADOT's EROSION AND POLLUTION CONTROL MANUAL FOR HIGHWAY DESIGN AND CONSTRUCTION, published by ADOT Intermodal Transportation Division.

____ SWPPP is in compliance with other Federal, State Laws, or Local Regulations.

VI. POLLUTION PREVENTION PLAN CERTIFICATION

A. I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Applies to VI. B., C., and D)

B. The operator/contractor as defined in NPDES should sign the SWPPP in accordance with CGP Part 7.2.15 and retain the SWPPP on-site at the construction site or other location easily accessible during normal business hours.
Signature: (operator/contractor) _____
Date: _____
Name: _____
Title: _____
ADOT District: _____

C. ADOT Resident Engineer
Signature: (owner) _____
Date: _____
Name: _____
Title: _____
ADOT District: _____

D. MUNICIPALITY for Municipal Separate Storm Sewer System (MS4)
Signature: _____
Date: _____
Name: _____
Title: _____
Municipality: _____

VII. OTHER REQUIREMENTS

A. A copy of the General Permit and NOI should be attached.

B. A copy of the page from the environmental clearance for the project that discusses endangered or threatened species should be attached.

C. Use the process in NPDES General Permit Appendix C (ESA Review Procedures) to determine eligibility prior to submittal of the Notice of Intent (NOI) for Endangered and Threatened Species and Critical Habit Protection.

D. A seven-day waiting/review period between NOI submittal and authorization to begin construction will be used by U.S. Fish and Wildlife Service and National Marine Fisheries Service to screen proposed construction activities for potential impacts on endangered species.

	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION ROADSIDE DEVELOPMENT SECTION	
DESIGN				
DESIGN				
DRAWN			NPDES SWPPP INDEX SHEET	
DRAWN				
CHECKED				
TEAM LEADER				
ROUTE	MP	LOCATION		SHEET OF
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Sample

C

REFERENCE FORMS AND CHECKLISTS

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F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

PART 1 - To be completed by the Landscape Architect or Design Engineer

I. PROJECT DESCRIPTION

A. Owner Name and Address: (PERMITTEE)

_____

_____

_____

_____

B. Project Location: _____

_____

Beginning Latitude (NAD 83): ___ ° ___ ' ___ "
Beginning Longitude (NAD 83): - ___ ° ___ ' ___ "

Ending Latitude (NAD 83): ___ ° ___ ' ___ "
Ending Longitude (NAD 83): - ___ ° ___ ' ___ "

C. Project Description: _____

_____

_____

_____

_____

_____

II. HYDROLOGIC INFORMATION

A. Project Size:

Length (Mi.) _____

Area (Ac.) _____

B. Area to be Graded (Ac.): _____

C. Percentage of the site that is impervious before and after construction:

Percentage before Construction: _____

Percentage after Construction: _____

D. Receiving Water(s): _____

_____

_____

III. PRESERVATION OF EXISTING VEGETATION

A. In accordance with the specifications, existing vegetation will be preserved. Clearing limits shall be confined to areas that require grading. Existing vegetation outside the boundaries of the cleared area shall be protected from damage by construction activities. Existing trees within the area to be cleared shall be preserved and protected, wherever possible.

IV. SOIL STABILIZATION MEASURES

A. All disturbed soil, which will not be paved, riprapped or otherwise covered to prevent erosion, will be revegetated and/or landscaped in accordance with the project plans and specifications.

B. Scheduling of the revegetation effort can be found on PART 2 of this sheet under SCHEDULE OF MAJOR ACTIVITIES.

V. MEASURES TO CONTROL EROSION AND SEDIMENT

A. Temporary Erosion and Sediment Controls: (Refer to the Following SWPPP Site Plan and Specifications)

_____ Erosion Control Mattings
_____ Temporary Diversion Dikes
_____ Check Dams
_____ Rock Inlet/Outlet Protection
_____ Sediment Control Berms
_____ Silt Fences
_____ Wattles (Excelsior/Straw)
_____ Excelsior Logs / Sediment Logs
_____ Seeding (Class II with mulch)
_____ Others Describe: _____

_____

_____

_____

_____

B. Permanent Erosion and Sediment Controls and Post-construction Storm Water Management Measures: (Refer to SWPPP Site Plan and Specifications)

_____ Crown Ditch/Dike
_____ Rock Protection
_____ Rock Riprap Channel Lining
_____ Sediment Basin
_____ Embankment Curb
_____ Spillways and Downdrains
_____ Minibenching
_____ Seeding established as a perennial vegetative cover with a density of 70% of the native background vegetative cover.
_____ Others Describe: _____

_____

_____

_____

_____

_____

VI. MAINTENANCE AND INSPECTIONS

A. Frequency of Inspections:

___ At least once every 7 calendar days, OR

___ Every 14 calendar days and within 24 hours after a rainfall of 0.5 inches (12.7 mm) or more.

NOTE: RAINFALL GAUGE TO BE KEPT ON-SITE TO DETERMINE DEPTH OF RAINFALL

B. Inspection Procedure:

Permittee's Contractor's Inspection Log and Compliance Evaluation Report (CER) will be completed by the contractor or his representative and will be kept on file for 3 years. If repairs are necessary, they shall be initiated within 24 hours of the inspection report.

PART 2 - To be completed by PERMITTEE & CONTRACTOR

http://www.azdot.gov/Highways/MaintPermits/PDF/EncroachmentPermit.pdf
http://www.azdot.gov/Highways/MaintPermits/PDF/encroachment_policies_guidelines_procedures.pdf

I. SCHEDULE OF MAJOR ACTIVITIES

A. Project Schedule: _____

Start Date: _____

End Date: _____

B. Construction Sequencing Schedule: (Attach Additional Sheets) Construction Activities _____

_____

_____

_____

_____

_____

II. INVENTORY OF POLLUTANTS

A. The materials or substances checked below are expected to be onsite during construction:

___ Concrete ___ Asphalt
___ Paints ___ Fertilizer
___ Herbicides ___ Wood
___ Fuel ___ Oil
___ Others, List: _____

_____

III. POLLUTION CONTROL MEASURES

A. Other Best Management Practices:

___ Wind Erosion and Dust Control
___ Solid Waste Management
___ Equipment Maintenance Procedures
___ Designated Washout Areas
___ Stabilized Construction Entrance
___ Protected Chemical and Material Storage Area
___ Other, Describe: _____

_____

_____

IV. SPILL PREVENTION AND RESPONSE

A. Spill Prevention:
The procedures outlined in the Best Management Practices listed under Pollution Control Measures will be followed to prevent and contain spills of hazardous material. These preventative action include BMP's on equipment maintenance and proper handling, storage and disposal of chemicals and materials. All manufacturer's recommendations for usage, clean-up and disposal shall be followed.

B. Spill Response:
In the event of any accidental spill of chemicals or hazardous materials in ADOT R/W, contact the ADOT Traffic Operations Center at 800-379-3701. If a reportable quantity is discharged into the storm water, ADOT shall contact the National Response Center and document the spill to the EPA. ADOT's Hazardous Materials Specialist shall provide instructions.

V. CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

A. This Storm Water Pollution Prevention Plan (SWPPP) has been prepared in accordance with the latest updated version of ADOT's EROSION AND POLLUTION CONTROL MANUAL FOR HIGHWAY DESIGN AND CONSTRUCTION, published by ADOT Intermodal Transportation Division.

___ SWPPP is in compliance with other Federal, State Laws, or Local Regulations.

VI. POLLUTION PREVENTION PLAN CERTIFICATION

A. I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Applies to VI. B., C., and D)

B. The operator/contractor as defined in AZPDES should sign the SWPPP in accordance with CGP Part VIII. J, and retain the SWPPP on-site at the construction site or other location easily accessible during normal business hours.

Signature: (operator/contractor) _____
Date: _____
Name: _____
Title: _____
Company: _____

C. The owner/operator as defined in AZPDES and described in B

Signature: (owner/operator) _____
Date: _____
Name: _____
Title: _____
Company: _____

D. MUNICIPALITY for Municipal Separate Storm Sewer System (MS4)

Signature: _____
Date: _____
Name: _____
Title: _____
MS4 Name: _____

VII. OTHER REQUIREMENTS

A. A copy of the General Permit and NOI are attached in accordance to AZPDES General Permit for Storm Water Discharges From Construction Activities To The Water Of The United States.

B. Projects that are within 1/4 mile of impaired or unique waters require the SWPPP to be sent to ADEQ in combination with the NOI.

C. For further requirements, check the ADEQ's Smart NOI Web Page: https://az.gov/app/smartnoi/

	NAME	DATE
DESIGN		
DRAWN		
CHECKED		

ADOT ENCROACHMENT PERMITS
AZPDES SWPPP INDEX SHEET

ROUTE | LOCATION

DWG NO

___ OF ___

Sample

$FILE$ V:/ROADSIDE\users\a3956\ 11:07:00 AM 6/20/2012 V:\Roadside\RdsdDev\ERO_BMPs\Updated_Index_Sheets\Permits_AZPDES_SWPPP_Index_Sheet_2012.dgn

C

REFERENCE FORMS AND CHECKLISTS

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ADEQ Arizona Department of Environmental Quality

NOTICE OF INTENT (NOI)

for Construction Activity Discharges

to Waters of the United States under the
AZPDES Stormwater Construction General Permit
(AZG2008-001)

FOR COVERAGE, A COMPLETE AND ACCURATE NOI (INCLUDING REQUIRED FEE) MUST BE SUBMITTED TO:
Arizona Department of Environmental Quality, Surface Water Section / Stormwater and General Permits Unit
1110 West Washington Street, 5415A-1, Phoenix, Arizona 85007

Is this NOI a revision to a project filed under the 2008 AZPDES Stormwater Construction General Permit? _____YES _____NO If Yes, complete the following:

- Provide your current authorization number: AZCON - _____
- Provide the name of the project / site in Part II below. You do not need to complete the entire form. Provide only the information that is being changed from the original NOI.
- Complete the certification in Part VI (including signature of authorized signer).

Is the site located on Indian Country Lands?

_____ YES _____ NO

I. OPERATOR (Applicant) INFORMATION:

- Contact Name: _____
- Phone Number: _____ Fax Number: _____
- Operator's Business Name: _____
- Operator's Mailing Address: _____
- City: _____ State: _____ Zip Code: _____
- Business Status: Federal: _____ State: _____ Other Public: _____ Private: _____

II. CONSTRUCTION SITE INFORMATION:

- Project/Site Name: _____
- County Parcel No. (at main entrance): _____ Phone Number: _____
- Type of Project (subdivision, commercial, road, pipeline, utility, ADOT project, etc.): _____

  If a subdivision, has state or local subdivision approval been obtained? _____YES _____NO

  If yes, provide the Subdivision Certificate of Approval Number: _____
- Is the project part of a larger common plan of development? _____YES _____NO

Sample

II. CONSTRUCTION SITE INFORMATION ***(continued)***

- Does the project have/need other environmental permits or approvals? If so, list them and provide the permit/approval number for each: _____

  _____

- Site physical location (Provide address. If no address, provide driving directions from nearest municipality):

  _____

  _____

- City: _____ State: AZ Zip Code: _____ County: _____

- Estimated Project Start Date: _____ Estimated Project Completion Date: _____
  Month/Day/Year Month/Day/Year

- Estimate of total acres (to nearest whole acre) to be disturbed by the entire construction activity: _____

- Estimate of total acres (to nearest whole acre, round up if < 1) to be disturbed by your operations: _____

- **Select the non-stormwater discharges expected to be associated with your construction-related activities:**

_____ None

_____ Discharges from emergency fire-fighting activities

_____ Fire hydrant flushing – ephemeral receiving waters only

_____ Waters used to control dust – no reclaimed or other wastewaters

_____ Potable waterline flushing – ephemeral receiving waters only

_____ Routine external building wash down (no detergents)

_____ Pavement wash waters – no spills or leaks of toxic or hazardous materials and no detergents

_____ Uncontaminated air conditioning or compressor condensate

_____ Uncontaminated groundwater

_____ Foundation or footing drains – uncontaminated

_____ Potable water well flushing – ephemeral receiving waters only

_____ Waters used for compacting soil – no reclaimed or other wastewaters

_____ Water used for drilling and coring (e.g., for evaluation of foundation materials) uncontaminated

_____ Uncontaminated water from dewatering operations or foundations

_____ Other (specify) _____

_____

_____

Sample

III. DISCHARGE LOCATION

- Provide the latitude and longitude of the construction site at the point nearest the receiving water (natural water course):

  Latitude: |__ı__|° |__ı__|' |__ı__| . |_____|" Longitude: |__ı__ı__|° |__ı__|' |__ı__| . |_____|"
  (Degrees, minutes, seconds) (Degrees, minutes, seconds)

- Identify the closest receiving water to the construction site (e.g., dry washes, named and unnamed waterbodies, etc.):

  _____

- Is there a potential for any discharges from the site to enter a municipal separate storm sewer system (MS4), canal, or a privately owned conveyance? _____YES _____ NO

  If yes, enter the name of the MS4, canal, or conveyance owner: _____

IV. STORMWATER POLLUTION PREVENTION PLAN (SWPPP) – A SWPPP must be developed in accordance with the terms of the general permit before completing and submitting this NOI.

- ____ I confirm that a SWPPP meeting the requirements of the Stormwater Construction General Permit (No. AZG2008-001) has been developed and will be implemented prior to commencing construction activities at this site. The SWPPP will be located at the site during construction activities. If this is a late NOI, a SWPPP has been developed and implemented prior to submitting this NOI. NOTE: ADEQ retains the authority to take enforcement action(s) for any unpermitted discharge or other non-compliance that occurs between the time construction commenced and discharge authorization is issued.

- When construction activities are not actively underway, the SWPPP will be available at the following location:

  _____

- Name of SWPPP Contact Person: _____
- Telephone Number of SWPPP Contact Person: _____
- This project may discharge within 1/4 mile of an Impaired or Outstanding Arizona Water: _____ YES _____NO

  ____ If yes, a copy of my SWPPP is included with this NOI for review by ADEQ.

Sample

V. FEES

____ I confirm that the correct fee payment is included with the NOI:

____ Less than or equal to I acre: $250.00 *

____ Greater than 1 acre, but less than or equal to 50 acres: $350.00

____ Greater than 50 acres: $500.00

____ Review of SWPPP by ADEQ, if required (see section IV above): add $1,000.00

Total fee payment included: $_____

____ No fee is required. The signer below represents an Arizona state agency (exempt from AZPDES fees).

____ No fee is required. This is an amendment of an NOI previously filed under the 2008 Stormwater Construction General Permit, for which the fee was paid or not required.

* *(If the project will disturb less than one acre, Stormwater Construction General Permit coverage is required only if the project is part of a larger common plan of development or sale that will ultimately disturb one acre or more.)*

VI. CERTIFICATION BY AUTHORIZED SIGNATORY (see Part VIII.J.1 of the General Permit for requirements)

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision, in accordance with a system designed to ensure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage this system, or those persons directly responsible for gathering the information, I believe the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. In addition, as the operator, I certify that I have reviewed and will comply with all the terms and conditions stipulated in the Stormwater Construction General Permit (AZG2008-001)."

- Printed Name: _____ Title: _____
- Signature: _____ Date: _____
- Business Name: _____
- Address: _____
- City: _____ State: _____ Zip Code: _____ Phone: _____

Sample

Grading and Stabilization Record

To be completed with every inspection

Inspector: _____ **Date:** _____

Amount of last precipitation: _____inches Duration of last precipitation: _____min/hrs/days (Circle Applicable Units)

Area Description	Days Since Last Disturbed	Days Until Next Disturbance ("active" for areas under construction)	Stabilized (Yes/No)	Temporary or Permanent?	Stabilized With	Condition (good, fair, poor)	Stabilization Required On/Before Date

Referred for Stabilization:
Area: _____ **Date Completed:** _____
Area: _____ **Date Completed:** _____
Area: _____ **Date Completed:** _____

Sample

C
REFERENCE FORMS AND CHECKLISTS

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ADOT Roadside Development Section **Tel: (602) 712-7357 Fax: (602) 712-3217**

Arizona Department of Transportation
Methodology for Determining Final Stabilization

(Last updated in January 2006)

"Final Stabilization" is a stipulation that must be met in order for an operator of a construction site to submit a Notice of Termination (NOT) to the Arizona Department of Environmental Quality (ADEQ) under the Arizona Pollutant Discharge Elimination System (AZPDES) Permit Program (Permit No. AZG2003-001) or to the U.S. Environmental Protection Agency under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP). AZPDES is applicable to projects that disturb greater than one (1) acre on non-Tribal lands; NPDES is applicable for projects on Tribal lands. A NOT is submitted by the operator to terminate coverage for discharges from construction activities to Waters of the United States.

According to AZPDES, "Final Stabilization" means that:

1. All soil disturbing activities at the site have been completed and either of the two following criteria are met:
   a. A uniform (e.g., evenly distributed, without large bare areas) perennial vegetative cover with a density of 70% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or
   b. Equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.
2. When background native vegetation will cover less than 100 percent of the ground (e.g., arid areas, beaches), the 70 percent coverage criteria is adjusted as follows: if the native vegetation covers 50 percent of the ground, 70 percent of 50 percent (.70 X .50 = .35) would require 35% total cover for final stabilization. On a beach with no natural vegetation, no stabilization is required.

According to NPDES, "Final Stabilization" means that:

1. All soil disturbing activities at the site have been completed and either of the two following criteria are met:
   a. a uniform (e.g., evenly distributed, without large bare areas) perennial vegetative cover with a density of 70 percent of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or
   b. equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.

205 S 17th Ave Room 297 Mail Drop 617 E
Phoenix, AZ 85007-3212

ADOT Roadside Development Section **Tel: (602) 712-7357 Fax: (602) 712-3217**

2. When background native vegetation will cover less than 100 percent of the ground (e.g., arid areas, beaches), the 70 percent coverage criteria is adjusted as follows: if the native vegetation covers 50 percent of the ground, 70 percent of 50 percent (0.70 x 0.50 = 0.35) would require 35 percent total cover for final stabilization. On a beach with no natural vegetation, no stabilization is required.
3. In arid and semi-arid areas only, all soil disturbing activities at the site have been completed and both of the following criteria have been met:
   a. Temporary erosion control measures (e.g., degradable rolled erosion control product) are selected, designed, and installed along with an appropriate seed base to provide erosion control for at least three years without active maintenance by you,
   b. The temporary erosion control measures are selected, designed, and installed to achieve 70 percent vegetative coverage within three years.

A methodology for determining final stabilization for native seeded/unpaved areas is described below.

Within seeded areas, sample plots with a nominal size of 100 square feet shall be used for projects that occur within low rainfall areas (defined as locations receiving 20 inches or less average annual rainfall). Sample plots with a nominal size of 25 square feet shall be used for all other project locations. The rationale for the larger plot size in low rainfall areas is that a larger sample size is necessary to accurately measure the vegetative cover, which is expected to be less dense than in areas of higher rainfall. As an option, data may be gathered at the 100-square-foot plot locations by means of four 25 square foot sub-plots established at that same location.

Multiple sample plots may be required on a project site; the number of samples shall be determined by the total disturbance area of the project. The total area represented by the sample plots shall be approximately 0.1% (.001) of the total site disturbance for areas of 1 to 20 acres, 0.08% (.0008) for areas of 20.1 to 40 acres, and 0.05% (.0005) for areas of 40.1 acres or more. The sample plot area shall be rounded to the nearest 100 square feet. For example, a project in a low rainfall area with 18 acres of disturbance would require eight sample plots (for a total sample area of 800 square feet) representing 0.1% of the total disturbance area.

The sample areas shall represent the variety of conditions found on a project. A project that has both cut and fill slopes, for example, should have roughly the same number of sample plots on cut as on fill. Final design plans should be utilized to identify each cut and fill slope. Each slope shall be assigned a number by the evaluator (e.g., C1, C2, C3; F1, F2, F3). The slopes to be sampled shall be randomly selected. The sample plot locations within each sampling area should be predetermined, either by selecting a point on the plans prior to going into the field, or by using the same selection method in the field for each plot. For example, on a roadway project, the midpoint (longitudinally) of

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the cut or fill could be identified in the field, and from that point a set number of paces could be taken from the edge of road to arrive at the sampling location. If conditions at the predetermined sample plot location are not typical of the project site the location of the sample plot may be adjusted.

In order to determine if a reseeded site has achieved 70% of the vegetative coverage of the surrounding, undisturbed landscape, it is necessary to conduct sample plot measurements for those undisturbed areas in a manner similar to the reseeded portions of the project site. A corresponding undisturbed sample plot shall be established for each project site sample plot, the location of which should be determined before going into the field. In the above roadway project example, the location for the undisturbed plot could be along an extension of the same theoretic line as the project site sample plot (perpendicular to the roadway) at a set number of paces beyond the limit of construction disturbance.

A sampling frame of either a circular or square shape should be utilized to delineate the sample plot. When a single 25 square foot sample is used, the frame shall be dropped at the sample location. If four 25 square foot sub-plots are required to obtain a total sample of 100 square feet, the sub-plots shall be established in each ordinal direction and within a few feet of the intended sample location.

The cover provided by perennial vegetation and inert material (gravel, cobble, boulders) shall be documented. The percentage of vegetative cover shall be determined as noted below. The percentage of inert material shall be estimated by the evaluator.

All perennial plants encompassed by the sampling frame should be counted., If the frame overlaps a portion of a plant that is rooted either inside or outside the frame, only the amount of vegetative cover within the frame (aerial cover) should be counted. Dividing the frame into quadrants may make counting the plants easier. The species and canopy diameter of each plant shall be recorded. The area covered by the plant can be calculated based on the recorded canopy diameter. The sum of the canopy area of all perennial plants shall be used to calculate the vegetative cover percentage within the sample plot area. If multiple sample plots are required for a single project, the average cover percentage of all plots shall constitute the reseeded/unpaved cover percentage. Inert material cover should be visually estimated as a percentage of the total area within the sampling frame.

A photograph should be taken of each sample plot. The photograph should include the area encompassed by the sampling frame and a label identifying the plot.

The sum of the perennial vegetation and/or inert material coverage percentages will be used to determine if final stabilization has been achieved. As the AZPDES permit stipulates, "A uniform perennial vegetative cover with a density of 70% of the native background vegetative cover" or "equivalent permanent stabilization measures" must occur before final stabilization is considered to have been achieved. In a situation where

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neither perennial vegetative cover nor inert material cover individually meet the 70% coverage requirement, the two types of cover may be combined. For example, if the perennial vegetation provides cover equivalent to 50% of the background cover, and the inert material provides 25% cover, the combined coverage (75%) would exceed the minimum requirement of 70% for final stabilization.

In addition to the determination of 70% cover, the temporary and permanent erosion control measures placed throughout the project shall be inspected for their effectiveness. Temporary erosion control measures such as sediment logs and straw bales shall be between 90% and 100% intact. Permanent erosion control measures such as rip rap at cut/fill transitions, drainage structures and swales shall be fully functional, with no evidence of sediment generation.

The draft results of the above analysis shall be provided to the project Resident Engineer with a copy to ADOT Roadside Development Section (Roadside). The results shall be presented in a memo format, with appropriate backup documentation and calculations to support the memo conclusions. At a minimum, a declarative statement similar to the following shall be provided: "The _____ project has achieved __% coverage in unpaved areas and has/has not achieved final stabilization as defined by AZPDES/NPDES." Once the results have been agreed to by the project Resident Engineer, 5 copies of the memo shall be submitted to the Resident Engineer for distribution.

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Phoenix, AZ 85007-3212

ADEQ Arizona Department of Environmental Quality

NOTICE OF TERMINATION (NOT)

for Construction Activity Discharges to Waters of the United States

Submission of this NOT constitutes notice that the party identified on this form is terminating coverage under the AZPDES general permit. Authorization to construction activity discharges to waters of the United States terminates at midnight on the day the NOT is received by ADEQ. To terminate your project, fax or submit a complete and accurate NOT to:

Arizona Department of Environmental Quality
Water Permits Section — Stormwater & General Permits Unit
1110 West Washington, 5415A-1; Phoenix, Arizona 85007
FAX: (602) 771-4528

I. PERMITTEE INFORMATION

AZPDES Stormwater Construction NOI Authorization Number: AZCON — _____.

Name of Operator submitted on Notice of Intent (NOI): _____

Operator Business: _____ Address: _____

City: _____ State: _____ Zip: _____ Phone: _____

II. CONSTRUCTION SITE INFORMATION

Project/Site Name: _____

Site address or physical location: _____

_____

City: _____ State: _____ Zip: _____ County: _____

Provide the latitude/longitude of the specified on the NOI:

Latitude: |__|__|° |__|__|' |__|__|" . |____| (Degrees, minutes, seconds) Longitude: |__|__|__|° |__|__|' |__|__|" . |____| (Degrees, minutes, seconds)

III. REASON FOR TERMINATING COVERAGE: (Check as applicable)

____ Final stabilization has been achieved on all portions of the site for which the operator is responsible.

____ Another operator has assumed control over all areas of the site that have not been finally stabilized. (To qualify for this condition, ADEQ must receive the new operator's NOI application or the new AZCON # with this NOT submittal.) (AZCON- _____)

____ For residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.

____ The operator has obtained coverage under another AZPDES permit. List new permit #(s). _____

____ Construction activity was never initiated and plans for construction have been permanently abandoned or indefinitely postponed.

IV. CERTIFICATION BY AUTHORIZED SIGNATORY

"I certify under penalty of law that all stormwater discharges associated with construction activity from the identified facility that are authorized by a general permit have been eliminated or that I am no longer the operator of the facility or construction site. I understand that by submitting this Notice of Termination, I am no longer authorized to discharge stormwater associated with construction activity under this general permit, and that discharging pollutants in stormwater associated with construction activity to waters of the United States is unlawful under the Clean Water Act where the discharge is not authorized by an AZPDES permit. I also understand that the submittal of this Notice of Termination does not release an operator from liability for any violations of this permit or the Clean Water Act."

Printed Name: _____ Title: _____

Signature: _____ Date: _____

Business Name (if different from above): _____

Address (if different from above): _____

City: _____ State: _____ Zip: _____ Phone: _____

February 29, 2008

Sample

C
REFERENCE FORMS AND CHECKLISTS

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Arizona Department of Transportation

Environmental Planning Group

MEMORANDUM

To: JULIE KLIEWER, Phoenix District BRANDON DECARLO, Phoenix District JAMES REEVES, Phoenix Traffic Engineering HES HARI KHANNA, Prog & Proj Mgmt Section JOHN ECKHARDT, R/W Proj Mgmt Section BARRY CROCKETT, Contracts & Specs Section	**Date:** **March 30, 2011**
From: THOR ANDERSON Manager	**Subject:** HSIP-MES-0(220)A 0000 MA MES SH478 01C Upgrade to 12" signal heads STIP: Amendment #80 Date: 01/19/2011

The Environmental Planning Group reviewed this project and has determined that it meets the criteria of a Group One Categorical Exclusion in accordance with 23 CFR 771.117(c) and the Arizona Programmatic Categorical Exclusion.

In accordance with 23 CFR 771.129(c), the Environmental Planning Group shall be consulted to determine whether this Categorical Exclusion remains valid for the referenced project prior to major approvals. These include environmental, design, right-of-way, and bid approvals.

The City of Mesa will procure 208 12-inch signal heads to replace existing 8-inch signal heads at various intersections throughout the city.

If there is a change in the project scope or the project limits, the Environmental Planning Group (Tish Hunter/ 602.712.6895) must be contacted to evaluate potential impacts.

This constitutes environmental approval.

Due to the nature of the scope of work for this project and lack of ground disturbance, no mitigation measures are required.

TA:ph:re

cc: Renate Ehm, City of Mesa Transportation Department
Irene Higgs, ADOT Traffic Safety Section
Mary Frye, FHWA

Sample

C
REFERENCE FORMS AND CHECKLISTS

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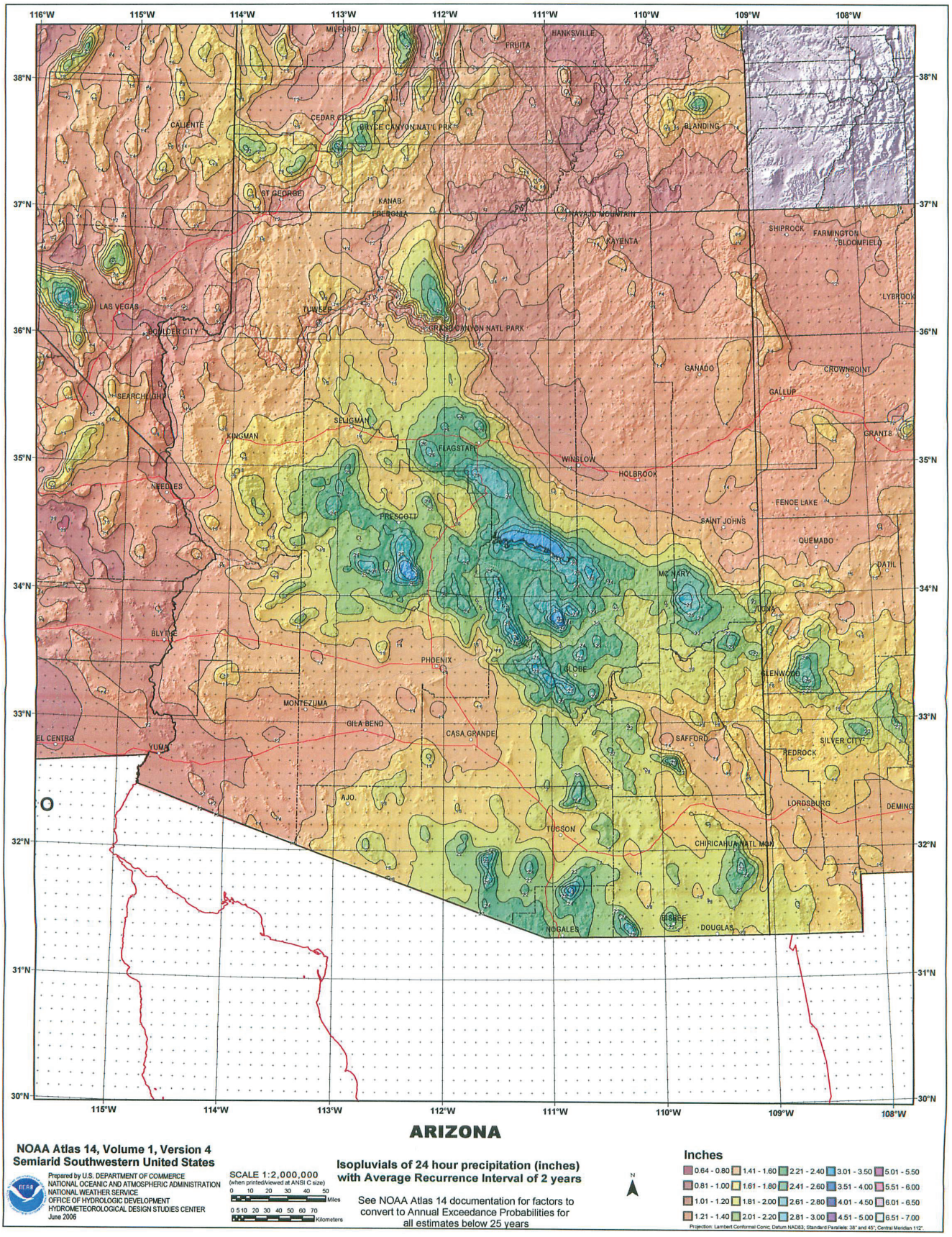
APPENDIX D

2-YEAR, 24-HOUR PRECIPITATION ISOPLUVIALS



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2-YEAR, 24-HOUR PRECIPITATION ISOPLUVIALS

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E

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APPENDIX F

ADDITIONAL PHOTOS

Appendix F is a digital appendix included only with the website document *ADOT Erosion and Pollution Control Manual for Highway Design and Construction, 2012.* Photographs will be added to supplement BMP sheet photos and concepts, and as new BMPs are developed. Access the website document at:

http://www.azdot.gov/business/engineering-and-construction/roadway-engineering/roadside-development

F
ADDITIONAL PHOTOS

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APPENDIX G

DOCUMENT REVISION HISTORY

This table describes changes to the *Arizona Department of Transportation Erosion and Pollution Control Manual for Highway Design and Construction, 2012.*

DATE	CHAPTER	PAGE	BRIEF DESCRIPTION OF CHANGE

G
DOCUMENT REVISION HISTORY

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