
ADOT EROSION AND POLLUTION CONTROL MANUAL



**For Highway Design
and Construction**



ADOT EROSION AND POLLUTION CONTROL MANUAL

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INTRODUCTION

Highway construction has been identified as a primary source of soil erosion and sediment loss. Construction of highways typically disturbs large areas of natural vegetative cover that can result in an accelerated rate of soil erosion. In contrast to highways of the past where the roadways were narrow and profiles followed the contour of the land, contemporary highways have wider cross sections and flatter profiles, which results in large areas of land disturbance, high fills and deep cuts (Figures 1.1 and 1.2). Consequently, highway design and construction requires careful consideration for erosion and sediment control.

Erosion and sedimentation from construction sites can have environmental and economic impacts. Environmentally, some of the more common impacts of excessive erosion include:

- Turbidity, which reduces in-stream photosynthesis and increased water temperatures, leading to reduced food supply and aquatic habitat;
- Introduction of soil nutrients into waters that cause algal blooms, which reduces water clarity and depletes oxygen;
- Sedimentation of stream bottoms that blankets fauna and destroys spawning areas; and
- Removal of top soil that leaves hard, rocky and infertile soil, which is difficult to revegetate.

Figure 1.1 Today's highways have wide cross sections that result in large areas of land disturbance



These environmental impacts result in damage to aquatic habitat that is difficult to quantify in terms of costs. However, the economic impacts go beyond the cost of damage to natural resources. For example: excessive accumulation of sediment in streams and reservoirs can require dredging at very high costs; replacement and repair of eroded soil can be very expensive; and sediment removal from roadways, channels and culverts can produce additional maintenance costs and cause flood damage (Figure 1.3).

Excessive sedimentation can also disturb the physical stability of ephemeral channels, resulting in accelerated rates of erosion and sediment deposition within the channels. Increased erosion and deposition can result in damage to native vegetation and subsequently to local wildlife populations for which ephemeral stream channels are important habitats and movement corridors. Increased channel erosion and sedimentation can also lead to accelerated delivery of sediment downstream to intermittent and perennial stream channels, thereby damaging those environments as well.

The Arizona Department of Transportation (ADOT) has adopted this manual to assist in developing erosion and pollution control during both design and construction of roadways.



Figure 1.2 (Above) Rill erosion on cut slope



Figure 1.3 (Below) Sedimentation at storm drain

There are three main goals:

- Reduce erosion potential.
- Reduce off-site sedimentation.
- Prevent contamination by construction materials.

These goals are achieved by means of both permanent and temporary storm water Best Management Practices (BMPs).



Figure 1.4 When properly designed, today's highways carefully fit into the physical and visual landscape

1.1 PURPOSE OF MANUAL

The overall purpose of this manual is three-fold:

- To outline ADOT's procedures for complying with water quality regulations and permits.
- To provide a "tool box" of available BMP's.
- To provide guidance for the selection of BMPs on ADOT construction projects.

1.2 WATER QUALITY REGULATIONS AND PERMITS

All ADOT construction projects must comply with federal, state and local water quality regulation and permit requirements. Attention must be given to these regulations and permit requirements through-out the planning, design and construction of a project to insure that the quality of the waters of the U.S. is not compromised. The following is a general overview of the pertinent regulations and permitting requirements.

1.2.1 Arizona Department of Environmental Quality's (ADEQ's) Arizona Pollution Discharge Elimination System (AZPDES) Storm Water Permit Requirements.

On Dec. 5, 2002, Arizona became one of 45 states with authorization from Environmental Protection Agency (EPA) to operate the National Pollutant Discharge Elimination System (NPDES) Permit Program (Section 402 of the Clean Water Act) (CWA) at the state level. Under the AZPDES Permit Program, all facilities that discharge pollutants from any point source into waters of the U.S. are required to seek coverage under an AZPDES permit. Pollutants can enter waters of the U.S. from various sources including agricultural, domestic, and industrial. For regulatory purposes, these sources are generally categorized as either point source or non-point sources.

For similar types of construction activities, the ADEQ has issued a Construction General Permit (CGP), Arizona Construction General Permit (AZCGP) No. AZG2003-001, which is available to provide storm water permit coverage to all construction projects in the State of Arizona (except on Tribal Trust Lands where the construction general permit is issued by the EPA, termed the Federal Construction General Permit or FCGP in this document). In order to comply with the conditions of either the AZCGP or the FCGP, the operator is required to file a Notice of Intent (NOI) with ADEQ or EPA if construction and construction-related activities, including all clearing, grading, excavation, and stockpiling activities, will result in the disturbance of equal to or greater than one acre. ADEQ or EPA approves the specific project use of the general permit for storm water discharges by accepting and approving the NOI. If ADEQ or EPA denies NOI approval, the operator may have to pursue an individual storm water discharge permit for the project.

The AZCGP specifies allowable storm water discharges (Part I.C) from construction sites and requires the operator to meet water quality standards through implementation of temporary and permanent BMPs and other measures. Compliance with the requirements of the AZCGP constitutes compliance with the National Pollution Discharge Elimination System permit. In order to obtain coverage, construction contractors under contract to ADOT and ADOT representatives shall:

- Comply with all terms and conditions of the AZCGP or FCGP.
- Prepare and implement a site specific Storm Water Pollution Prevention Plan (SWPPP) which meets the minimum requirements of Part IV of the AZCGP.
- Submit an NOI to ADEQ after the contract has been awarded and before any construction activity begins (the NOI is submitted to the EPA if the project is located on Tribal Trust Lands). These requirements are described under Part II.B and Part III of the AZCGP.

- Submit a Notice of Termination (NOT) to ADEQ when construction is complete, all permanent erosion and sedimentation controls are in place, and final stabilization has been achieved to meet the requirements described in Part II.C of the AZCGP. The NOI is submitted to the EPA if the project is located on Tribal Trust Lands.

Chapters 3 and 4 of this manual provide instructions for preparing a SWPPP and completing the NOI and NOT forms for ADOT projects.

1.2.2 Federal Highway Administration Erosion Control Guidelines

Section 1057 of the Intermodal Transportation Efficiency Act of 1991 (ISTEA) requires the Federal Highway Administration (FHWA) to develop erosion and sediment control guidelines for States to follow when building highways using Federal funds. FHWA has formally adopted the American Association of State Highway and Transportation Officials (AASHTO) Highway Drainage Guidelines, Volume III (see Reference 1, Appendix c), for this purpose. Each State highway agency is required to comply with the AASHTO Guidelines or to develop and apply their own more stringent guidelines.

1.2.3 Section 404 of the Clean Water Act

Section 404 of the CWA regulates the discharge of dredged or fill material within the waters of the U.S. and establishes a program to issue permits. In Arizona, the U.S. Army Corps of Engineers (Corps) administers this program. In addition, the U.S. Fish & Wildlife, the National Marine Fisheries Service and State resources agencies (e.g., ADEQ, Game and Fish Department, Water Resources) have important advisory roles. The phrase “discharge of dredged or fill material” includes all earthwork activities such as clearing, grading, filling, and excavating.

The 404 program has considerable impact on the design, construction and maintenance of Arizona’s highways. Essentially, any proposed work in washes, rivers, streams, lakes and wetlands requires ADOT’s Environmental and Enhancement Group (EEG) to obtain a permit from the Corps. During construction, the Corps evaluates adherence to permit conditions. Typical projects that are affected include the construction and maintenance of culverts, bridges, and stream bank erosion protection.

There are two types of 404 permits: nationwide permits and individual permits. Nationwide permits are general permits designed for allowing minor, noncontroversial projects that are similar in nature, and which create minimal impact on the environment. Individual permits are required for projects that do not meet the terms and conditions for a nationwide permit. They require greater scrutiny by the Corps, other regulatory agencies and the public.

Requirements for nationwide permits in Arizona are found in the Corps Special Public Notice dated April 19, 2002. Some projects may require an individual permit. The Corps should be contacted for determination of permit requirements.

U.S. Army Corps of Engineers
Regulatory Branch
3636 N. Central Avenue, Suite 900
Phoenix, AZ 85012-1939
(602) 640-5385
FAX (602) 640-2020

The federal Section 404 permit program can be easily confused with the ADEQ, Section 402, AZPDES program. It is important to remember, however, that they are two separate and distinct regulatory programs. The distinction is that a Section 404 permit provides permission to add fill material to the waters of the U.S., whereas an AZPDES permit provides permission to discharge treated storm waters to the waters of the U.S. in compliance with permit limitations, conditions and BMPs.

1.2.4 Section 401 of the Clean Water Act

Section 401 of the CWA enables the States to provide certification that the draft 404 permit is in compliance with State law. ADOT Environmental Planning Group obtains 401 Certification during the design process. The purpose of Section 401 is to ensure that the proposed activity meets the State's water quality standards and any other pertinent state-required criteria. In Arizona, ADEQ performs the State Water Quality Certification Review for all areas of the State with the exception of Indian Reservations. For projects within the White Mountain Apache Reservation, the Tribal Environmental Planning Office performs certification reviews. For projects within all other Indian Reservations in Arizona, EPA performs certification reviews.

Section 401 certification requirements apply to all activities regulated under Section 404 of the CWA. The certification review evaluates proposed projects for compliance with state water quality standards and consistency with approved water quality planning and management programs. 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.

In order to obtain a letter of certification from ADEQ, construction contractors under contract to ADOT and ADOT representatives shall contact ADEQ Water Permits Division.

1.2.5 Additional Federal Land Requirements

There are several agencies within the U.S. government that manage public lands and may have their own erosion and pollution control requirements. These agencies include the BLM, the BIA, the U.S. Forest Service, the National Parks Service and the U.S. Fish and Wildlife Service. Each affected agency shall 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 Land Management – <http://www.blm.gov/nhp/>

Bureau of Indian Affairs - www.doi.gov/bureau-indian-affairs.html

The U.S. Department of Agriculture Forest Service – www.fs.fed.us/

Southwestern Region
USDA Forest Service
333 Broadway SE
Albuquerque, NM 87102
(505) 842-3192

The National Parks Service – www.nps.gov/

Pacific West Region, Regional Director
National Park Service
One Jackson Center
1111 Jackson Street
Suite 700
Oakland, CA 94607
(510) 817-1300

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

Southwest Region 2
500 Gold Ave. SW
Albuquerque, NM 87102
(505) 248-6635

1.2.6 State and Local Government and Agency Requirements

The Arizona State Land Department does not have a specific policy on erosion control for construction projects but rather reviews projects on a case-by-case basis. For projects that are located on State Trust Land contact:

Arizona State Land Department
Right-of-Way Section
1616 W. Adams St.
Phoenix, AZ 85007
(602) 542-4098

Other environmental issues such as archaeological and/or historic sites may be identified during project planning and design that affect design and construction activities. These issues may affect the contractor's proposed activities outside of the approved right-of-way.

Projects may also be located within the jurisdictions of local governments. These may include Municipal Separate Storm Sewer Systems (MS4) and County Flood Control Districts. Each affected agency shall 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.

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.adeq.state.az.us/environ/water/permits/stormwater.html>

EPA Region 9: Water Programs Website
<http://www.epa.gov/region09/water/npdes/stormwater.html>

County Flood Control Districts

Phone Listings County Government Pages
Arizona Association of Counties Website
<http://www.azcounties.org/home/index.cfm>

1.3 BEST MANAGEMENT PRACTICE (BMP) SELECTION AND DESIGN

As used in this document, the term BMP refers to operational (non-structural) activities or physical controls (structural) that prevent or reduce the discharge of pollutants and minimize potential impacts upon receiving waters.

Proper BMP design, selection and installation are essential to achieve the goals of this manual. 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 and offsite sedimentation and to prevent the contamination of storm water is to select and install BMPs that best fit the specific conditions encountered.

This manual provides the following:

Chapter 2:

Design guidance for incorporating storm water quality controls in projects during the planning and design phases.

Chapter 3:

Instructions to the contractor for obtaining a Construction General Permit.

Chapter 4:

Instructions to the contractor for preparing a SWPPP, a necessary requirement of the General Permit.

Chapter 5:

Descriptions of both temporary and permanent BMPs for consideration by ADOT and the contractor during design and construction of ADOT projects.

PROJECT PLANNING AND DESIGN GUIDE

2.1 OVERVIEW

As used in this document, the term BMP refers to operational activities or physical controls that reduce the discharge of pollutants and minimize potential impacts upon receiving waters. There are two categories of BMPs within ADOT: Permanent Pollution Prevention BMPs and Temporary Pollution Prevention BMPs.

Permanent Pollution Prevention BMPs are permanent measures to improve storm water quality both during and after construction of the project. They include:

1. The minimization of impermeable surfaces;
2. The re-establishment of vegetation to disturbed soils (Figure 2.1);
3. The evaluation of increased runoff flows;
4. The preservation of existing vegetation;
5. The design of concentrated flow structures; and
6. The design of measures to protect disturbed slopes.



Figure 2.1 Revegetated cut slope



Figure 2.2 Installation of erosion control blanket

Temporary Pollution Prevention BMPs are temporary measures to improve storm water quality during the construction process. They include:

1. Temporary soil stabilization and sediment control (Figure 2.2);
2. Non-storm water management; and
3. Waste management.

The objective of this chapter is to provide guidelines for the consideration of permanent pollution prevention BMPs during the ADOT planning and design processes.

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. In order to maintain water quality affected by a project, ADOT has established the following objectives:

1. Maximize vegetated surfaces;
2. Stabilize disturbed soils;
3. Prevent downstream erosion.

The designer should consider the BMPs described in this chapter in order to achieve these objectives.

2.2.1. Evaluate Increased Runoff Flows

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

To address these concerns, the designer shall consider the following:

- Drainage design: Bridges typically affect offsite runoff less significantly than do culverts and may be less visually intrusive;
- Bio-engineered designs such as live fascines and/ or pole plantings;
- Modifications to receiving drainages: the drainage may need to be protected by means of vegetation, geotextile mats, rock or riprap;
- Energy dissipation devices at culvert outlets;
- Reducing the turbulence and scour at culvert inlets and outlets by smoothing the transition between culvert inlets and outlets and drainages;
- Incorporating detention facilities into project design in order to reduce peak discharges; and
- Spread runoff flows across channel outlet structures in order to mimic natural drainage channels.



Figure 2.3 Preserving vegetation and limiting land disturbance are major factors in highway erosion prevention

2.2.2 Preservation of Existing Vegetation

Existing vegetation provides natural protection against soil erosion and should be preserved wherever possible (Figure 2.3). Mature plants have extensive root structures that help hold soil in place and reduce erosion. Vegetative foliage also helps reduce erosion by absorbing the impact of raindrops that would otherwise fall directly to the ground and erode the soil. Disturbed soils typically erode at much greater rates than do undisturbed soils.

Therefore, the designer should seek to minimize land disturbance by the following general guidelines:

- Minimize land disturbance through appropriate design to balance cut and fill and to reduce the length and steepness of the highway slopes and the extent of grading (typically, vegetation will not successfully colonize slopes greater than 2:1, H: V);
- Areas to be preserved should be delineated prior to the start of soil-disturbing activities. Vegetation that lies within transition areas of cuts or fills and outside of clear zones should be preserved in place;
- For larger projects, existing vegetation should be preserved for as long as possible where activity will occur later in the construction process;
- Temporary roads should be located to avoid stands of significant vegetation and to follow existing contours to reduce cutting and filling; and
- Temporary roads should be located within limits of area to be disturbed by permanent road construction.



Figure 2.4 and Figure 2.5 Swale with check dams

2.2.3 Concentrated Flow Structures

2.2.3.1 Ditches and Dikes

These are permanent devices used to intercept and direct surface runoff into a drain and/or into an existing drainage. Because they concentrate storm water runoff, they are highly susceptible to erosion. Therefore, the designer should consider the following:

- The drainage design should include calculations of peak flows and velocities for all drainage structures and should provide erosion control measures where erodable velocities occur (Table 2.1);
- To prevent downcutting, riprap should be considered for all ditches and dikes that exceed five percent slope; and
- Rock check dams reduce runoff velocity and capture sediment (Figures 2.4 and Figure 2.5).



Figure 2.6 Cut fill transition

	Maximum	Permissible	Velocities For:
Soil Type or Lining (earth: no vegetation)	Clear Water	Water Carrying Fine Silts	Water Carrying Sand and Gravel
	F.P.S.	F.P.S.	F.P.S.
Fine sand (noncolloidal)	1.5	2.5	1.5
Sandy loam (noncolloidal)	1.7	2.5	2.0
Silt loam (noncolloidal)	2.0	3.0	2.0
Ordinary firm loam	2.5	3.5	2.2
Fine gravel	2.5	5.0	3.7
Stiff clay (very Colloidal)	3.7	5.0	3.0
Graded, loam to cobbles (noncolloidal)	3.7	5.0	5.0
Graded, silt to cobbles (colloidal)	4.0	5.5	5.0
Alluvial silts (noncolloidal)	2.0	3.5	2.0
Alluvial silts (colloidal)	3.7	5.0	3.0
Coarse gravel (noncolloidal)	4.0	6.0	6.5
Cobbles and shingles	5.0	5.5	6.5
Shales and hard pans	6.0	6.0	5.0

Table 2.1. Permissible Velocities for Channels with Erodible Linings, Based on Uniform Flow in Continuously Wet, Aged Channels¹

¹As recommended by Special Committee on Irrigation research, American Society of Civil Engineers, 1926.
From: FHWA - Hydraulic velocity by: 0.95 for slightly sinuous; 0.90 for moderately sinuous; and 0.80 for highly sinuous.

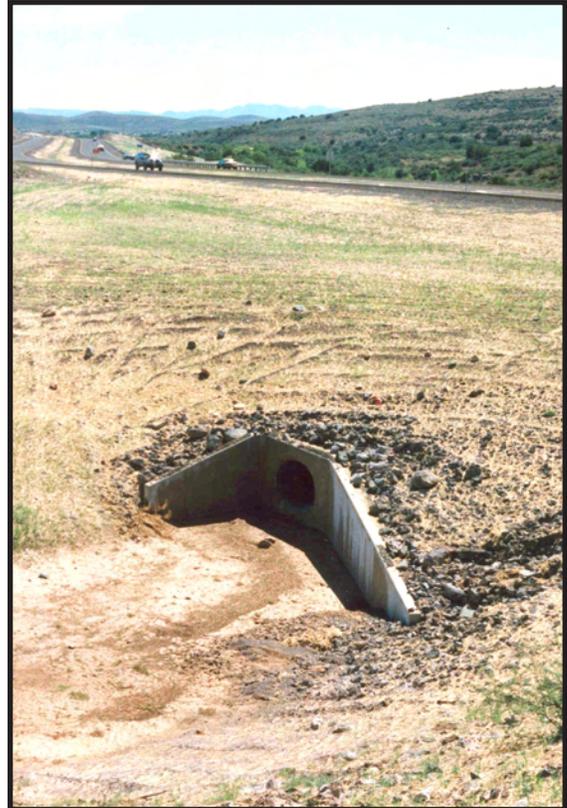


Figure 2.7 (left) Spillway (with failed temporary embankment curb)

Figure 2.8 (right) Culvert protection

Ditches and dikes also act as devices to prevent erosion. During the design process, the designer should consider the following:

- Crown ditches installed at the tops of slopes to divert runoff from adjacent cut slopes. Construction should take place prior to excavation of the slope. The designer should give careful consideration to crown ditch outlets to avoid downstream erosion and minimize ditch maintenance. In addition, since crown ditches can be highly visible to motorists, consideration should be given to ditch layout and existing vegetation. Finally, the designer should keep in mind that all ditches required maintenance; therefore, crown ditch access should be a consideration;
- Slope ditches: Installed at bottom and mid-slope locations to intercept sheet flow and convey concentrated flows;
- Embankment curbs: Installed on fill slopes at the edge of the roadway to intercept sheet flow from paved surfaces. Embankment curbs are of special consideration where the roadway is super-elevated, thereby directing all sheet flow to one side of the pavement; and

- Cut-to-fill slope transition protection: Installed at the intersection of cut and fill slopes. Cut ditches that discharge at cut-to-fill slope transitions will normally require erosion protection until runoff flows reach an existing stable drainage (Figure 2.6).



Figure 2.9 Rock rip rap at culvert

2.2.3.2 Overside Drains

Overside drains are pipes, downdrains and spillways used to protect slopes against erosion by collecting surface runoff and conveying it down the slope to a stabilized drainage. The designer should consider their use as follows:

- Cut slope spillway: Installed where offsite runoff will intercept a cut slope. Because cut slopes typically are highly visible to motorists, consideration should be given to the aesthetic design of these structures; and
- Fill slopes: Where embankment curbs are installed, openings in the curb are constructed that drain into a spillway or downdrain. Generally, downdrains are used for aesthetic reasons where slopes will be visible from a main roadway (Figure 2.7).

2.2.3.3 Culvert and Channel Outlets

Culvert and structural channel outlets are typically areas of high concern for erosion. The designer should consider the following:

- Careful review of inlet invert elevation: When lower than the existing natural channel, the channel backslope must be protected to avoid headcutting of that slope by runoff;

- Flared end section: These are typically installed at the inlets and outlets of pipes and channels to improve the hydraulic operation, retain the embankment near pipe conveyances and help prevent scour (Figure 2.8);
- Outlet protection/ velocity dissipation devices: In order to prevent scour at the outlet and to reduce runoff flow velocity, rock riprap or some other measure is typically installed. These devices should be constructed during or immediately after construction of the culvert; and
- Protection at the soil/ drainage structure interface: The interface between fill slope soils and concrete or metal structures is typically prone to erosion. While this interface frequently occurs at drainage structure outlets, it is also possible at the edges of spillways and bridge abutments. The designer should consider the use of rock or other protective measure to prevent erosion in this area (Figure 2.9).

2.2.4 Slope Protection

Surface protection consists of permanent design measures that are used alone or in combination to minimize erosion from disturbed surfaces. Vegetated surfaces may offer several advantages to paved 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.

2.2.4.1 Vegetated Surfaces

A vegetated surface is a permanent vegetative cover on areas that have been disturbed. The purpose of the vegetated surface is to prevent erosion and remove pollutants (including sediment) in storm water runoff. Vegetated surfaces should be established on areas of disturbed soil after construction related activities in that area are completed and after the slope has been prepared. Vegetated surfaces should only be considered for areas that can support the selected vegetation long-term. Typically, responsibility for treatment of vegetated slopes rests with the project Landscape Architect as follows:

- Project site shall be evaluated for soil types and conditions; topography; local climate and season; existing native vegetation types and species;
- Surfaces to be vegetated shall be designed to maximize rainfall infiltration and minimize concentrated flow volumes and speeds. Slopes shall be considered for roughening, terracing, and rounding; and
- Existing project site topsoil and vegetation shall be considered for salvage during clearing and grubbing operations. Use salvaged materials as part of surface preparation prior to seeding.

2.2.4.2 Hard Surfaces

Hard surfaces consist of placing concrete, rock or rock and mortar. Typically, these measures are considered where vegetation will not provide adequate erosion control and/or where vegetation will be difficult to maintain. The designer should to consider the downstream effects of increased runoff volumes and velocities from hard surfaces. Typical applications include bank protection and bridge abutments.

2.2.4.3 Erosion and Sediment Control Plans and Details.

As part of the project design process, the designer should develop plans and details which direct the contractor to the proper locations, installation and maintenance of BMPs. The intent of these plans is to provide general direction and specific BMP expectations to the contractor. They will not be considered a complete 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 plans as a guide in developing his own SWPPP.



Figure 2.10 Installation of sediment wattles

INSTRUCTIONS FOR OBTAINING ARIZONA OR FEDERAL CONSTRUCTION GENERAL PERMIT AUTHORIZATION FOR ADOT CONSTRUCTION PROJECTS

The following sections describe the steps that ADOT and the general contractor will follow to comply with the ADEQ's AZCGP requirements (federal CGP instructions are described at the end of this chapter). Within each section a short summary of responsibilities for the individuals involved in the construction process is explained. It is ADOT's intent to share responsibilities on the job site with the contractor. It shall not be the general contractor's nor ADOT's sole responsibility to comply with AZCGP requirements. Instead, it is a shared obligation between ADOT and the general contractor and subcontractors to protect the environment.

Step	Action	AZCGP Reference	Information & forms
Step 1	Prepare a Storm Water Pollution Prevention Plan (SWPPP).	Part IV	Chapter 4 Appendix A, Contract Documents ADOT Stored Specification 104SWDEQ
Step 2	Certify the SWPPP	Part IV.C.1, Part IV.J.1, Part VII.K	ADOT Standard Sheet-Appendix A "AZPDES SWPPP Index"
Step 3	Submit a Notice of Intent (NOI)	Part III	Appendix A www.adeq.state.az.us Project Specifications
Step 4	Retain the NOI and SWPPP at the job site	Part IV.J.	Project Specifications
Step 5	Implement the SWPPP	Part IV.D	Maintenance, record keeping and site-monitoring forms - Appendix A Project Specifications
Step 6	Inspect the BMP's regularly and after each storm event	Part IV.H,	ADOT Inspection Form Appendix A Project Specifications
Step 7	Adjust the SWPPP to fit site conditions	Part IV.H.7	Project Specifications
Step 8	Maintain an Updated SWPPP	Part IV.I	Project Specifications
Step 9	Maintain the BMPs	Part IV.E.1 -3	BMP descriptions-Appendices A & B
Step 10	Evaluate job site to determine if Final Stabilization is achieved	Part IX - definition of final stabilization	Final Stabilization Methods Appendix A Project Specifications
Step 11	Submit Notice of Termination (NOT)	Part II.C	Appendix A www.adeq.state.az.us Project Specifications
Step 12	Retain Records after project is complete for 3 years.	Part VI	Project Specifications

Table 3.1 Steps for obtaining Arizona Construction General Permit Authorization

3.1 STEP 1: PREPARE A STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

A complete SWPPP shall be developed by an Erosion Control Coordinator who is designated by the contractor in accordance with the project specifications. Instructions for completing a SWPPP are included in Chapter 4. Two copies of the draft SWPPP shall be submitted to the Engineer at the preconstruction conference if possible, but not later than 14 calendar days from the Department's approval of the contractor's Erosion Control Coordinator.

Responsibilities:

ADOT: Provide supporting documents required to complete the SWPPP. Review the credentials of the Erosion Control Coordinator selected by the contractor. Review the draft SWPPP submitted by the contractor.

The Contractor: Designate an Erosion Control Coordinator. The Erosion Control Coordinator shall prepare the SWPPP.

3.1.1 Project Document BMPs

As described in Section 2.2.4.3, during the project design process ADOT will prepare storm water pollution prevention plans (entitled "Erosion and Sediment Control Plans"), details (entitled "Erosion and Sediment Control Details") and specifications (in Section 810 of the Special Provisions) using BMPs from this manual and BMPs developed for unique conditions particular to individual projects. The project documents will provide direction and specific expectations to the contractor regarding storm water 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 standard 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 his own SWPPP.

3.2 STEP 2: CERTIFY THE SWPPP

ADOT, the contractor and any subcontractors that are responsible for constructing the pollution controls must certify the SWPPP. In the case of ADOT local government projects involving federal aide, the appropriate municipality shall also certify the SWPPP. Refer to the AZCGP Part IV.C.1, Part IV.J.1, and Part VII.K for specific instructions. The certifications shall occur after award of the contract and before construction begins.

3. Instructions for Obtaining a Construction General Permit for ADOT Projects

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

The following certification is required by ADEQ and is included on ADOT's "AZPDES SWPPP Index" Sheet (Appendix A).

Responsibilities:

ADOT: The Engineer will certify the SWPPP.

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.

The Contractor: The Contractor, the Erosion Control Coordinator and any Subcontractors who are involved in implementing measures identified in the SWPPP must sign the certification.

3.3 STEP 3: SUBMIT NOTICE OF INTENT (NOI)

A complete and accurate NOI form must be prepared and signed by the operator(s) to receive coverage under the AZCGP. The NOI form serves as a promise that the operator(s) will comply with the AZCGP conditions. An operator(s) is any person associated with the project that has control over the construction plans or specifications (the ADOT Engineer) or day-to-day operational control of the site (the Contractor, the Erosion Control Coordinator, and any Subcontractor directly associated with installation or maintenance of BMPs). Refer to Part IX of the AZCGP for a complete definition of operator.

The NOI must be mailed to ADEQ at least 2 business days before any construction activities occur at the site (AZCGP Part III.C.1). If the project is located within or has the potential to discharge to an MS4, a copy of the NOI must also be submitted to the MS4 (AZCGP Part III.F). A list of MS4 municipalities in Arizona is located on the ADEQ website (www.adeq.state.az.us). Also, contractors operating under an approved local sediment and erosion control plan, grading plan, or storm water management plan shall submit a signed copy of the NOI to the local authority upon their request. If the project site is

3. Instructions for Obtaining a Construction General Permit for ADOT Projects

located within 1/4 mile of unique or impaired waters, the NOI must be submitted at least 32 business days before any construction activities occur at the site (AZCGP Part II.B.1).

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 for the SWPPP to 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 unique or impaired water (AZCGP Part II.B.1).

The NOI form and detailed instructions for completing the form are available at the ADEQ website (www.adeq.state.az.us) or by calling either 602-771-4665 or 602-771-4449.

Submit NOI form by certified mail or hand delivery to:

Arizona Department of Environmental Quality
Water Permits Section/Storm Water NOI (5415B-3)
1110 W. Washington Street
Phoenix, AZ 85007

Forms can be faxed to 602-771-4674.

The agency now offers a Web-based service to assist individuals in applying for construction storm water discharge permits (Smart NOI). Access the website as described above.

Responsibilities:

ADOT: Because of its control over the project specifications, ADOT is required to submit the NOI. Following approval by ADOT and completion of the Contractor-prepared SWPPP, the Engineer shall prepare, sign, and mail the NOI for ADOT.

The Contractor: Because he has day-to-day control over the job site, the Contractor also is required to submit the NOI. The Contractor shall prepare the NOI after certification of the SWPPP and mail the signed forms at least 48 hours before any construction begins.

3.4 STEP 4: RETAIN DOCUMENTS AT THE JOB SITE

The following documents must be kept with the SWPPP and retained on the job site, or a location easily accessible during normal business hours, throughout the construction process:

Document	AZCGP Reference	Source
Copy of the AZPDES AZCGP (AZG2003-001)		www.adeq.state.az.us
NOI (as completed by the contractor and ADOT)	Part IV.J	www.adeq.state.az.us
AZPDES authorization number for the project.	Part IV.J.2	Provided by ADEQ after NOI is approved.
Other agreements with any state, local or federal agencies that affect the provisions or implementation of the SWPPP.	Part IV.J.3	ADOT environmental clearance documents

Responsibilities:

ADOT: The Engineer shall keep copies of the above-mentioned documents at the construction office.

The Contractor: The contractor shall post a sign or other notice near the main entrance of the construction site with specific information requested in Part IV.J.2 of the AZCGP. If the contractor maintains a construction office at or near the site, the SWPPP with all the above-mentioned attachments shall be kept at the office. If there is no construction office, the contractor’s superintendent and ADOT’s inspector shall keep copies in their vehicles.

3.5 STEP 5: IMPLEMENT THE SWPPP

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

The SWPPP is intended to be a dynamic plan that shall be revised as a result of unanticipated or changing conditions during construction. Making changes to the plan where it is not effective is a requirement of the AZCGP. Any changes to the plan shall be noted and dated on the plan.

Responsibilities:

In order to effectively implement the SWPPP, ADOT and the contractor shall monitor and record weekly-extended weather forecasts. The contractor and the Engineer shall discuss these forecasts at regularly scheduled weekly progress meetings. In the event that extended forecasts report a high probability for precipitation in the project area, the contractor shall ensure that all BMPs in the SWPPP have been properly installed and maintained. He shall also install additional measures in areas determined to be susceptible to erosion as directed by the Engineer.

Stabilization measures shall be installed within 14 calendar days in portions of the site where construction activities have temporarily or permanently ceased. Exceptions can be found in the AZCGP Part IV.D.4.

The 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 of installation of stabilization measures.

These records shall be included in the SWPPP. A sample form for record keeping is included in Appendix A.

3.6 STEP 6: INSPECT THE BMPS REGULARLY

Regular site inspections are required as part of the AZCGP (Part IV.H) to ensure that BMPs are functional and that the SWPPP is properly maintained.

The AZCGP requires regular inspections. In areas of the state that receive greater than 20 inches mean annual rainfall, the inspection requirement is every 7 calendar days or once every 14 calendar days and within 24 hours after a rainfall event of 1/2 inch or greater. In areas of the state that receive less than 20 inches mean annual rainfall and construction occurs during the seasonal dry period, inspections are required monthly, anytime rain is predicted and within 24 hours following a rainfall event of 1/2 inch or greater. Refer to the following map (Figure 3.1) to determine the locations in Arizona where the mean annual rainfall is less than or greater than 20 inches. The reduced inspection frequency requirement also applies to sites where runoff is unlikely due to winter conditions.

3. Instructions for Obtaining a Construction General Permit for ADOT Projects

Inspections must be performed by qualified personnel as described in Part IV.H.3 of the AZCGP and as specified in the project specifications.

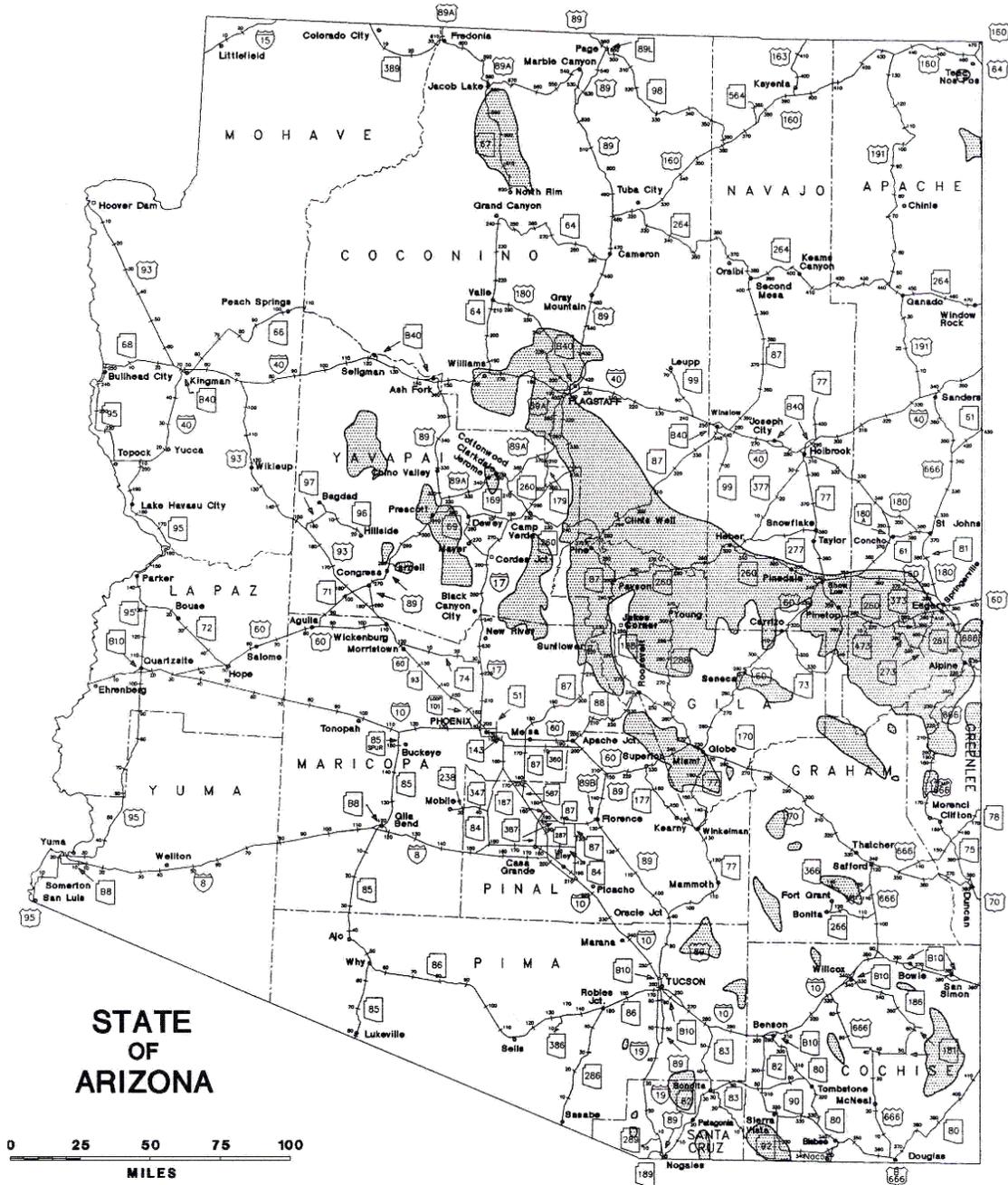
Inspections must include all areas of the site disturbed by construction activity, staging areas and areas used for storage of materials that are exposed to precipitation. Refer to AZCGP Part IV.H.4 for a complete scope of inspections. ADOT has developed an AZPDES inspection checklist to be used on ADOT construction projects (Appendix A). The completed ADOT checklist and any additional sheets necessary to record the results of the inspection shall serve as the Compliance Evaluation Report (Part IV.H.5). The Report and the record of any follow-up actions taken shall be retained as part of the SWPPP.

Responsibilities:

ADOT: Responsible for inspections of BMPs and approval of any follow-up actions deemed necessary following the inspections.

The Contractor: Responsible for inspections, inspection reports and installation and maintenance of all BMPs. Responsible for required follow-up actions within time limits described in project specifications.

3. Instructions for Obtaining a Construction General Permit for ADOT Projects



 Average Annual Precipitation Greater Than 508mm (20 Inches)

Source: Highway Drainage Design Manual Hydrology,
Arizona Department of Transportation,
March, 1993

Figure 3.2 Arizona Climate Map

3.7 STEP 7: ADJUST THE SWPPP TO FIT SITE CONDITIONS

The operator shall implement follow-up actions based on results of the inspection process within seven calendar days following the inspection, or as required by the project specifications. Where adjustments to the SWPPP are deemed necessary, implementation must be completed before the next anticipated storm event or as soon as practical (AZCGP Part IV.H.7).

Responsibilities:

ADOT: Responsible for the approval of any changes or additions to the SWPPP based on specific site conditions.

The Contractor: Responsible for the installation and adjustment of BMPs to fit specific site conditions deemed necessary as a result of inspections. The contractor is also responsible for recording these actions on the SWPPP.

3.8 STEP 8: MAINTAIN AN UPDATED SWPPP

It is imperative that the SWPPP remain current with the changes and adjustments made in the field. Failure to update the SWPPP is considered a violation of AZCGP conditions and grounds for issuance of a failure notice.

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 (Refer to AZCGP Part IV.I).

Responsibilities:

ADOT: The Engineer must retain copies of updated SWPPP in his vehicle.

The Contractor: Must maintain an updated SWPPP.

3.9 STEP 9: MAINTAIN THE BMPS

All erosion and sediment control measures and other protective measures identified in the SWPPP must be maintained in effective operational condition (Refer to AZCGP Part IV.E.1-3).

Responsibilities:

ADOT: Responsible for inspections and approval of maintenance activities.

The Contractor: Responsible for the maintenance of all erosion and sediment control measures.

3.10 STEP 10: EVALUATE JOB SITE TO DETERMINE FINAL STABILIZATION

Final Stabilization shall be defined as the completion of all soil-disturbing activities and the two following criteria have been met:

- 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.
- Permanent erosion control measures (e.g., riprap, gabions, or geotextiles) have been employed and are fully operational.

Refer to Appendix A for methods for determining final stabilization for native seeded/unpaved areas.

Responsibilities:

ADOT: Determine final acceptance in accordance with the project specifications.

The Contractor: Initiate inspections to determine if final stabilization has been achieved.

3.11 STEP 11: SUBMIT NOTICE OF TERMINATION (NOT)

A complete and accurate NOT must be submitted to ADEQ after it has been determined that the project has met the submittal criteria as described in 3.10 above.

The NOT form is available at the ADEQ website www.adeq.az.us or by calling 602-771-4665 or 4449.

3. Instructions for Obtaining a Construction General Permit for ADOT Projects

Submit form by certified mail or hand delivery to:

Arizona Department of Environmental Quality
Storm Water Program - Water Permits Section/NOT (5415B-3)
1110 W. Washington Street,
Phoenix, AZ 85007

Responsibilities:

ADOT: The Engineer is responsible for filling out, signing and submitting the NOT form for ADOT.

The Contractor: The Contractor is responsible for submitting his own NOT form to ADEQ and providing one copy to the Engineer. In the case of an urban highway project where the landscape contract lags behind the paving project, the following rules apply for submitting the NOT:

- If the bare ground is temporarily seeded and mulched as part of the paving project, ADOT and the contractor shall submit NOTs when the contract is complete. At the start of the subsequent landscape contract, both ADOT and the landscape contractor shall submit NOIs to obtain a new permit to cover the landscaping activities.
- If temporary seeding and mulching are not part of the paving project, ADOT cannot submit a NOT until after the completion of the landscaping project. Therefore, ADOT shall maintain temporary erosion and sediment controls in the area. ADOT shall also perform regular inspections (in accordance with the AZCGP) during the interim period after the paving project is complete and before the landscape contract begins. It should be noted that in this latter case, the paving contractor will submit a NOT at the end of the paving contract and the landscape contractor will submit a NOI before beginning subsequent work. In the interim, ADOT will have sole responsibility for the project.

3.12 STEP 12: RETENTION OF RECORDS

ADOT and the Contractor shall retain copies of SWPPPs and all documentation required by this permit, including records of all data used to complete the NOI to be covered by this permit, for at least three years from the date of final stabilization of the site (AZCGP Part VI).

3. Instructions for Obtaining a Construction General Permit for ADOT Projects

3.13 SPECIAL CONDITIONS, REQUIREMENTS AND EXCEPTIONS

Condition, Requirement or Exception	Action	Location of forms and further information
Permit Requirements for Tribal Trust Lands	Permit must be obtained through the EPA	EPA website: www.epa.gov http://cfpub.epa.gov/npdes/index.cfm ADOT Stored Specification 104SWEPA
Permit Requirements for discharge to unique or impaired waters	Follow instructions outlined in AZCGP and submit NOI, SWPPP and Monitoring Program 32 business days before construction activity will begin	AZCGP Part II.B.1 www.adeq.state.az.us This chapter - for AZCGP instructions Chapter 4 - for SWPPP preparation
Permit Requirements for Batch Plants, Borrow Pits and Material Pits located outside the right-of-way.	Obtain permit coverage under Multi-Sector General permit for construction activities not directly related to a construction site.	www.adeq.state.az.us AZCGP Part I.C.1.c for definition of allowable discharges.
Waivers for Small Construction Activities	Determine if project equal to or greater than 1 acre but less than 5 acres is exempt from permit requirements	AZCGP Part I.E and Part III.B

Table 3.3 Special Conditions, Requirements and Exceptions

3.13.1 Permit Requirements on Tribal Trust Lands

If the project is located entirely on Tribal Trust Lands, permit coverage shall be obtained through the EPA (<http://cfpub.epa.gov/npdes/index.cfm>). Follow these steps (described in detail on the EPA website) 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).
- Step 4: Complete and submit a NOI.

3. Instructions for Obtaining a Construction General Permit for ADOT Projects

Forms can be submitted by mail to:

Storm Water Notice Processing Center
Mail Code 4203M
U.S. EPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Electronic NOI forms are available from the following website:

<http://cfpub.epa.gov/npdes/stormwater/enoi.cfm>

If the project site is located on the White Mountain Apache Reservation, the NOI shall be sent to:

Tribal Environmental Planning Office
P.O. Box 2109
Whiteriver, AZ 85941

3.13.2 Permit requirements for projects located within 1/4 mile of Impaired or Unique Waters.

If the project site is located within ¼ mile of unique (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 (AZCGP Part II.B.1). This extra time 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 (AZCGP Part I.D.5.a).

3.13.3 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 (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 for an AZCGP.

3.13.4 Waivers for Small Construction Activities

Small Construction Activities, equal to or greater than 1 acre and less than 5 acres may be exempt from Arizona or Federal Construction General Permits if:

- The project's rainfall erosivity factor calculation is less than 5 during the entire period of construction activity (AZCGP Part I.E.1) or,
- When an EPA-approved "total maximum daily load" indicates that receiving waters will not be impacted by discharges from the project (AZCGP Part I.E.2).

STORM WATER POLLUTION PREVENTION PLANS (SWPPP)

Storm Water Pollution Prevention Plans (SWPPPs) are developed to describe operational activities and physical controls (BMPs) that will be used to prevent the discharge of pollutants into the waters of the United States. SWPPPs are site specific and, for ADOT construction projects, the contractor develops them as a first step in obtaining a CGP. A useful construction SWPPP checklist can be downloaded from the ADEQ website (www.adeq.state.az.us) and is included in Appendix A. The follow steps have been developed to provide direction and resources to facilitate the completion of the SWPPP.

Step	Action	AZCGP Reference	Information & forms
Step 1	Identify all operators for the Project	Part IV.C	
Step 2	Describe the Site and Prepare a Schedule of Construction Activities	Part IV.C	ADOT Standard Sheet Project Specifications
Step 3	Select Controls to Reduce Pollutants	Part IV.D	Chapters 2 & 5
Step 4	Prepare a Plan for Maintenance of BMPs	Part IV.E	Appendix A
Step 5	Collect Permit Related Documents	Part IV.F	
Step 6	Comply with Applicable Federal, State and Local Programs	Part IV.G	Chapter 1 Design Documents
Step 7	Develop a Site Specific Inspection Plan	Part IV.H	ADOT AZPDES Inspection Checklist

4.1 STEP 1: IDENTIFY ALL OPERATORS FOR THE PROJECT

An operator(s) is any person associated with the project who has control over the construction plans or specifications (ADOT) or day-to-day operational control of the site (the Contractor, the Erosion Control Coordinator, and any Subcontractor directly associated with installation or maintenance of BMPs).

Operators certify the SWPPP (Chapter 3, Step 2) and are identified on the Standard “AZPDES SWPPP Index” Sheet in the erosion and sediment control plans developed by ADOT.

4.2 STEP 2: DESCRIBE THE SITE AND PREPARE A SCHEDULE OF CONSTRUCTION ACTIVITIES

Much of the information needed to complete this portion of the SWPPP is included in the contract documents or in reports that are generated as part of the design process. These reports include the soils/geotechnical report, the project drainage report, and the environmental clearance documents and are available from ADOT.

For larger projects, the project site may be divided into sub-areas based on the maximum allowable exposed area as specified in the project specifications. A schedule of construction activity shall be developed for each sub-area.

4.3 STEP 3: SELECT BMPS TO REDUCE POLLUTANTS

To comply with Part IV.D of the AZCGP, the SWPPP must describe all BMPs that will be implemented as part of the construction project to control pollutants in storm water discharges. The SWPPP must clearly describe appropriate control measures to be used in each sub-area. Refer to the BMP descriptions in Chapter 5 when selecting appropriate permanent and temporary controls.

As discussed in Section 3.1.1, ADOT will prepare Erosion and Sediment Control plans and details as part of the construction documents. These will provide direction and specific BMP expectations to the contractor. However, the project documents shall not be considered a complete 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 plans as a guide in developing his own SWPPP.

The SWPPP must also describe the "Good Housekeeping" procedures and practices as specified in the project specifications. These include:

- An inventory of chemicals and materials needed for construction.
- A spill prevention and clean-up plan;
- A description of storage, use and disposal of chemical and construction materials;
- A hazardous waste management plan;
- A solid waste management plan; and
- Sanitary/septic waste storage and disposal procedures.

4.4 STEP 4: PREPARE A PLAN FOR MAINTENANCE OF BMPS

Proper maintenance of BMPs is an integral part of the effort to prevent storm water pollution. BMPs must be cleaned or replaced where design capacity is reduced by 50%. Procedures and activities for this purpose must be included in the SWPPP. Maintenance criteria are included in the BMP descriptions in Chapter 5.

4.5 STEP 5: COLLECT PERMIT-RELATED DOCUMENTS

The following documents must be included in the SWPPP:

Document	AZCGP Reference	Source
AZPDES permit (AZG2003-001)		www.adeq.state.az.us
NOI (as completed by the contractor)	Part IV.J	www.adeq.state.az.us
NPDES or AZPDES authorization number for the project.	Part IV.J.2	Provided by ADEQ after NOI is approved.
Other agreements with any state, local or federal agencies that affect the provisions or implementation of the SWPPP.	Part IV.J.3	ADOT environmental clearance documents.

In addition, a site specific inspection plan must be developed as part of the SWPPP. A standard ADOT inspection checklist is included in Appendix A. Identify and document the credentials of qualified inspectors. The credentials of a qualified inspector are described in the project specifications.

4.6 STEP 6: COMPY WITH APPLICABLE FEDERAL, STATE AND LOCAL PROGRAMS

Chapter one described the federal, state and local soil and erosion control programs that must be followed to prevent pollution to the waters of the U.S.

4.7 STEP 7: DEVELOP A STE SPECIFIC INSPECTION PLAN

An inspection plan must be developed as part of the SWPPP. A standard ADOT inspection checklist is included in Appendix A. Identify and show the credentials of qualified inspectors, as described in project specifications and in the SWPPP to simplify the completion of inspection reports in the field.

BEST MANAGEMENT PRACTICES

5.0 INTRODUCTION

ADOT requires contractors to prepare and implement a SSWPPP to control water pollution effectively during the construction process of all ADOT projects. As described in Chapter 4 of this manual, in order to complete the SWPPP for ADOT approval, the contractor is required to select those BMPs which will best control storm water pollution. This chapter provides instructions for the selection and implementation of BMPs. The BMPs described in this Chapter include both temporary and permanent erosion and sediment control practices. Each project presents unique conditions. These BMPs are provided as a “toolbox” to allow ADOT and the Contractor options to best address the requirements of the Arizona Construction General Permit.

Disturbed Soil Area Management

Limiting the amount of disturbed soil is a critical component in conducting an effective storm water management program. Section 104.09 of the Special Provisions states

“Unless otherwise approved in writing, the contractor shall not expose an area greater than 750,000 square feet in any one location within the project limits until the erosion control devices proposed for that portion of the project have been installed and accepted by the Engineer.... In addition, unless otherwise approved by the Engineer, erosion control measures for each slope that is not scheduled to be re-disturbed within 21 days shall be placed not later than 14 days after construction activity has temporarily or permanently ceased for that portion of the work.”

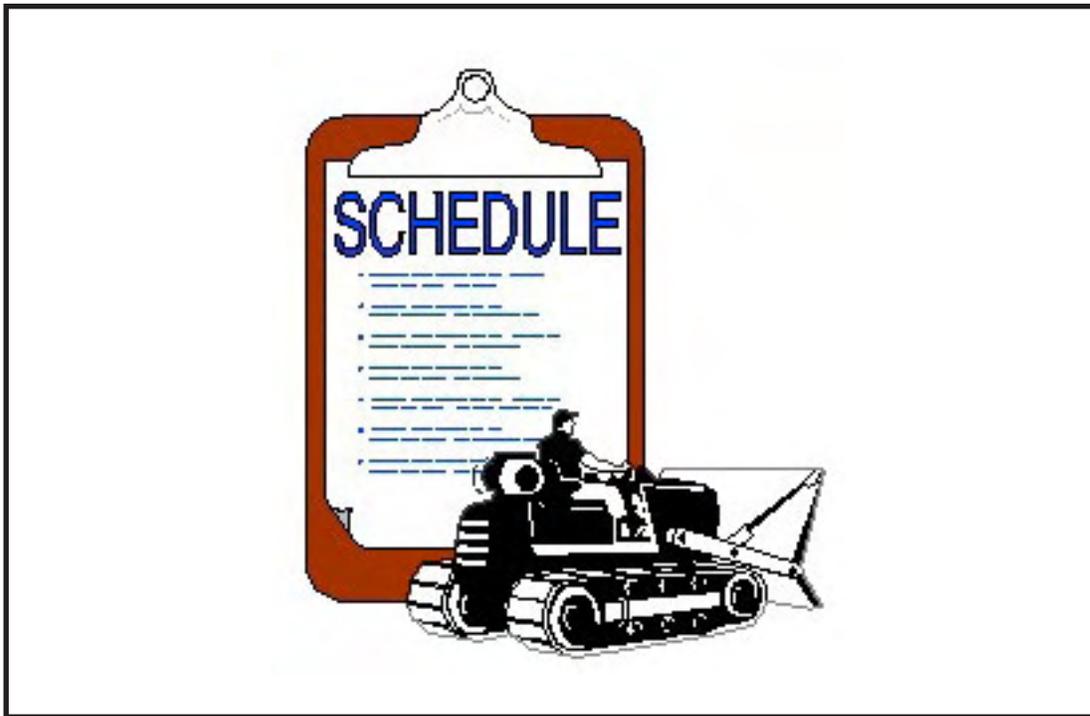
The Engineer may elect to further restrict the size of the project’s total disturbed area during the rainy season.

5.1 SOIL STABILIZATION BEST MANAGEMENT PRACTICES

Soil stabilization consists of preparing the soil surface and applying one of the following BMPs, or a combination thereof, to disturbed soils areas.

5.1.1	Scheduling.....	36
5.1.2	Preserve Existing Vegetation.....	38
5.1.3	Minibenches/Slope Roughening.....	40
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Scheduling



5.1.1 Scheduling

Definition

The development of a schedule for every project that includes sequencing of construction activities in conjunction with the implementation of construction site BMPs in order to reduce the amount and duration of soil exposed by construction activities. The purpose is to minimize erosion of disturbed soils by wind, rain, runoff, and vehicle tracking.

Purpose

- To reduce the amount and duration of soil exposed to erosion.
- To ensure that BMPs are implemented in a timely manner as construction proceeds.

Appropriate Applications

- Construction activities shall be planned to minimize the amount of disturbed land exposed to erosive conditions.
- Stabilization measures shall be installed and maintained as work progresses, not just at the completion of construction.

Planning Considerations

- Schedule the installation of temporary and permanent controls as specified in the Construction General Permit.
- The schedule of construction activities and concurrent application of temporary and permanent 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 temporary or permanent BMPs have been installed.
- Schedule shall include dates for significant long-term operations or activities that may have planned non-storm water discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, bridge cleaning, etc.
- Schedule shall include dates for installation of permanent drainage systems and runoff diversion devices. These devices should be installed as early as possible in the construction process.
- The schedule shall include non-storm water BMPs, waste management and materials pollution control BMPs.
- Stabilize non-active areas as specified in the CGP.
- Monitor weather forecast and adjust construction schedule to allow for the implementation of soil stabilization and sediment controls on all disturbed areas prior to the onset of rain.

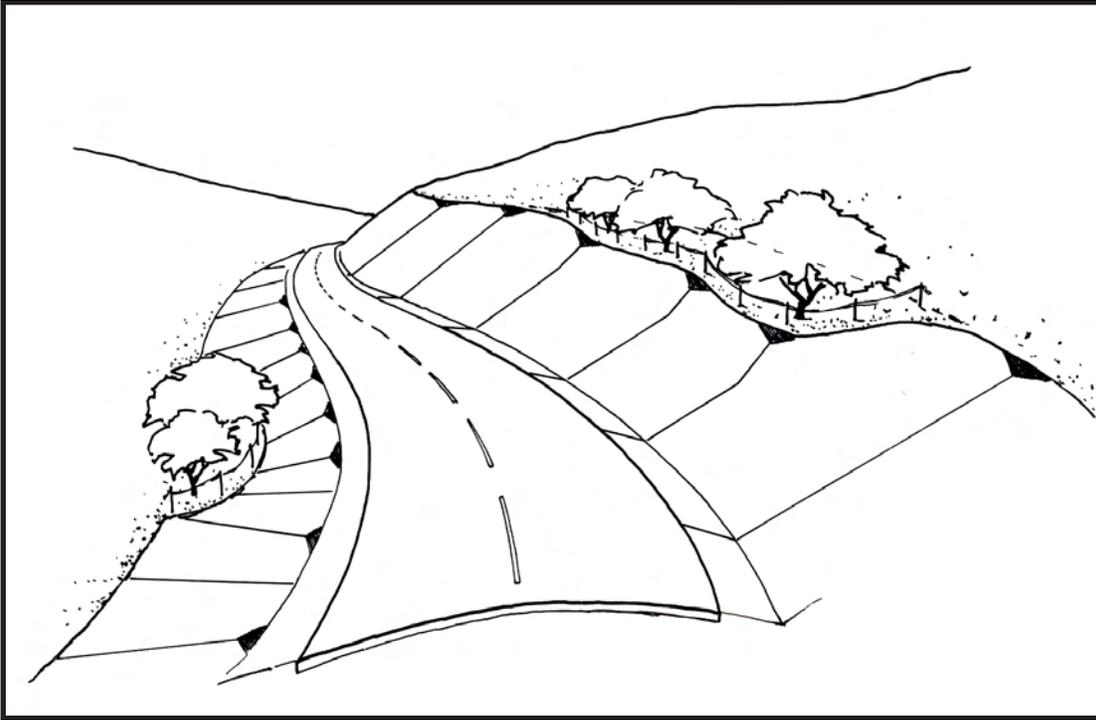
Inspections

- Verify that work is progressing in accordance with the schedule.

Maintenance

- The schedule must be updated when changes are warranted or when directed by the Engineer.

Preserve Existing Vegetation



5.1.2 Preserve Existing Vegetation

Definition

The carefully planned protection of trees and natural vegetated areas within the construction site or right-of-way in order to minimize the amount of bare soil exposed to erosive forces and provide vegetated areas to filter storm water runoff.

Purpose

- Reduce soil erosion, sediment transport, and tracking.
- Reduce maintenance.

Appropriate Application

- Protect trees and natural areas not in direct conflict with construction activities.

Limitations

- Difficult on sites with restricted access.
- Requires planning and may limit area available for construction activity.

Standards and Specifications

Timing

- Evaluate existing vegetation early in the planning process to adjust grading limits around high quality natural areas.
- Areas to be preserved in place shall be clearly marked at the site and identified on the project plans.
- Preservation of existing vegetation shall conform to scheduling requirements set forth in the special provisions.
- Clearing and grubbing and other soil-disturbing construction activities shall not be permitted prior to preservation of existing vegetation.

Design and Layout

- Areas to be preserved shall be marked with highly visible, non-metallic, temporary fencing as described in the project specifications.
- Temporary fencing shall be placed beyond the “dripline” of a tree by a distance that is 1½ times the length of the “dripline” radius.
- Temporary roads shall be constructed to minimize disturbance to existing vegetation and remain within limits of disturbance of permanent road.
- Construction materials, equipment storage, and parking areas shall be located where they will not cause root compaction.
- Waste materials including vegetation to be removed shall not be stored within the preserved area.

Construction Activities

- Where tree roots are disturbed, they shall be covered with soil as soon as possible.
- Damaged roots and limbs shall be cut cleanly.
- Seriously damaged trees shall be examined a trained arborist.
- Remove and replace trees if they are damaged seriously enough to affect their survival.
- Aerate soil where compaction occurs from construction activity.
- Immediately repair damage to irrigation systems.

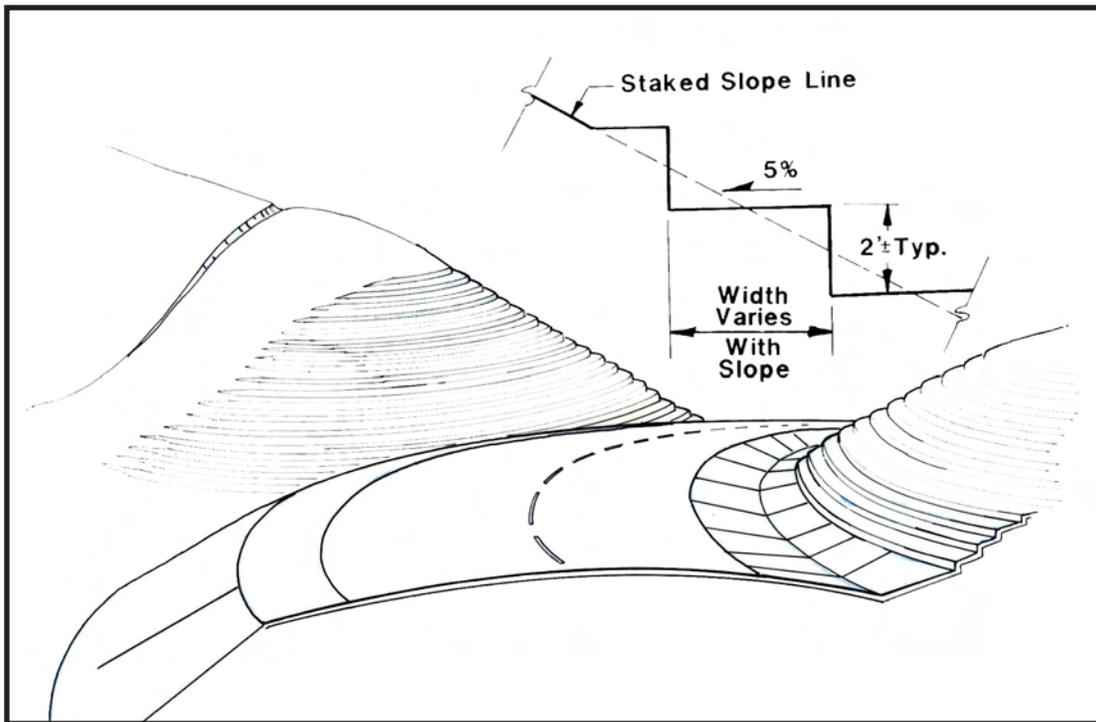
Inspections

- Follow inspection schedule required in CGP Part IV.H.
- Inspect the preservation fencing to ensure that it is intact and that there has been no encroachment into the preservation area.
- Evaluate preserv-in-place vegetation for signs of stress.

Maintenance

- Maintain preservation fencing as needed.
- After all other work is complete, fencing and barriers shall be removed last.
- Address unhealthy and declining vegetation as described in project specifications.

Minibenches/Slope Roughening



5.1.3 Minibenches/Slope Roughening

Definition

Terracing and roughening are techniques for creating furrows, terraces, serrations, stair-steps or track-marks on the soil surface.

Purpose

- To improve water infiltration.
- To increase the effectiveness of temporary and permanent soil stabilization practices.

Appropriate Applications

- Large engineered slopes, primarily cuts in rural settings.
- Soils prone to erosion.
- Prior to application of permanent seeding.

Limitations

- Not appropriate on rock slopes.
- Must be constructed as slope is cut.

Standards and Specifications

Planning Considerations

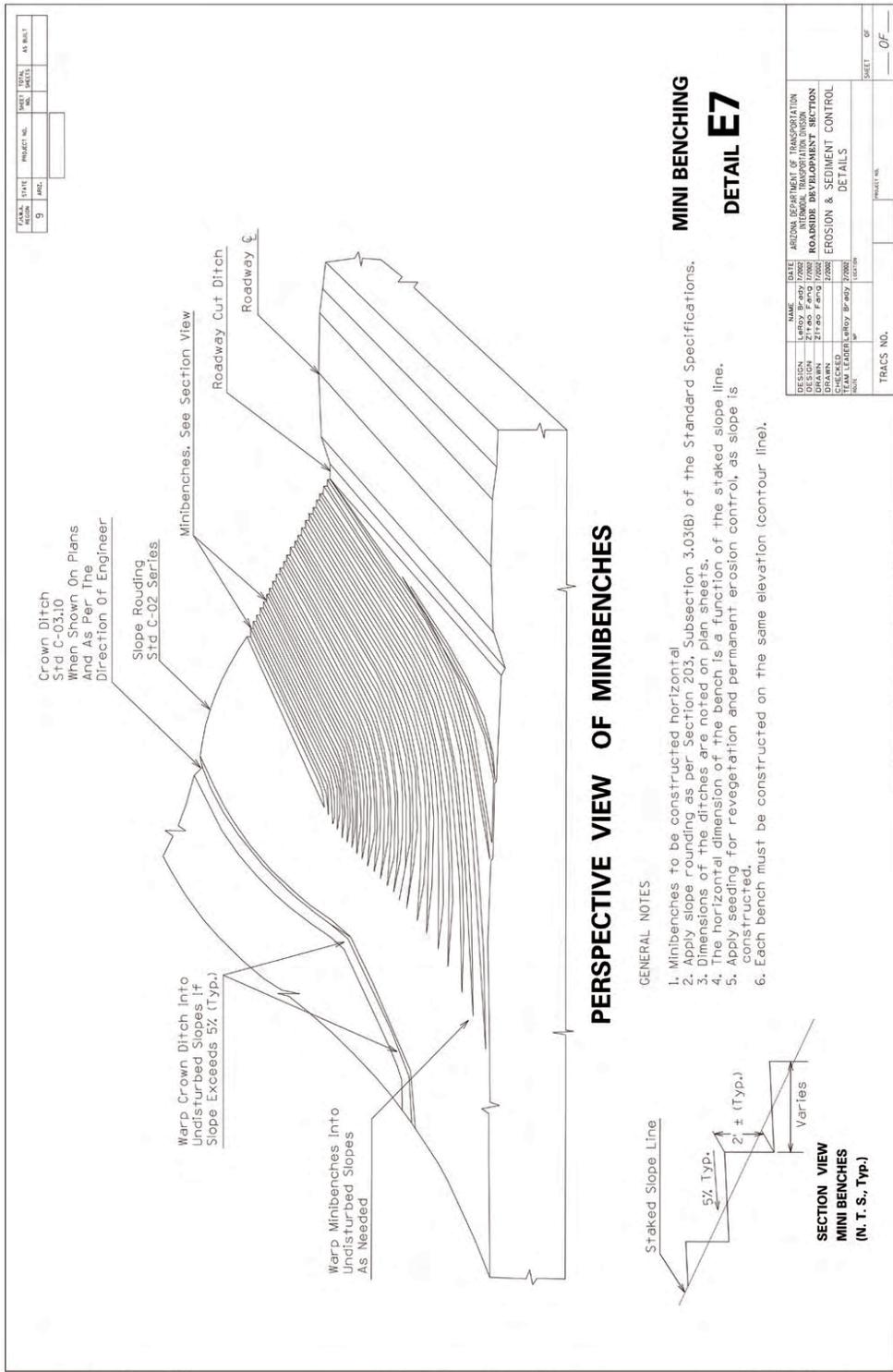
- Minibenching and slope roughening shall be constructed from the top of a cut slope down.

Design

- Minibenches, terraces, furrows, and other horizontal roughening techniques shall follow the contour.

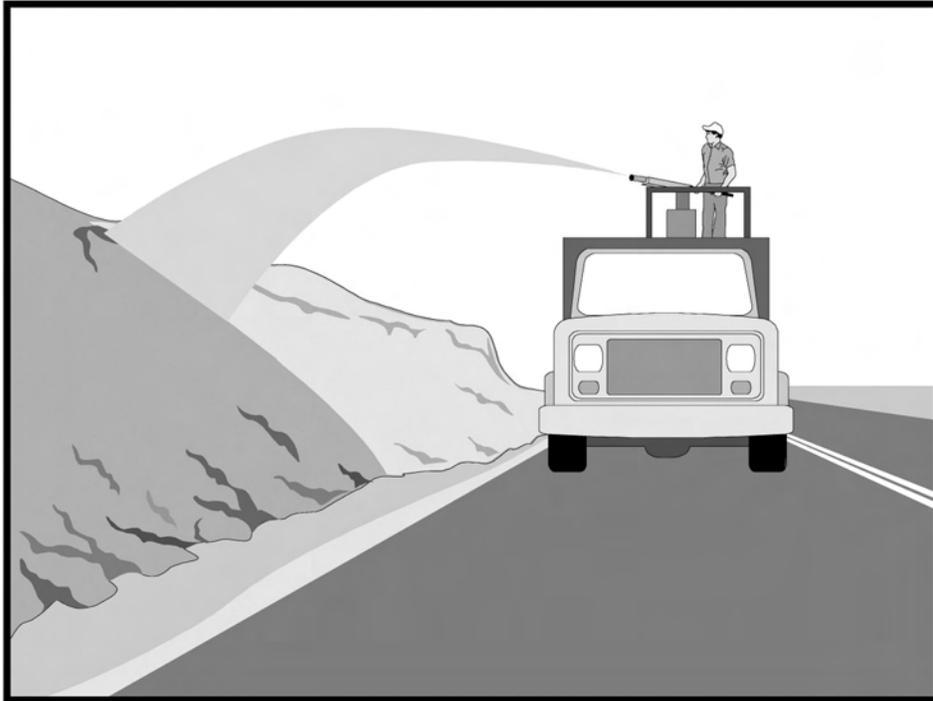
Inspections and Maintenance

- Follow inspection schedule required in the CGP Part IV.H.
- Where horizontal roughening falls away from the contour, additional BMPs may be required to protect the slope.





Hydraulic Mulch



5.1.4 Hydraulic Mulch

Definition

Hydraulic mulch consists of applying a mixture of shredded wood fiber or a hydraulic matrix (e.g., bonded fiber matrix), and a stabilizing emulsion or tackifier with hydro-mulching equipment. This will protect exposed soil from erosion by raindrop impact or wind. This is one of five temporary soil stabilization alternatives to consider.

Purpose

- Reduce soil erosion through temporary stabilization.

Appropriate Applications

- Temporary protection of disturbed areas until permanent measures (such as vegetation) are installed.
- Temporary protection of disturbed areas that must be re-disturbed following an extended period of inactivity.
- Hydraulic matrices typically are effective for longer periods of time.

Limitations

- Wood fiber hydraulic mulches are typically short-lived (less than a growing season).
- Hydraulic tackifiers typically require 24 hours to cure to be effective. Therefore,

should not be applied immediately prior to a storm event.

Standards and Specifications

- Apply as specified in project documents or by manufacturer.
- Soil surface must be loose at time of application.
- Area to be mulched shall be completely covered.
- Avoid overspray onto existing pavements, structures and vegetation.
- Selection of hydraulic mulches by the contractor must be approved by the Engineer prior to use.

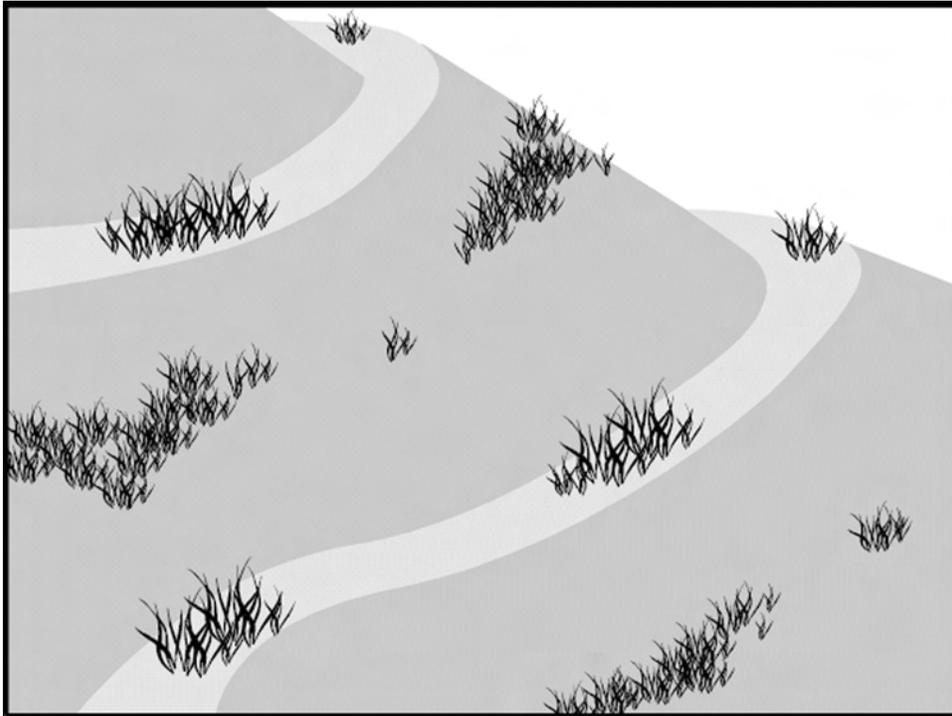
Inspections

- Follow inspection schedule required in the CGP Part IV.H.
- Inspect after all rainfall events.

Maintenance

- Maintain an unbroken ground cover throughout the period of construction the soils are not being reworked.

Hydroseeding



5.1.5 Hydroseeding

Definition

Hydroseeding typically consists of applying a mixture of fiber, seed, fertilizer, and stabilizing emulsion with hydro-mulch equipment, which protects exposed soils from erosion by water and wind. This is one of five temporary soil stabilization alternatives to consider.

Purpose

Reduce soil erosion through temporary soil stabilization.

Appropriate Applications

- Application of seed for permanent revegetation and stabilization of disturbed soils.
- Temporary protection of disturbed areas until permanent measures (e.g., vegetation) are installed.
- Temporary protection of disturbed areas that must be re-disturbed following an extended period of inactivity.

Limitations

- Straw mulching may be necessary in addition to hydroseeding in order to promote establishment of vegetation.

- Steep slopes are difficult to protect with temporary seeding.
- Dry or cold weather will affect vegetative establishment.

Standards and Specifications

- 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.
- Prior to use, ADOT shall approve application rates for mulches, tackifier, soil amendments and seed mixtures as per specifications prior to application.
- All seed shall be in conformance with requirements of the project specifications.
- Areas to be seeded shall be filled as described in project specifications. Soil shall be loose and friable.

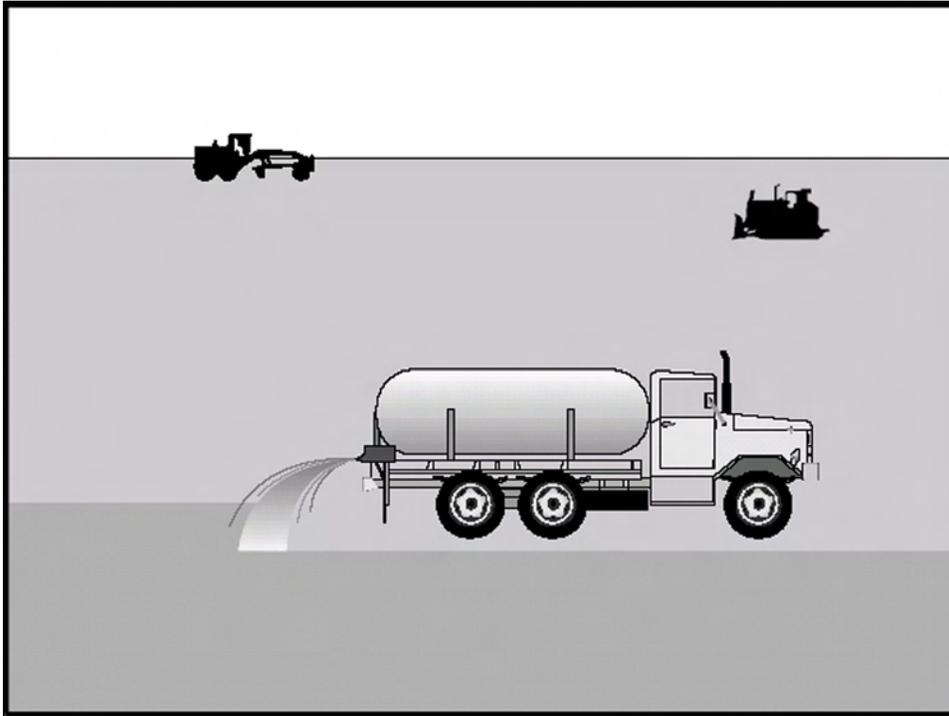
Inspections

- Follow inspection schedule required in the CGP Part IV.H and project specifications.

Maintenance

- Any temporary revegetation efforts that do not provide adequate cover must be revegetated as required by the Engineer.

Soil Binders



5.1.6 Soil Binders

Definition

Soil binders consist of applying and maintaining polymeric or lignin sulfonate soil stabilizers or emulsions. Soil binders are materials applied to the soil surface to temporarily prevent water-induced erosion of exposed soils on construction sites. Soil binders typically also provide dust, wind, and soil stabilization (erosion control) benefits. This is one of five temporary soil stabilization alternatives to consider.

Purpose

- Reduce soil erosion through temporary soil stabilization.

Appropriate Applications

- Temporary protection of disturbed areas until permanent measures (e.g., vegetation) are installed.
- Temporary protection of disturbed areas that must be re-disturbed following a period of inactivity. Because they can be often incorporated back into the work, they may be a good choice where grading activities will soon resume.

Limitations

- Soil binders are temporary in nature and may require reapplication, especially after heavy or prolonged rainfall.
- 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.

Standards and Specifications

General Considerations

- Site conditions (soil type, temperature and humidity) must be evaluated prior to determining appropriate soil binder type.
- Regional soil types will dictate appropriate soil binders to be used.
- Must be environmentally benign (non-toxic to existing plants and wildlife).

Selecting a Soil Binder

Properties of common soil binders used for erosion control are provided on Table 5.1.6. In consultation with the Engineer, use Table 5.1.6 to select an appropriate soil binder.

Factors to consider when selecting a soil binder include the following:

- Suitability to situation – Consider where the soil binder will be applied: if it needs a high resistance to leaching or abrasion, and whether it needs to be compatible with any existing vegetation. Determine the length of time soil stabilization will be needed, and if the soil binder will be placed in an area where it will degrade rapidly. In general, slope steepness is not a discriminating factor for the listed soil binders. The soil binders in Table 5.1.6 may also be used for dust control using the provided dust control application rates. The dust control application rates will not be adequate to provide protection from water-induced erosion.
- Soil types and surface materials – Fines and moisture content are key properties of surface materials. Consider a soil binder’s ability to penetrate, likelihood of leaching, and ability to form a surface crust on the surface materials.
- Frequency of application – The frequency of application can be affected by subgrade conditions, surface type, traffic volumes, climate, and maintenance schedule.

Soil Binders

Frequent applications could lead to high costs. Application frequency may be minimized if the soil binder has good penetration, low evaporation, and good longevity. Consider also that frequent application will require frequent equipment clean-up.

After considering the above factors, the soil binders in Table 5.1.6 will be generally appropriate as follows:

Copolymer: Appropriate for long term soil stabilization in areas where cross-traffic might occur, or where stabilization needs to be achieved in conjunction with preserving existing vegetation. Longevity can be up to 2 years, it has a high resistance to abrasion, and is compatible with existing vegetation. However, it is also relatively costly which makes it less desirable for short-term or frequent applications.

Lignin sulfonate: Appropriate for short- or medium-term soil stabilization applications in low traffic areas. The moderate relative cost makes it less desirable to reapply frequently, though it typically lasts longer than psyllium or guar. With only moderate penetration and a low resistance to abrasion, it would be more suited to areas which will not be disturbed frequently by construction activities.

Psyllium/Guar: Appropriate for typical soil stabilizing situations or short-term applications. Because of the relatively low cost, they can be applied more frequently. Their high penetration provides good stabilization but their moderate resistance to abrasion limits their longevity. They are not very compatible with vegetation.

Applying Soil Binders

After selecting an appropriate soil binder, the untreated soil surface must be prepared before applying the soil binder. The untreated soil surface must contain sufficient moisture to assist the agent in achieving uniform distribution. In general, the following steps shall be followed:

- Follow manufacturer's recommendations for application rates, pre-wetting of application area and cleaning of equipment after use.
- Prior to application, roughen embankment and fill areas. Track walking shall only be used where rolling is impractical.
- Soil binders shall not be applied during or immediately before rainfall.
- Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- Do not apply soil binders to frozen soil, areas with standing water, under freezing or rainy conditions, or when temperature is below 4 ° (40°F).

- More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate.
- Generally, soil binders require a minimum curing time of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure times.

For liquid agents:

- Crown or slope ground to avoid ponding.
- Uniformly pre-wet ground at 0.14 to 1.4 l/m² (0.03 to 0.3 gal/yd²) or according to manufacturer's recommendations.
- Apply solution under pressure. Overlap solution 150 to 300 mm (6 to 12 inches).
- Allow treated area to cure for the time recommended by the manufacturer, typically, at least 12 hours.
- Apply second treatment before the first treatment becomes ineffective, using 50% application rate.
- In low humidities, reactivate chemicals by re-wetting with water at 0.5 to 0.9 l/m² (0.1 to 0.2 gal/yd²).

Maintenance and Inspection

- Reapplying the selected soil binder may be needed for proper maintenance. High traffic areas shall be inspected on a daily basis, and lower traffic areas should be inspected on a weekly basis.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

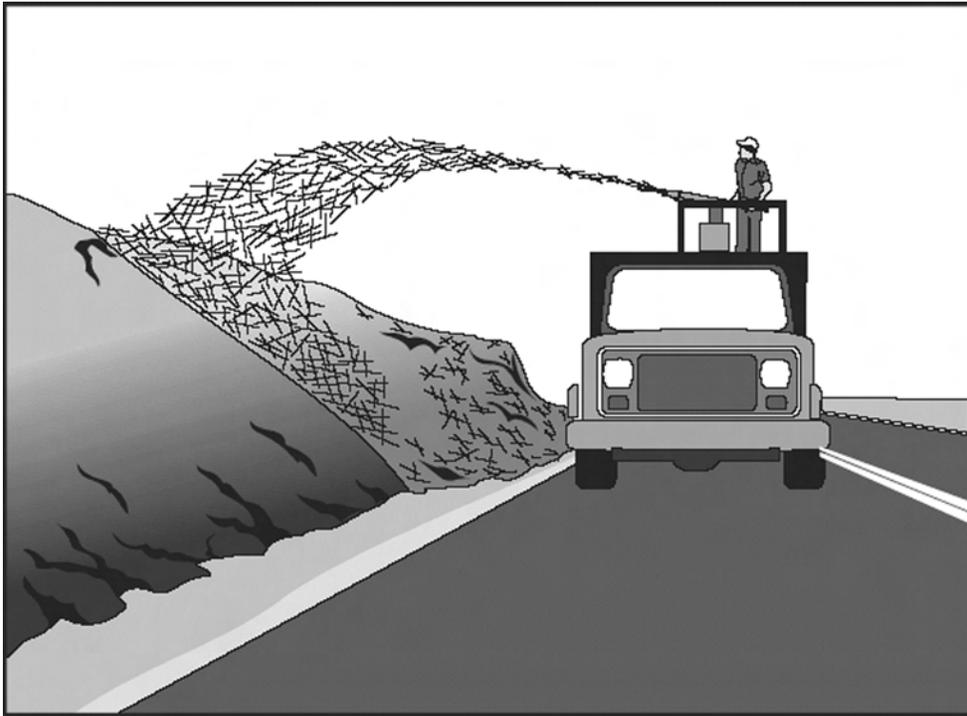
Soil Binders

Properties of Soil Binders for Erosion Control

Chemicals	Copolymer	Lignin Sulfonate	Psyllium	Guar
Comments	- Forms semi-permeable transparent crust. - Resists ultraviolet radiation and moisture induced breakdown	- Paper industry waste produce - Acts as dispersing agent- Best in dry climates- Can be slippery	- Effective on dry, hard soils - Forms a crust	- Effective on dry, hard soils - Forms a crust
Relative Cost	High	Moderate	Low	Low
Environmental Hazard	Low	Low	Low	Low
Penetration	Moderate	Moderate	High	High
Evaporation	Moderate	Moderate	Moderate	Moderate
Resistance to Leaching	Low	High	High	High
Resistance to Abrasion	High	Low	Moderate	Moderate
Longevity	1 to 2 years	6 months to 1 year	3 to 6 months	3 to 6 months
Minimum Curing Time before Rain	24 hours	24 hours	24 hours	24 hours
Compatibility with Existing Vegetation	Good	Poor	Poor	Poor
Mode of Degradation	Chemically Degradable	Biologically/Physically/Chemically Degradable	Biologically Degradable	Biologically Degradable
Labor Intensive	No	No	No	No
Specialized Application Equipment	Yes	Yes	Yes	Yes
Liquid/Powder	Liquid	Powder	Powder	Powder
Surface Crusting	Yes	Yes, but dissolves on rewetting	Yes, but dissolves on rewetting	Yes, but dissolves on rewetting
Clean-Up	Solvents	Solvents	Water	Water
Erosion Control Application Rate	Apply 800-1,000 l/ha (85-110 gal/ac).	Apply 5,600-6,500 l/ha (600-700 gal/ac).	Apply 170 kg/ha (150 lb./ac) with 560-2,200 kg/ha (500-2,000 lbs./ac) fiber mulch.	Apply 110-220 kg/ha (100-200 lbs./ac) with 560-2,200 kg/ha (500-2,000 lbs./ac) fiber mulch.
Dust Control Application Rate	Apply 280-520 L/ha (30-55 gal/ac).	Loosen surface 25-50mm (1-2 in). Need 4-8% fines. Apply 470-1,900 l/ha (50-200 gal/ac).	Apply 170 K/ha (150 lbs./ac).	Apply at 45-70 K/ha (40-60 lbs./ac).

Table 5.1.6

Straw Mulch



5.1.7 Straw Mulch

Definition

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil by mechanical means (e.g., a drill or studded roller) or anchoring it with tackifier. This is one of five temporary soil stabilization alternatives to consider.

Purpose

- Reduce soil erosion through temporary soil stabilization.

Appropriate Applications

- Straw mulch is used for soil stabilization as a temporary surface cover on disturbed areas until soils can be prepared for final stabilization.
- Typically used in combination with temporary and/or permanent seeding applications to enhance plant establishment.

Limitations

- 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 is potentially a nuisance when applied in urban areas.

Standards and Specifications

- Materials shall conform to and shall be applied at rates specified in special provisions.
- Straw shall be certified to be free of weeds and invasive species.
- When applied by blower, avoid overspray onto existing pavements, structures and vegetation.
- On slopes less steep than 2 (horizontal): 1 (vertical) and where mechanical action will not contribute to soil compaction, straw can be “punched” into the soil using a knife-blade roller or a straight bladed coulter (“crimper”).
- For small areas, straw can be anchored by hand tools.

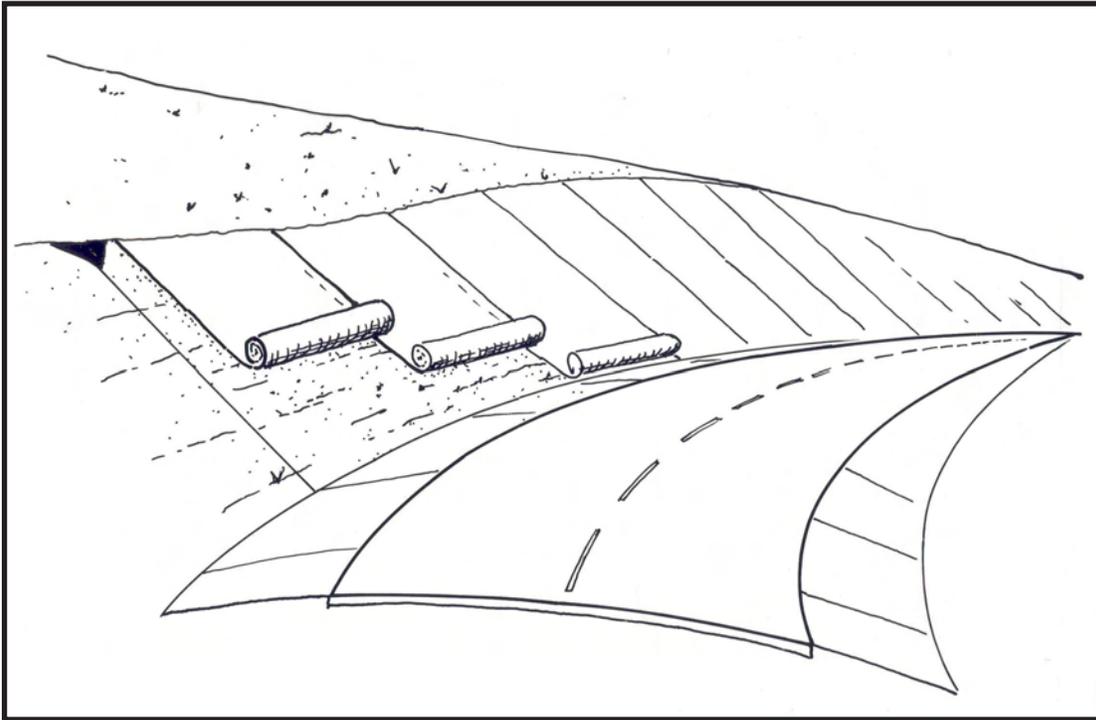
Inspections

- Follow inspection schedule required in the CGP Part IV.H.

Maintenance

- Reapply mulch when more than 20% bare ground is exposed in application area.

Geotextiles, Plastic Covers, Erosion Control Blankets/Mats



5.1.8 Geotextiles, Plastic Covers and Erosion Control Blankets/Mats

Definition

A natural (excelsior, straw, coconut, etc.) or synthetic (usually polyethylene) material installed to reduce soil erosion by wind or water. This is one of five soil stabilization alternatives to consider.

Purpose

- Reduce rainfall impact.
- Provide a microclimate to promote seedling establishment.
- Protect exposed soil from wind and rain.
- Reduce erosiveness of concentrated flows.

Appropriate Applications

- Steep slopes (typically greater than 3 horizontal: 1 vertical).
- Slopes with highly erosive soils or where the erosion hazard is high.
- Slopes adjacent to bodies of water.
- Concentrated flow areas such as ditches and channels with flows exceeding 3.3 ft/sec. (refer to ADOT Hydraulic Manual for channel lining criteria).
- In areas where plant establishment is likely to be slow.
- Areas inaccessible to hydraulic equipment.

- Stockpiles.

Limitations

- Costly.
- Not suitable for excessively rocky sites or rough slopes.
- Not suitable for areas where vegetation will be mowed.
- Plastic sheeting is easily disturbed and must be removed and disposed of prior to
- Application of permanent soil stabilization measures. Plastic also results in increased runoff rates.
- May trap wildlife.

Standards and Specifications

Material Selection

There are a wide variety of types and materials from which to choose. Selection shall be based on needs for the specific project. Factors to consider include:

- Cost: materials, site preparation, installation.
- Effectiveness: reduction of erosion, flow velocity, and runoff.
- Acceptability: environmental compatibility, regulatory, and aesthetic concerns.
- Vegetation enhancement: moisture retention, temperature modification.
- Installation: durability, longevity, ease of installation, safety.
- Maintenance.

Geotextiles:

Material shall be woven polypropylene fabric with minimum thickness of 0.5 inches, minimum width of 12 feet and shall have minimum tensile strength of 50 lbs/ ft (0.67 kN) (warp) 25 lbs/ ft. (0.36 kN) (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric shall be approximately 0.07 sec^{-1} in conformance with the requirements in ASTM Designation: D4491. The fabric shall have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets shall be secured in place with wire staples or sandbags and by keying into tops of slopes to prevent infiltration of surface waters under

Geotextiles may be reused if, in the opinion of the RE, they are suitable for the use intended.

Geotextiles, Plastic Covers, Erosion Control Blankets/Mats

Plastic Covers:

Material shall be polyethylene sheeting and shall have a minimum thickness of 6 mm. Plastic covers shall be anchored by sandbags placed no more than 10 feet apart and by keying into the tops of slopes to prevent infiltration of surface waters under the plastic. All seams shall be taped or weighted down their entire length, and there shall be at least 12 inches to 24 inches overlap of all seams.

Plastic covers may be reused if, in the opinion of the engineer, they are suitable for the use intended.

Erosion Control Blankets/Mats:

Blankets and Mats are available in materials with a wide variety of susceptibility to biological and photo-degradation. The most common materials in order of least to most durable are:

- Agricultural straw.
- Jute fiber.
- Wood fiber (Excelsior).
- Coconut fiber (coir).

Site Preparation

- Proper site preparation is essential to ensure complete contact of the blanket or matting with the soil.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil. Contractor shall cut material to fit around large boulders.
- If areas is to be seeded, prepare soil as directed in the project specifications before applying covering.

Seeding

Seed the area before blanket installation for erosion control and revegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all check slots and other areas disturbed during installation must be re-seeded. Where soil filling is specified, seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Anchoring

- U-shaped wire staples, metal pins or wooden stakes can be used to anchor mats and blankets to the ground surface.
- Staples shall be made of .12 inch steel wire and shall be U-shaped with 8-inch legs and 2-inch crown. Wire staples shall be minimum of 11 gauge.

-
- Metal stake pins shall be 0.188-inch diameter steel with a 1.5 inch steel washer at the head of the pin.
 - Wire staples and metal stakes shall be driven flush to the soil surface.
 - All anchors shall have sufficient ground penetration to resist pullout by wind. Longer anchors may be required for loose soils.

Installation on Slopes

Always consult the manufacturer's recommendations for installation. In general, these will be as follows:

1. Begin at the top of the slope and anchor the blanket in a 12-inch deep trench. Backfill trench, tamp earth firmly and staple every 12 inches.
2. Unroll blanket downslope in the direction of water flow.
3. Overlap the edges of adjacent parallel rolls 4 inches and staple every 12 inches.
4. When blankets must be spliced, place blanket ends in common trench as described above with 6-inch overlap. Staple through overlapped area, approximately 6 inches apart.
5. Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
6. Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples shall be placed down the center and staggered with the staples placed along the edges.
7. On steep slopes, 1:1 (V:H) to 1:2 (V:H), require a minimum of 2 staples/yd². Moderate slopes, 1:2 (V:H) to 1:3 (V:H), require a minimum of 1 ½ staples/yd², placing 1 staple/yd on centers. Gentle slopes require a minimum of 1 staple/yd².

Installation in Channels

Always consult the manufacturer's recommendations for installation. In general, these will be as follows:

1. Dig initial anchor trench 12 inches deep and 6 inches wide across the channel at the lower end of the project area.
2. Excavate intermittent check slots, 6 inches deep and 6 inches wide across the channel at 25- to 30 foot-intervals along the channels.
3. Cut longitudinal channel anchor slots 4 inches deep and 4 inches wide along each side of the installation to bury edges of matting, whenever possible extend matting 2 inches to 3 inches above the crest of the channel side slopes.
4. Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 12 inches intervals. Note: matting will initially be upside down in anchor trench.
5. In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 3 inches.

Geotextiles, Plastic Covers, Erosion Control Blankets/Mats

6. Secure these initial ends of mats with anchors at 12-inch intervals, backfill and compact soil. Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 3-inch overlap.
7. Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 12-inch intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.

Alternate method for non-critical installations:

1. Place two rows of anchors on 6-inch centers at 25- to 30-foot intervals in lieu of excavated check slots.
2. Shingle-lap spliced ends by a minimum of 12 inches apart on 12-inch intervals.
3. Place edges of outside mats in previously excavated longitudinal slots, anchor using prescribed staple pattern, backfill and compact soil.
4. Anchor, fill and compact upstream end of mat in a 12 inches by 6 inches terminal trench.
5. Secure mat top ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
6. Seed and fill turf reinforcement matting with soil, if specified.

Soil filling (if specified for turf reinforcement)

- Always consult the manufacturer's recommendations for installation.
- Do not drive tacked or heavy equipment over mat.
- Avoid any traffic over matting if loose or wet soil conditions exist.
- Use shovels, rakes or brooms for fine grading and touch up. Smooth out soil filling; just exposing top netting of mat.

Removal

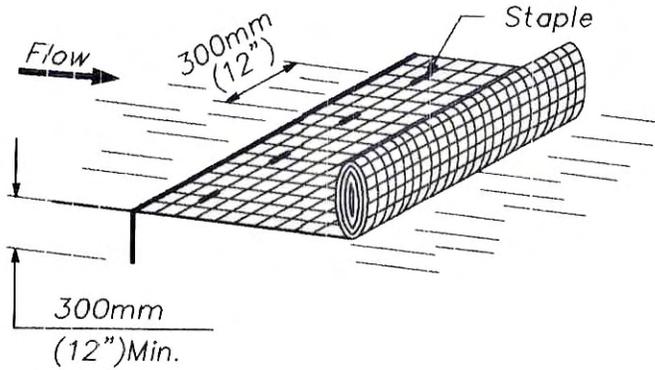
When no longer required for the work, coverings shall become the property of the Contractor and shall be disposed of outside the highway right of way in conformance with the special provisions.

Inspections

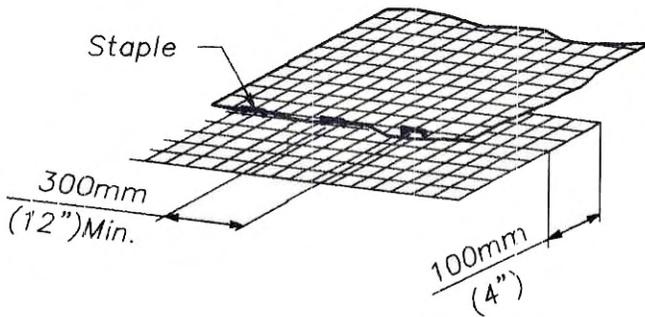
- Follow inspection schedule required in CGP Part IV.H.
- Erosion may occur under blankets in areas where contact with soil has been compromised. This damage may be difficult to detect and repair.

Maintenance

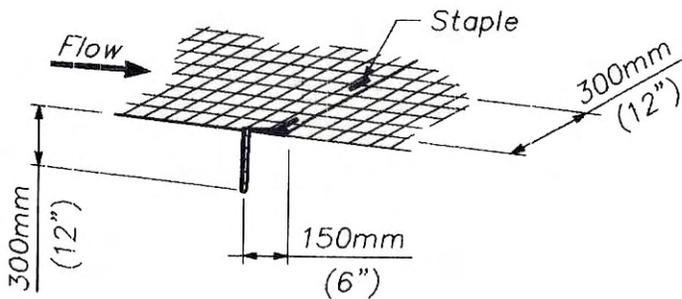
- Re-anchor loosened matting and replace lost matting and staples as required.
- Repair slope or channel damage before re-installing matting if washout or breakage occurs.



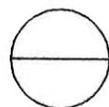
ANCHOR SLOT: Bury the up-slope end of the net in a 300mm (12") deep trench. Tamp the soil firmly. Staple at 300mm (12") intervals across the net.



OVERLAP: Overlap longitudinal edges of adjoining mattings at least 100mm (4"). Staple every 300mm (12") down the edge of the overlapping net.

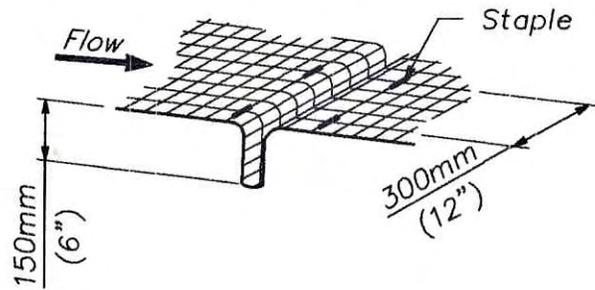


JOINING MATS: Insert the roll in a trench; as with the anchor slot. Overlap the up-slope end of the roll a min. of 150mm (6"). Staple at 150mm (6") intervals along the end of the up-slope net.

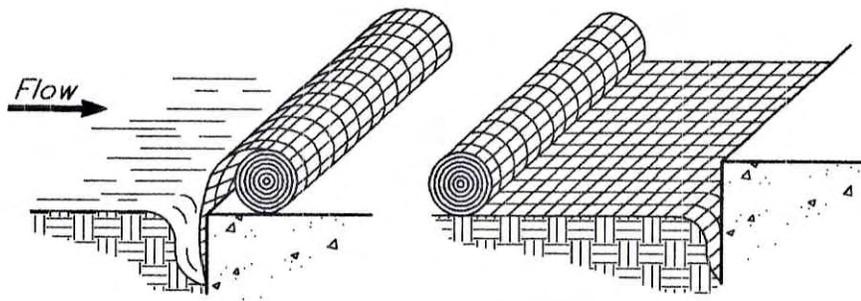


INSTALLATION OF MATTING

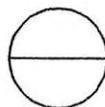
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CHECK SLOTS: On erodible soils or steep slopes, check slots should be placed every 4.5m (15'). Insert a fold of the mat into a 150mm (6") trench and tamp firmly, staple at 300mm (12") intervals across the mat on each side of the check slot. Lay the mat smoothly on the surface of the soil – Do Not stretch the mat and Do Not allow wrinkles.



ANCHORING ENDS AT STRUCTURE: Place the end of the mat in a 300mm (12") slot on the up-channel side of the structure. Fill the trench and tamp firmly. Roll the net up the channel. Place staples at 300mm (12") intervals along the anchor end of the net.

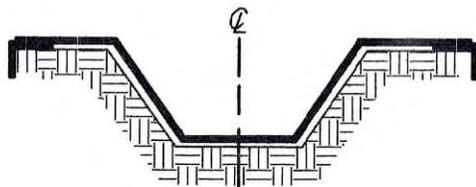


INSTALLATION OF MATTING

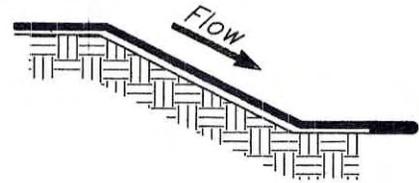
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Apply matting parallel to the direction of flow. Use check slots every 4.5 Meters (15 feet). Center first strip in the center of channel.

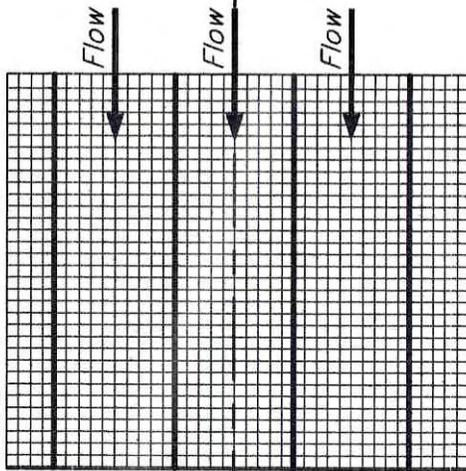
Apply matting parallel to the direction of the flow on slopes of 25% or greater.



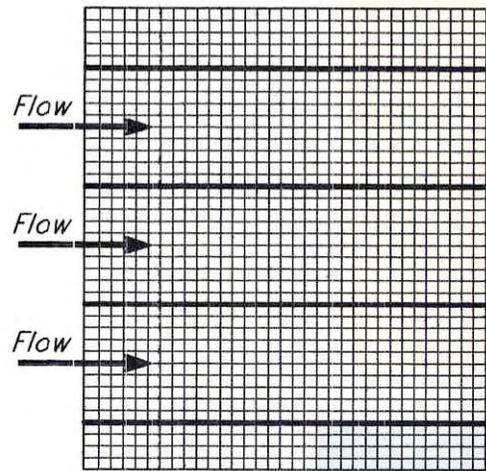
SECTION "A"
(Channel)



SECTION "B"
(Slope)



PLAN "A"
(Channel)



PLAN "B"
(Slope)

MATTING ORIENTATION
not to scale

Compost/Wood Mulching



5.1.9 Compost/Wood Mulching

Definition

Compost or wood mulching consists of applying a mixture of compost, shredded wood mulch or bark.

Purpose

- To temporarily protect exposed soil from wind, raindrop impact, increase infiltration and reduce runoff.
- To provide a suitable microclimate to promote seed germination.
- To prevent surface compaction or crusting.

Appropriate Applications

- Temporary soil stabilization.
- Shredded bark mulch may be applied to smaller drainage channels to reduce runoff velocities and soil erosion.
- Sensitive areas may be mulched at the end of a day's operations if rain is predicted.
- In conjunction with seed to encourage seed germination and establishment.

Mulches that are susceptible to erosion by wind or water are anchored to the soil using a variety of techniques.

- Crimping, tracking, disking or punching.
- Hydraulic bonding using a variety of organic or acrylic tackifiers.
- Covering with netting and stapled

Limitations

- Susceptible to wind disturbance.
- Potential for accidental introduction of undesirable weed species.
- Areas where hydraulically bonded mulches are to be applied must be accessible to equipment used in the process.
- Hydraulically bonded mulches require 24 hours to dry before rainfall occurs to be effective.
- Shredded wood mulch will not withstand significant concentrated flows and is prone to sheet erosion.

Standards and Specifications

Mulch Selection

There are many different types of mulches. Selection on type shall be based on type of application and site conditions. Prior to use, choice of mulch shall be approved by the Landscape Architect.

- Shredded wood and wood chips)—may be available from existing suitable vegetation to be cleared from site.
- Compost – typically applied as a component of seeding applications; shall be tested as described in the special provisions for biotic and abiotic factors.

Installation

- May be applied by hand or by mechanical or hydraulic methods.

Inspections

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for exposed areas of soil or where covering is broken.

Maintenance

- Reapply mulch when more than 20% bare ground is exposed in application area.

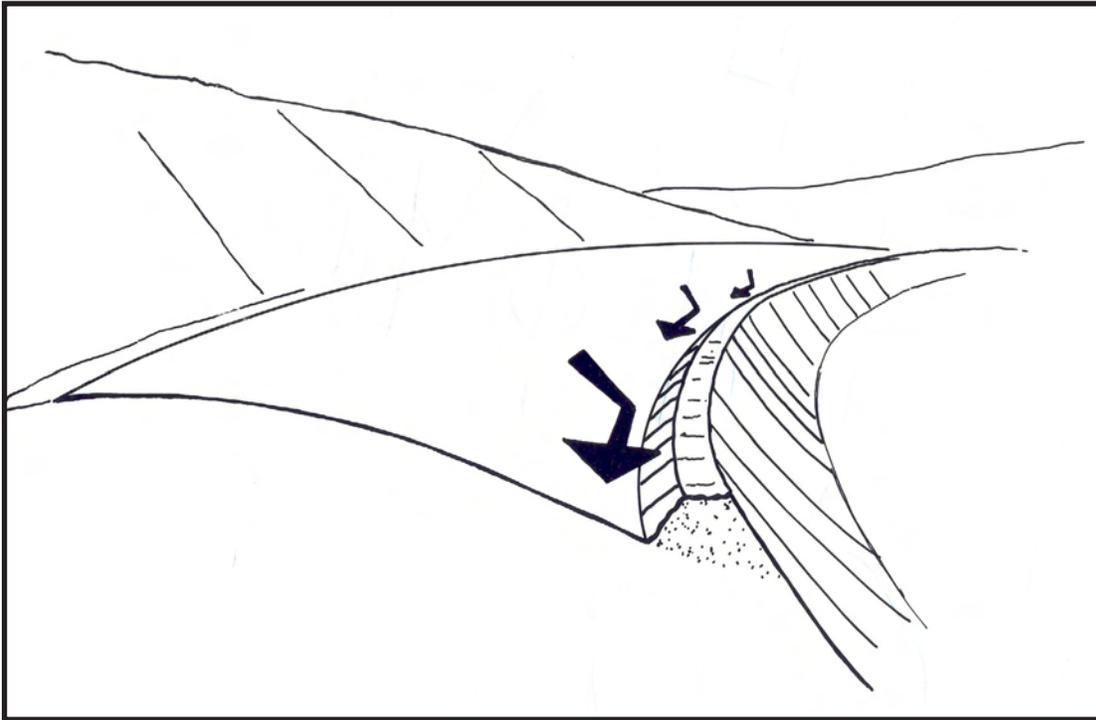
5. Temporary Best Management Practices

5.2 CONCENTRATED FLOW CONVEYANCE CONTROLS

Temporary concentrated flow conveyance controls consist of a system of installations or BMPs that are used alone or in combination to intercept, divert, convey, and discharge concentrated flows with a minimum of soil erosion, both on-site and downstream (offsite). Temporary concentrated flow conveyance controls may be required to direct run-on around or through the project in a non-erodible fashion. Temporary concentrated flow conveyance systems include the following BMPs:

5.2.1	Earth Dikes/Drainage Swales.....	68
5.2.2	Cut to Fill Slope Transitions.....	70
5.2.3	Erosion Protection at Structures.....	72
5.2.4	Rock Outlet Protection.....	74
5.2.5	Slope Drains.....	76

Earth Dikes/Drainage Swales



5.2.1 Earth Dikes/Drainage Swales

Definition

Structures that intercept, divert, and convey surface runoff (generally sheet flow) to a desired location.

Purpose

- To divert runoff away from erodible surfaces.
- To divert runoff toward sediment trapping devices.

Appropriate Applications

- At the base of fill slopes where runoff begins to concentrate.
- At the top of slopes to control rill and gully erosion.
- At bottom and mid-slope locations to intercept sheet flow and convey concentrated flows.
- To divert runoff toward a stabilized watercourse or drainage structure.
- To divert sediment laden water to sediment trapping device.
- To divert storm water 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 check dams, blankets, and sediment logs or riprap.
- Does not control erosion or remove sediment.

Standards and Specifications

- Must be sized correctly for expected flows.
- Swales shall be lined where high runoff velocities are expected.
- Dikes shall be stabilized by compaction or other means such as erosion control blankets or riprap.
- Provide stabilized outlets. Where runoff will carry sediment, divert flow into sediment traps.
- Where installed at construction traffic crossings, the top width may be wider and side slopes may be flatter.
- When possible, dikes and swales shall be installed early in the construction process.
- Shall not adversely impact adjacent properties and must conform to local floodplain management regulations.

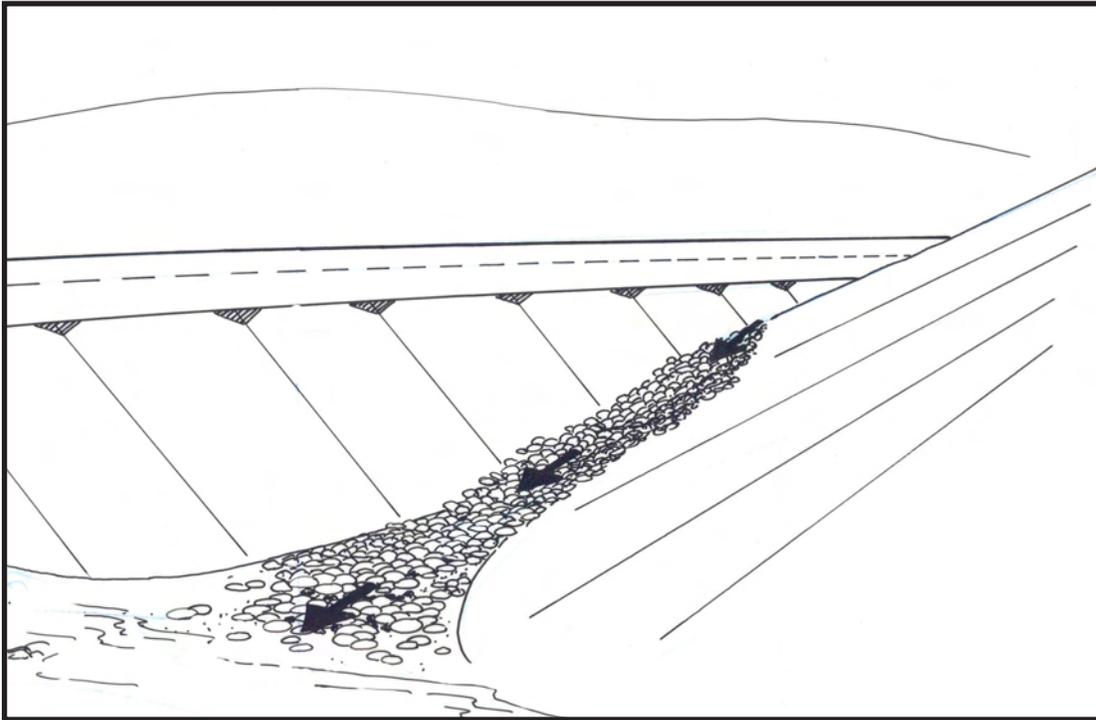
Inspections

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for washouts and failure of associated BMPs.
- Check outlet stabilization for signs of erosion.

Maintenance

- Repair as needed.
- Repair where damaged by construction equipment.
- If material is added to repair the dike it must be properly recompact.
- Where flows are directed into sediment traps, maintain as described in Sediment Trap BMP.

Cut to Fill Slope Transitions



5.2.2 Cut to Fill Slope Transitions

Definition

Rock riprap placed in cut-to-fill slope transitions.

Purpose

- To reduce erosion at cut-to fill transitions.

Appropriate Applications

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

Limitations

- Rock riprap transitions reduce erosion only when they have been sized and built properly.

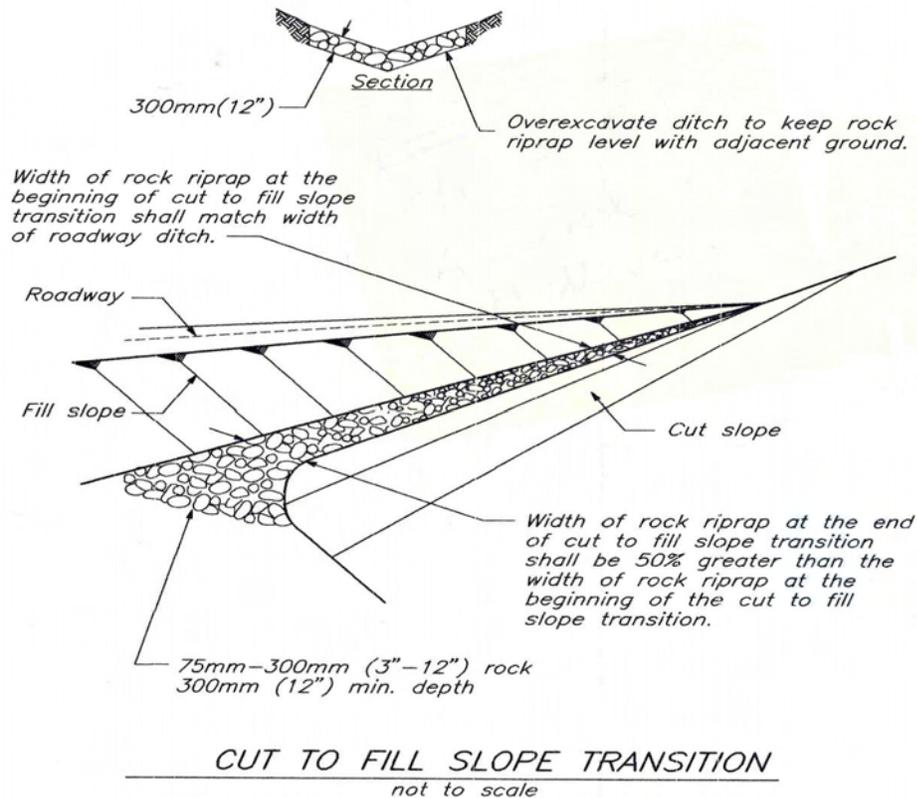
Standards and Specifications

- Width of riprap application at beginning of the cut-to-fill transition shall match width of roadside ditch.
- Width of rock riprap at end of cut-to-fill transition shall be 50% greater than the width of rock riprap at the beginning of the cut-to-fill transition.

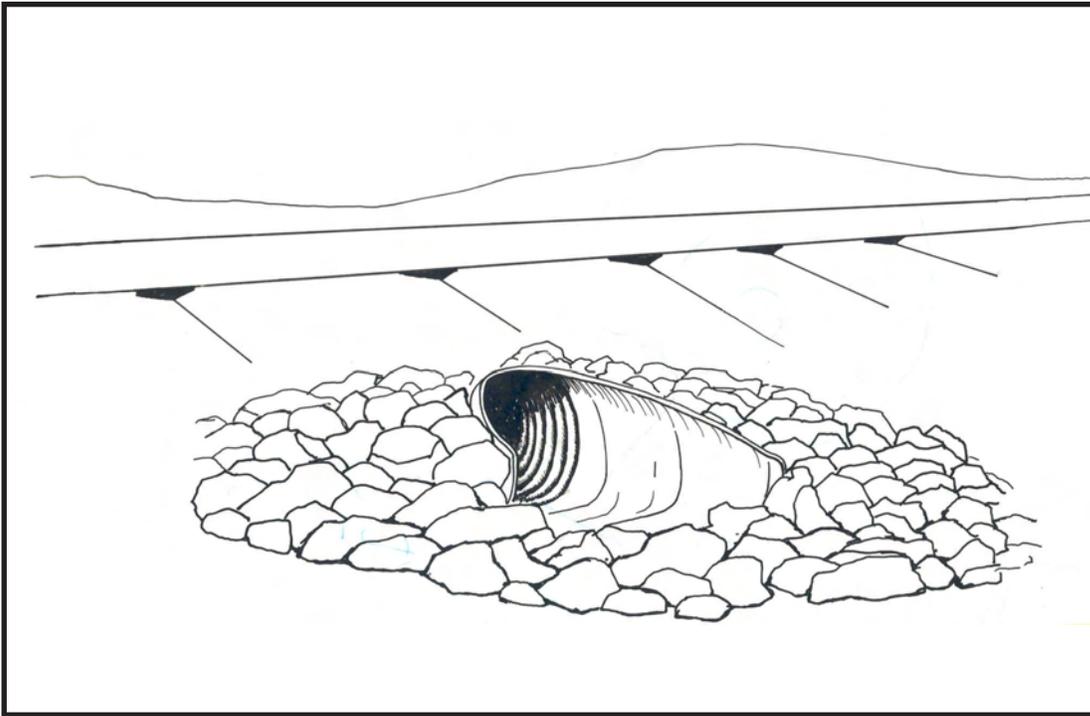
- Cut-to-fill transition shall terminate at a planned or existing stabilized drainage.
- Rock shall be placed by hand or mechanical means to achieve complete coverage at the transition. Dumping of riprap may be necessary.
- Riprap shall be embedded into slopes.
- Riprap shall be placed to ensure that the center of the transition is lower than the edges and avoid runoff flow over unprotected soil.
- Size of rock used must be large enough to withstand expected design flow through the transition. Riprap greater than 6 inches shall be wire-tied if required by traffic recovery area.

Inspections and Maintenance

- Follow inspection schedule required in the CGP Part IV.H.
- 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.



Erosion Protection at Structures



5.2.3 Erosion Protection at Structures

Definition

Rock riprap placed along soil interface of concrete and metal structures

Purpose

- To reduce or eliminate the potential for undercutting at structures.

Appropriate Applications

- Place at any structure that abuts a soil surface and where concentration and/or velocity of storm water is great enough to cause erosive flows.

Limitations

- None

Planning Considerations

- Rock interface protection is effective when the rock is sized and placed properly.

Standards and Specifications

- Design and size as specified in the contract documents or as directed by the Engineer.

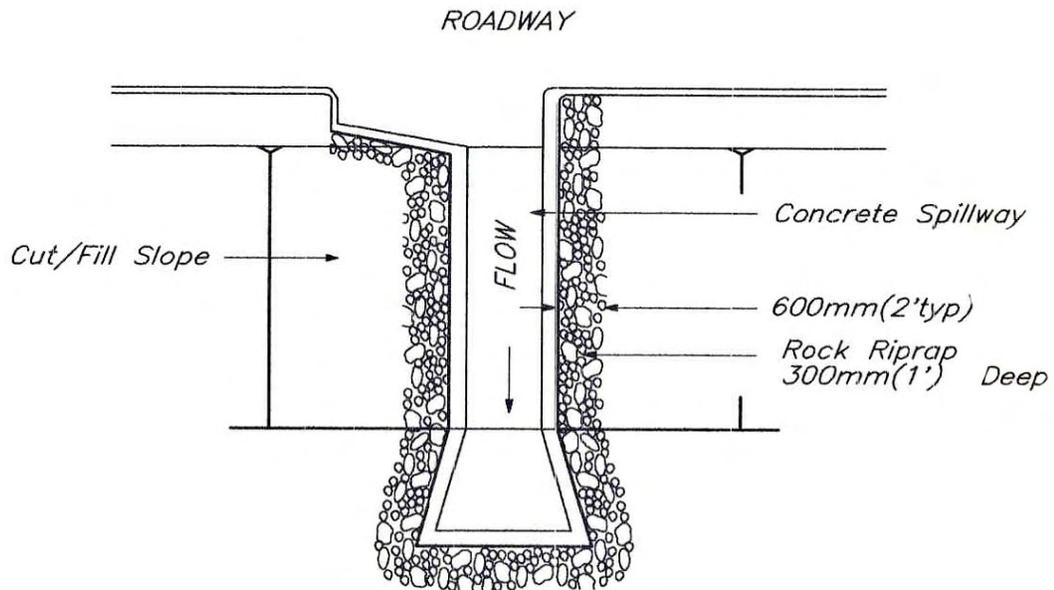
- Use sound, durable, and angular rock for best results.

Inspections

- Follow inspection schedule required in the CGP Part IV.H.
- Inspect for signs of erosion and undercutting around the structure.

Maintenance

- Replace rock and repair erosion damage as needed.



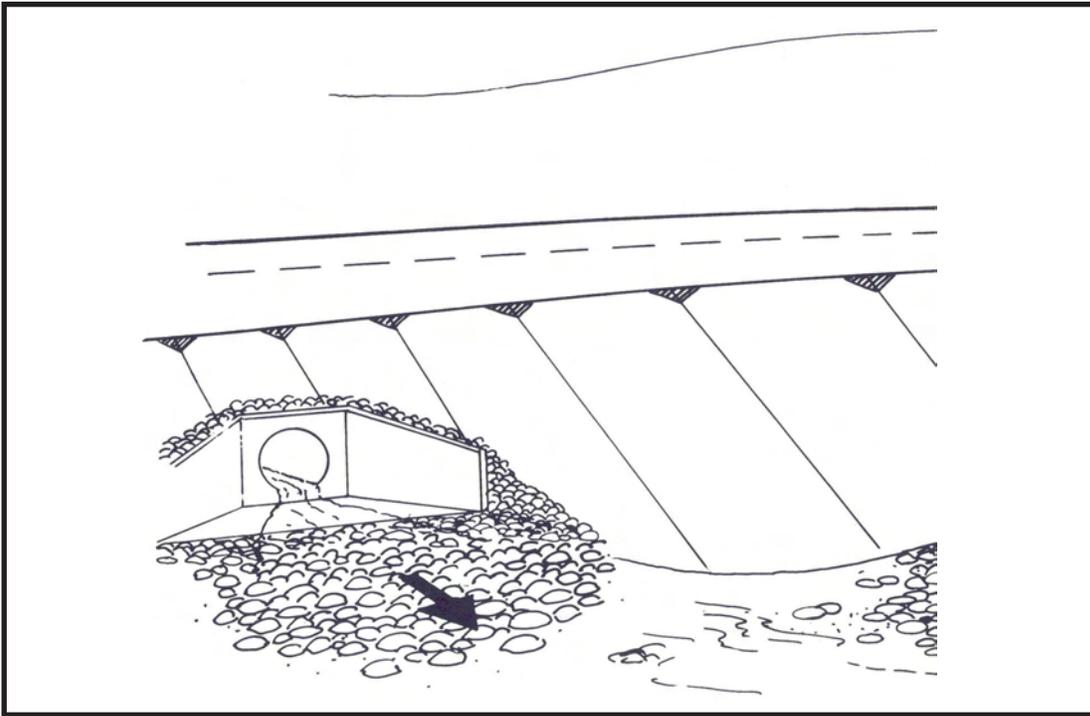
PLAN

SIZE WIDTH AND DEPTH OF ROCK RIPRAP
SHALL BE SIZED PER SITE CONDITIONS

SPILLWAY EROSION PROTECTION

not to scale

Rock Outlet Protection



5.2.4 Rock Outlet Protection

Definition

Rock riprap or grouted riprap placed at outlets ends of culverts, conduits, or channels.

Purpose

- To prevent scour and reduce velocity of exiting storm water flows.

Appropriate Applications

- Where discharge velocities and energies at the outlets of culverts, pipes or channels are sufficient to erode the downstream channel.
- At discharge outlets that carry continuous flows of water.
- At points where lined conveyances discharge to unlined conveyances.

Limitations

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

Standards and Specifications

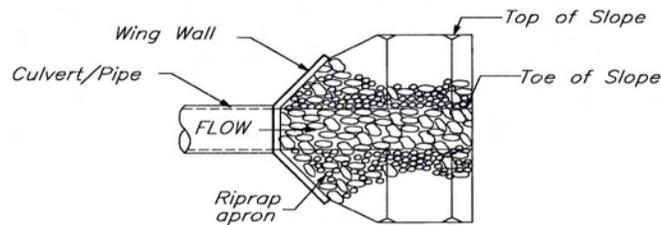
- Grouted or wire-tied rock riprap can minimize maintenance requirements.
- Rock must be sized and placed properly to be effective. Refer to ADOT Drainage Manual.
- A sediment trap below the outlet is recommended if runoff is sediment-laden.
- Use sound, durable and angular rock for best results.

Inspections

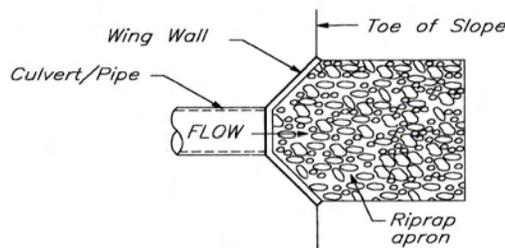
- Follow inspection schedule required in the CGP Part IV.H.
- Inspect for displacement of riprap or damage to underlying fabric, and signs of scour beneath the riprap or around the outlet.

Maintenance

- Replace rock and repair apron and slopes as needed.



WELL DEFINED CHANNEL PIPE OUTLET



UN-DEFINED CHANNEL PIPE OUTLET

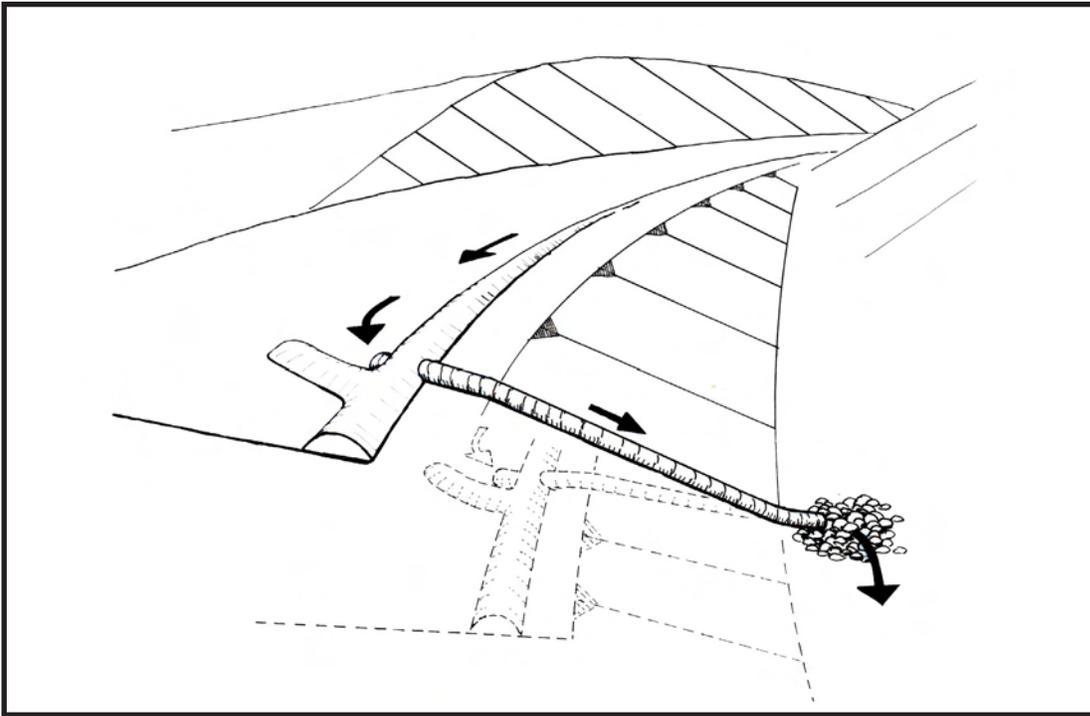
NOTES:

1. Area, depth, and size of riprap are based on culvert or pipe size and hydraulic flow calculations.
2. Pipes and culverts should also include erosion protection around the inlet and outlet structures (see BMP No. 6A Erosion Protection at Structures).

ROCK OUTLET PROTECTION

not to scale

Slope Drains



5.2.5 Slope Drains

Definition

A temporary drain used to intercept and convey runoff into a stabilized drainage.

Purpose

- To prevent soil erosion.

Appropriate Applications

- Installed where slopes may be eroded by surface runoff.
- Typically used in conjunction with top of slope diversion berms, dikes or swales or temporary embankment curbs.
- 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.

Standards and Specifications

Design and Layout

- Size of area to be drained must be taken into consideration. Typically, no more than 5 acres shall be drained by one pipe. For larger areas, use a rock-lined channel or a series of pipes.
- Direct runoff into stabilized drainages.
- Inlet installation is critical because it is a common point of failure. Consider use of erosion control blanket at inlets.
- Outfall must be protected by riprap. For that reason, installation is typically limited to maximum grades of 2:1(v:h). Installation on steeper slopes is difficult.
- Consider flared end section for high volume discharges.
- Slope drains can be placed on the surface of slopes or installed below grade.
- Recommended materials for pipes are PVC, ABS or comparable.
- If a pipe slope drain is conveying sediment-laden water all flows shall be directed into a sediment-trapping device.

Installation

- Install as directed in contract documents. Drains shall be perpendicular to slope contours.
- All slope drain pipe sections shall be securely fastened together with a watertight seal and shall be securely anchored into the soil.
- Follow requirements for diversion dikes/swales to construct diversions used to direct runoff into a slope drain. Compact soil around and under inlet, outlet, and along length of pipe.
- The area below the outlet must be stabilized with a riprap apron. Refer to Erosion Protection and Structures Detail E-2.

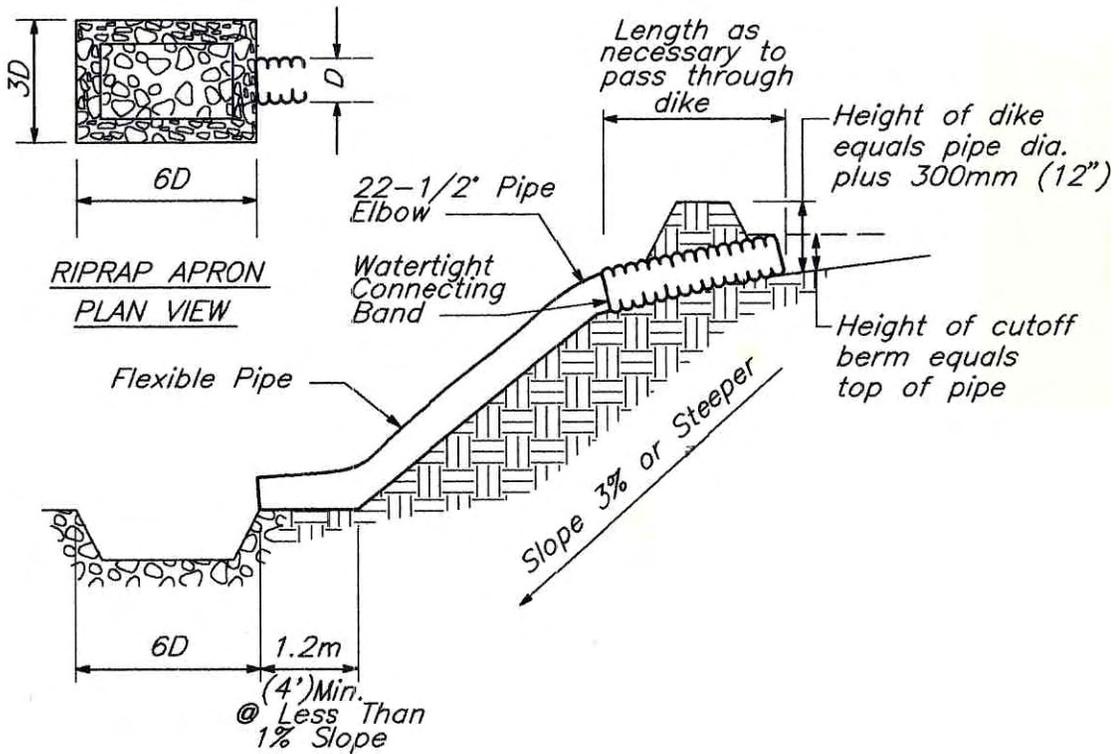
Inspections

- Follow inspection schedule required in Construction General Permit Part IV.H.
- Inspect for structural integrity, blockage, and stability at the inlet and outlet.
- Inspect for downstream scour; remedy as required.

Maintenance

- Reinforce inlet with compacted soil or sandbags if problems occur.
- If outlet flow is directed to a sediment-trapping device, sediment should be removed as specified in for that device.

Riprap shall consist of 150mm (6") dia. stone placed as shown. Depth of apron shall equal the pipe dia. and riprap shall be a min. of 300mm (12") in thickness.



FLEXIBLE PIPE SLOPE DRAIN

not to scale

5.3 SEDIMENT CONTROL BEST MANAGEMENT PRACTICES

Temporary sediment control practices include those measures that intercept and slow or detain the flow of storm water to allow sediment to settle and be trapped and include the following BMPs:

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Sediment Control Berm



5.3.1 Sediment Control Berm

Definition

A temporary sediment barrier consisting of salvaged topsoil, surface soils and/or compacted vegetation pushed into a small berm at midslope locations or at the 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 topsoil for future plating on slopes.

Appropriate Applications

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

Limitations

- May require additional BMPs where concentrated flows are involved.
- Can create a temporary sedimentation pond on the upstream side of the berm.
- Must be graded out prior to application of BMPs and seed to final slopes.
- Additional BMPs are required where profile slopes exceed 3%.

Standards and Specifications

General

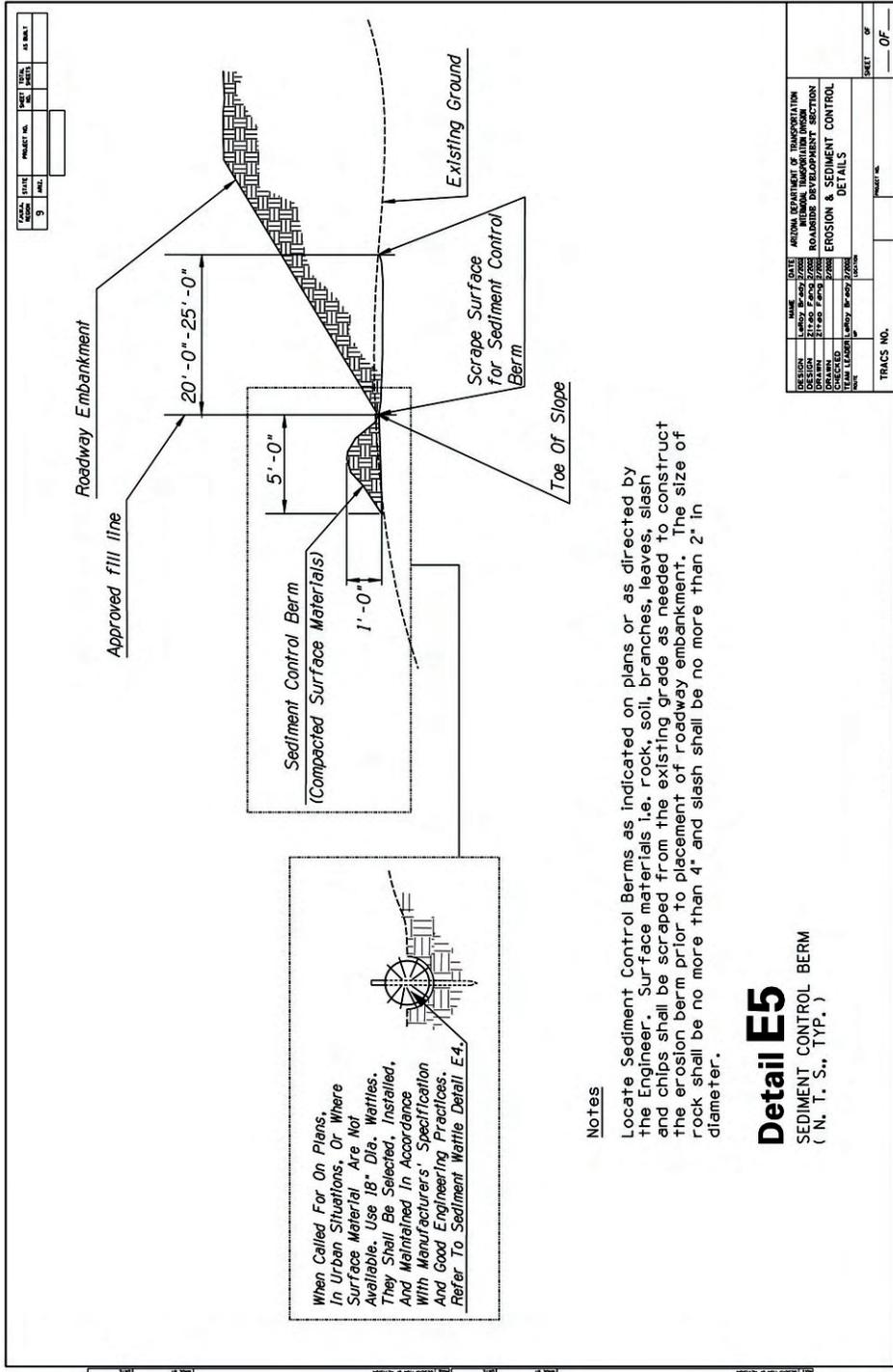
- Berm soil shall be stabilized to prevent erosion.

Installation

- Salvage topsoil as directed in the project plans or by the Engineer.
- Create a stabilized weir where runoff will pond and overtop berm.

Inspections and Maintenance

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for breaks and erosion in berms.
- Repair as necessary.
- Remove berm when up-slope area has been permanently stabilized. Grade area to blend in with adjacent ground.



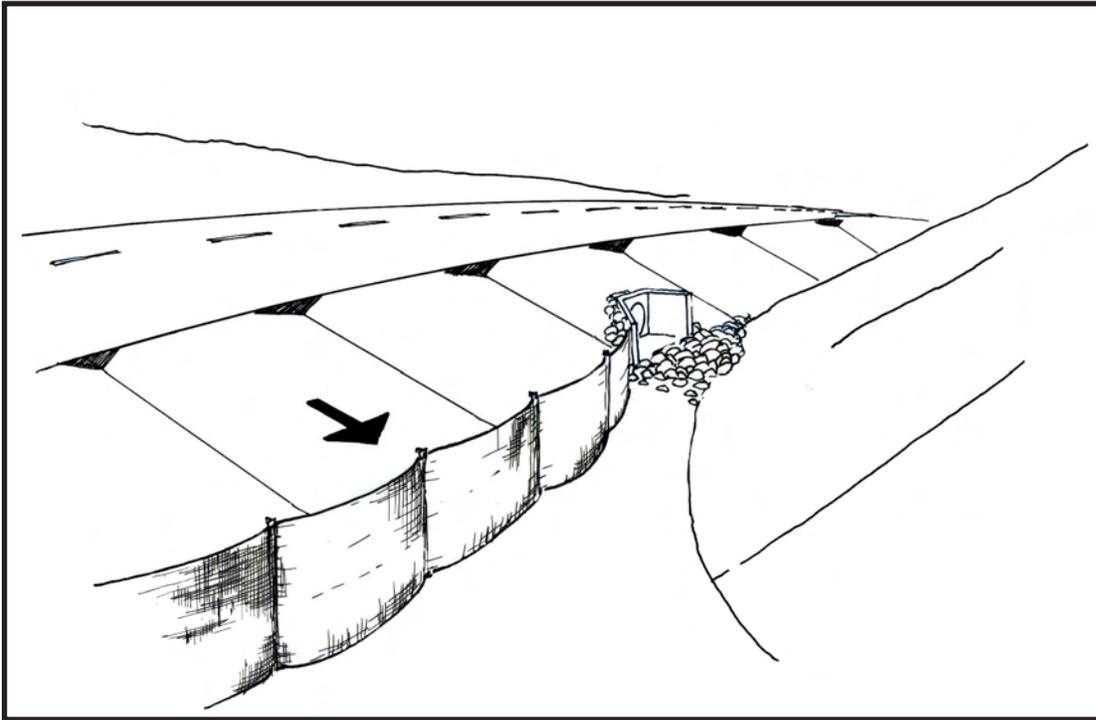
NOTES

Locate Sediment Control Berms as indicated on plans or as directed by the Engineer. Surface materials i.e. rock, soil, branches, leaves, slash and chips shall be scraped from the existing grade as needed to construct the erosion berm prior to placement of roadway embankment. The size of rock shall be no more than 4" and slash shall be no more than 2" in diameter.

Detail E5
 SEDIMENT CONTROL BERM
 (N. T. S., TYP.)



Silt Fence



5.3.2 Silt Fence

Definition

A temporary sediment barrier consisting of a filter fabric that is entrenched into the soil 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.

Appropriate Applications

- At downstream perimeter of disturbed site.
- Below the toe of exposed and erodible slopes and soil stockpiles.
- Above active riparian areas as a last line of defense.
- As check dams in swales and ditches with flow velocities of less than 1.0 ft³/s.
- Around area drains or inlets located in a sump.

Limitations

- Not practical where large flows are involved.
- Will not halt slope creep or slumping.
- Can create a temporary sedimentation pond on the upstream side of the fence and cause temporary flooding.

- Must be removed following final approved stabilization of disturbed area.
- Typical fabric lifespan is between five and eight months.

Standards and Specifications

General

- Filter fabric must be trenched in to be effective.
- Upstream drainage area is limited to 1 acre/100 feet of silt fence.
- Use caution when installing in highly erodible soils: sediment-laden sheetflow may collapse fence.

Design and Sizing Criteria

Maximum Allowable Slope Length

- Select filter fabric based on soil conditions at the project site. Refer to manufacturer's specifications.
- Wire mesh backing and posts shall be sized as specified in the contract documents.

Installation

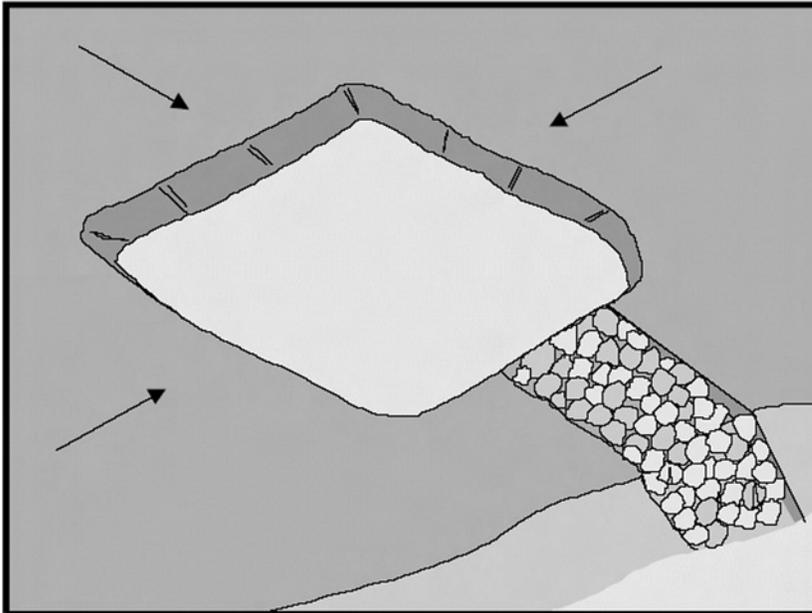
- Compact backfill for tight seal at base.
- Install fence along contour of slopes.
- Overlap seams between sections.
- Finish with ends up-slope to prevent runoff around fence.
- Consider installing fence a minimum 5 feet away from toe of slope to allow space for ponding.
- Provide sufficient room for sediment removal equipment between the silt fence and the toe of slope, or other obstructions.

Inspections and Maintenance

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for depth of sediment, splits or tears in fabric, undercutting, fabric attachment to the fence posts and to confirm that the posts are firmly in the ground.
- Repair as necessary.
- 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 the right-of-way.
- Remove fence when up-slope area has been permanently stabilized. Fill and compact post holes and fabric trench, remove accumulated sediment and grade area to blend in with adjacent ground.



Desilting Basin/Sediment Trap



5.3.3 Desilting Basin/Sediment Trap

Definition

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

Purpose

- To slow the velocity of runoff and allow sediment to settle out before the water is discharged.

Appropriate Applications

- Projects under construction during the rainy season.
- Where sediment-laden water may enter the drainage system or watercourses.
- At outlets of disturbed soil areas measuring between 5 and 10 acres.

Limitations

- Alternative BMPs should be considered before selecting temporary basins.
- Require large surface areas to permit settling of sediment.
- Not appropriate for drainage areas greater than 75 acres.
- Not appropriate in live streams.
- If safety is a concern, basins may require protective fencing.
- Size may be limited by availability of right-of-way.

Standards and Specifications

For common drainage locations that serve an area with 10 or more acres disturbed at one time, a temporary (or permanent) sediment basin that provides storage for a calculated volume of runoff from a 2-year, 24-hour storm from each disturbed area drained must be provided where attainable until final stabilization of the site. Where no calculation has been performed, a temporary (or permanent) sediment basin, providing 3,600 cubic feet of storage per acre drained, shall be provided where attainable until final stabilization of the site (*APDES General Permit*).

- Limit the contributing area to the basin to only runoff from disturbed soil areas. Where possible, use temporary dikes and swales to divert runoff from undisturbed areas away from the basin.
- Basin length shall be more than two times basin width; the length shall be measured by measuring the distance between the inlet and outlet.
- Basin depth must be 3 feet minimum and 5 feet maximum.
- A professional Civil Engineer registered with the state of Arizona shall design basins with an impounding levee greater than 5 feet tall, measured from the lowest point of the impounding area to the highest point of the levee, and basins capable of impounding more than 35,000 cubic feet. The design must be submitted to the Engineer for approval at least 7 days prior to the basin construction. The design shall include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the basin outlet and bypass structures.
- Design and locate basins so that they can be maintained. Construct basins prior to the rainy season and construction activities.
- Basins, regardless of size and storage volume, shall include features to accommodate overflow or bypass flows that exceed the design storm event. The calculated basin volume and proposed location shall be submitted to the Engineer for approval at least 3 days prior to the basin construction.
- Basins shall be designed to drain within 72 hours following storm events.
- The outflow from the basin shall be provided with outlet protection to prevent erosion and scouring of the embankment and channel.
- Basin shall be located: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where post-construction (permanent) detention basins will be constructed, (3) where failure would not cause loss of life or property damage, and (4) where the basins can be maintained on a year-round basins to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area, and to maintain the basin to provide required capacity.
- Areas under embankments, structural works, and basin must be cleared, stripped of vegetation in accordance with Standard Specifications.

Desilting Basin/ Sediment Trap

- Basin inlets shall be located to maximize travel distance to the basin outlet.
- Rock or vegetation shall be used to protect the basin inlet and slopes against erosion.
- A forebay, constructed upstream of the basin may be provided to remove debris and larger particles.
- Principal outlet shall consist of a corrugated metal, high density polyethylene (HDPE), or reinforced concrete riser pipe with dewatering holes and an anti-vortex device and trash rack attached to the top of the riser, to prevent floating debris from flowing out of the basin or obstructing the system. This principal structure shall be designed to accommodate the inflow design storm.
- Structure shall be placed on a firm, smooth foundation with the base securely anchored with concrete or other means to prevent floatation.
- Attach riser pipe (watertight connection) to a horizontal pipe (barrel) that extends through the embankment to toe of fill. Provide anti-seep collars on the barrel.
- Cleanout level shall be clearly marked on the riser pipe.
- Avoid dewatering of groundwater to the basin during the rainy season. Insignificant quantities of accumulated precipitation may be dewatered to the basin unless precipitation is forecasted within 24 hours.
- Chain link fencing shall be provided around each basin to prevent unauthorized entry to the basin or if safety is concern. Fencing shall be in accordance with Standard Specifications.
- One of the dewatering configurations shown below for the principal outlet may be used. The contractor shall verify that the outlet is properly designed to handle the design and peak flows.

Installation

Outlet #1

- Perforate the top one-third of the riser with 0.5-inch diameter holes spaced 8 inches vertically and 10 to 12 inches horizontally.
- Wrap with well-secured filter fabric.
- Place ¾-inch gravel over perforated holes to approximately 2-inch minimum thickness to assist in prevention of clogging of dewatering holes. Gravel will naturally settle into a cone surrounding the riser pipe.

Outlet #2

- Perforate the lower one-half of the riser pipe with 0.5-inch diameter holes spaced approximately 3 inches apart, in each outside valley (corrugated metal pipe).
- Place ¾-inch gravel over perforated holes to approximately 2-inch minimum thickness to assist in prevention of clogging of dewatering holes. Gravel will

naturally settle into a cone surrounding the riser pipe.

Outlet #3

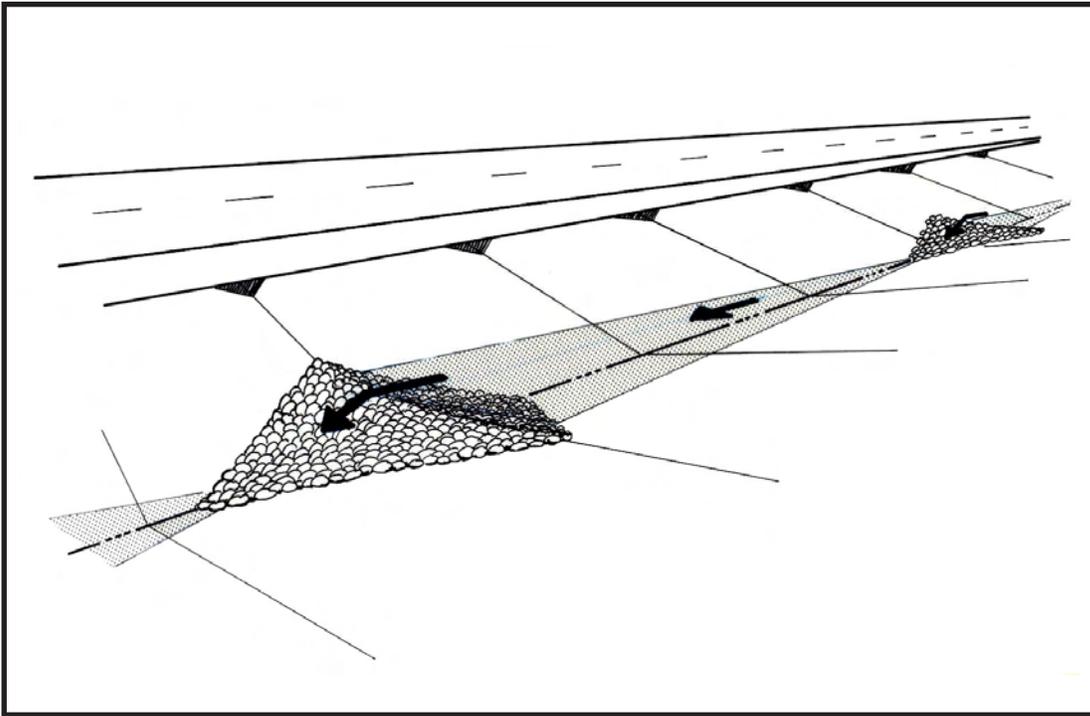
- Provide two 1-inch diameter holes above the sediment storage volume on opposite sides of the non-perforated riser pipe. This will typically provide sufficient detention time for basins to drain approximately 10 acres.
- Construct an emergency spillway to accommodate flows not carried by the principal spillway. Spillway shall consist of an open channel (earthen or vegetated) over undisturbed material (not fill) or constructed of a non-erodible riprap.
- Spillway control section, which is a level portion of the spillway channel at the highest elevation in the channel, shall be a minimum of 20 feet in length.
- Use outlet protection at the pipe outlet.

Inspections and Maintenance

Follow inspection Schedule required in Construction General Permit Part IV.H.

- Examine basin banks for seepage and structural soundness.
- Check inlet and outlet structures and spillway for any damage, obstructions or erosion.
- Repair damage, remove obstructions and stabilize if required or if directed by the Engineer.
- Remove sediment when storage zone is one-third full.
- Check barrier fencing and repair if needed or directed by the Engineer.
- Inspect temporary basins before and after rainfall events and weekly during the rest of the rainy season. During extended rainfall events, inspect at least every 24 hours.
- Examine basin banks for seepage and structural soundness.
- Check inlet and outlet structures and spillway for any damage or obstructions. Repair damage and remove obstructions as needed, or as directed by the Engineer.
- Check inlet and outlet area for erosion and stabilize if required, or if directed by the Engineer.
- Remove sediments when storage zone is one-third full.
- Check fencing for damage and repair as needed or as directed by the Engineer.

Check Dams



5.3.4 Check Dams

Definition

A small temporary or permanent dam constructed in a swale or channel.

Purpose

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

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 or swales that need protection during the establishment of grass linings.

Limitations

- Not to be used 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 Recovery Zone.

Standards and Specifications

General

Specific design criteria apply if check dam is located within the clear zone.

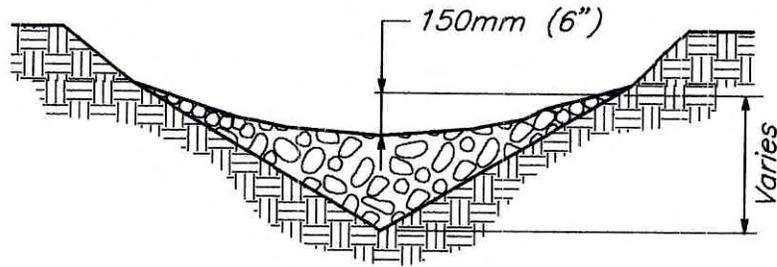
- Must be designed and constructed with adequate spillways, dissipater aprons and tie-ins to the channel banks and/or bed to protect the channel and structure during times of peak flow.
- In locating the check dam, consideration shall be given to the effects and the reach of the impounded water and sediment.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

Installation

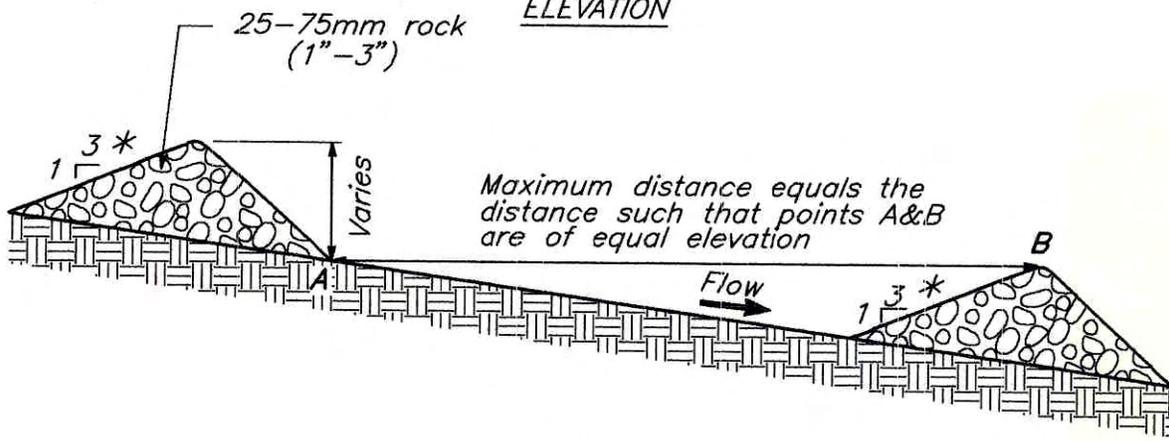
- Rock shall be placed to achieve complete coverage of the channel or swale.
- The center of the dam shall be lower than the edges.

Inspections and Maintenance

- Follow inspection schedule required in CGP Part IV.H.
- 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.



ELEVATION



SECTION

* Slope shall be 1V:6H if check dam is within the clear zone.

ROCK CHECK DAM

not to scale



Sediment Wattles



5.3.5 Sediment Wattles

Definition

Aspen wood excelsior, straw, flax or other similar materials that are rolled and bound into tight tubular rolls and placed on the face of slopes at regular intervals depending on the steepness of the slope.

Purpose

- Intercept runoff, reduce flow velocities, and promote infiltration.
- Release runoff as sheet flow.
- Reduce sediment from runoff.

Appropriate Applications

- At the top, face and at grade breaks of exposed and erodible slopes.
- As check dams for small runoff volumes.

Limitations

- Offer a potential for accidental introduction of undesirable weed species if filled with straw.
- Not to be used in place of linear sediment barrier such as silt fence.

Standards and Specifications

- Materials shall be certified to be weed-free.
- Can be prefabricated or rolled tubes of erosion control blanket.
- Consideration shall be given to predation of wattles by herbivores. Some materials are more palatable to wildlife and cattle than others.
- Consideration shall be given to required lifespan of wattles. Excelsior wattles wrapped in polyethylene, jute or shredded coconut may extend lifespan up to 3 years.
- Typically left in place following final approval of soil stabilization.

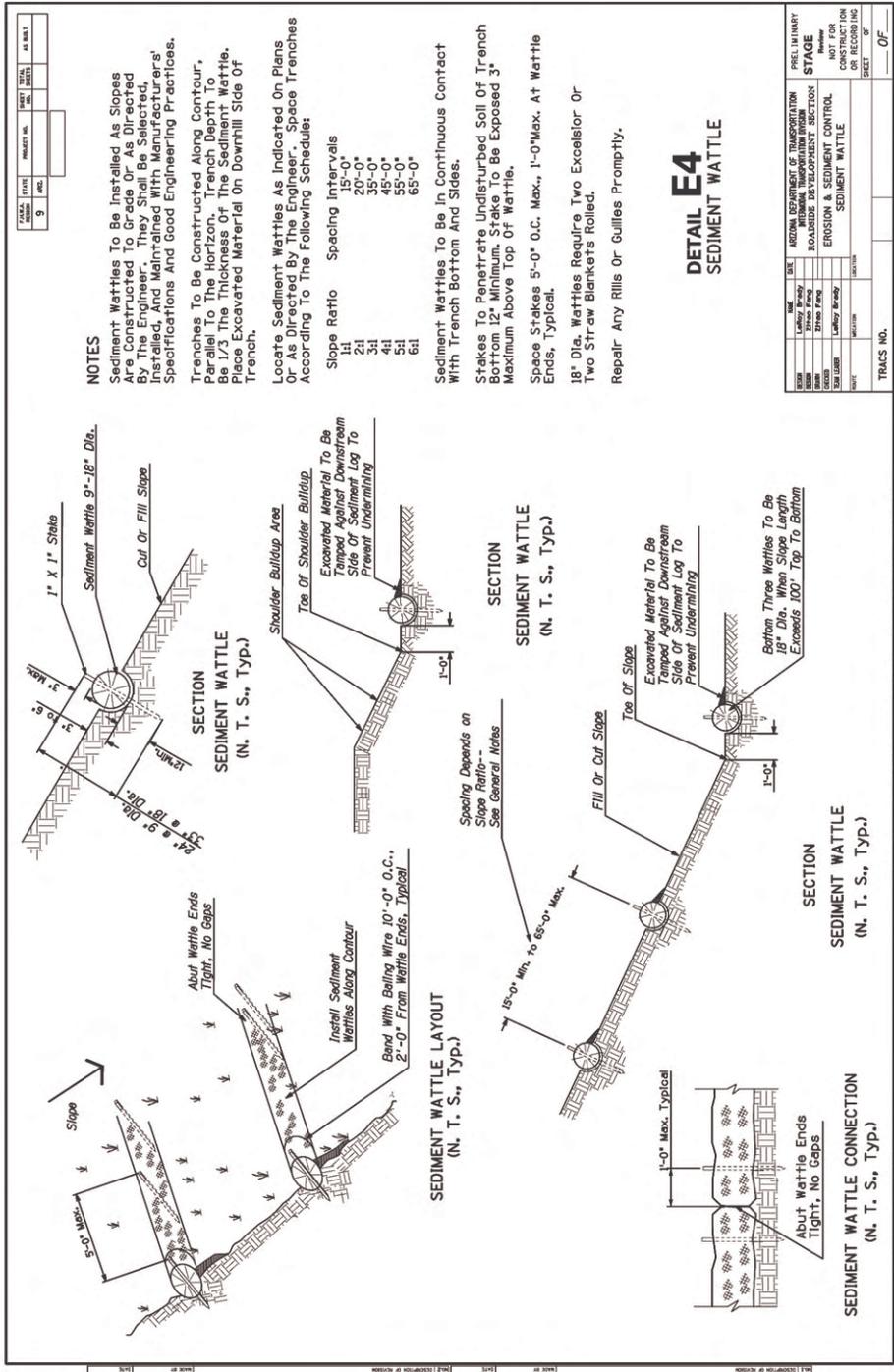
Installation

- Wattles shall be installed as indicated on the plans, or as directed by the Engineer and in accordance with manufacturer's specifications.
- Typical installations are as follows:

Steeper than 2 (H): 1 (V) slopes	10-foot spacing
2:1 to 3:1 slopes	20-foot
Greater than 3:1 slopes	30-foot
- The important consideration is to prevent undercutting of wattle. Therefore, subgrade preparation as directed is essential.
- Wattles may be staked with hardwood or pine stakes.

Inspections and Maintenance

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for tears, split or unraveling rolls and the evidence of erosion due to the failure of the device to reduce runoff velocity. Repair or replace as required.
- Repair any rills or gullies promptly.
- Where used as check dams, dispose of sediment when it reaches one-third the height of the wattle. Removed sediment shall be incorporated into the project at locations approved by the Engineer or removed from the right-of-way.



NOTES

Sediment Wattles To Be Installed As Slopes Are Constructed To Grade Or As Directed By The Engineer. They Shall Be Directed Into The Trench From The Downhill Side. Install Wattles In Accordance With Manufacturers' Specifications And Good Engineering Practices. Trenches To Be Constructed Along Contour, Parallel To The Horizon. Trench Depth To Be 1/3 The Thickness Of The Sediment Wattle. Place Excavated Material On Downhill Side Of Trench.

Locate Sediment Wattles As Indicated On Plans Or As Directed By The Engineer. Space Trenches According To The Following Schedule:

Slope Ratio	Spacing Intervals
1:1	10'-0"
2:1	20'-0"
3:1	35'-0"
4:1	45'-0"
5:1	55'-0"
6:1	65'-0"

Sediment Wattles To Be In Continuous Contact With Trench Bottom And Sides.

Stakes To Penetrate Undisturbed Soil Of Trench Bottom 12" Minimum. Stakes To Be Exposed 3" Maximum Above Top Of Wattle.

Space Stakes 5'-0" O.C. Max., 1'-0" Max. At Wattle Ends, Typical.

18" Dia. Wattles Require Two Excelsior Or Two Straw Blankets Rolled.

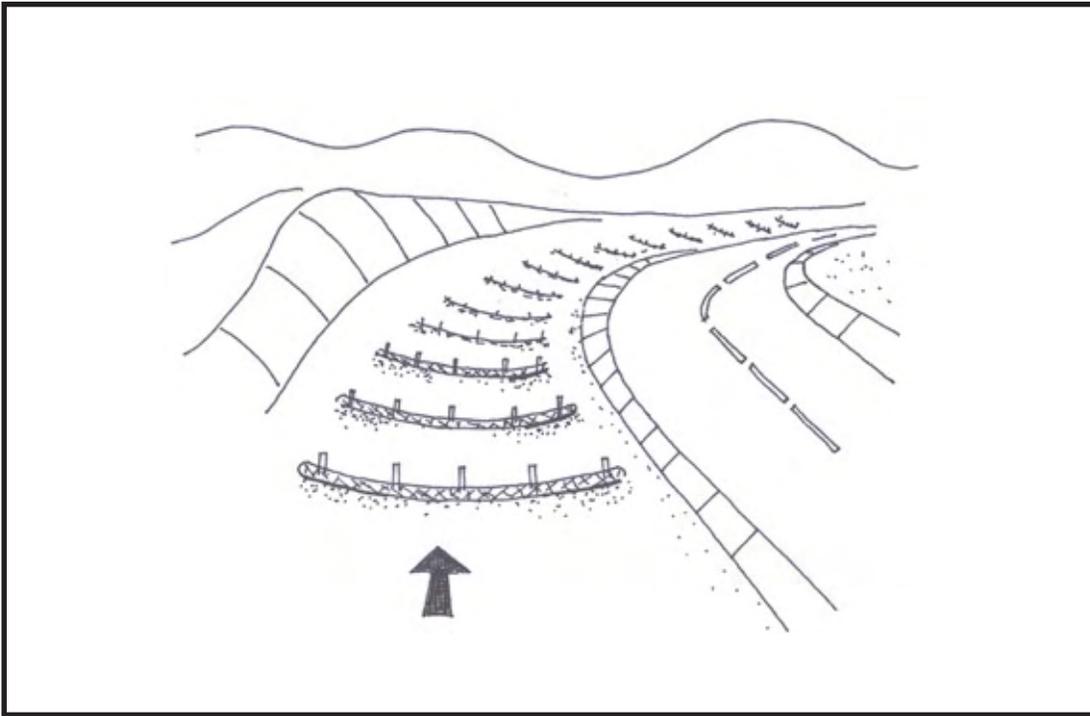
Repair Any Rills Or Gullies Promptly.

**E4
SEDIMENT WATTLE**

DATE	DESCRIPTION	PRELIMINARY
DESIGNED BY	ADDITIONAL DEPARTMENT OF TRANSPORTATION	STAGE
CHECKED BY	ROADSIDE DEVELOPMENT SECTION	REVISION
DATE	DESCRIPTION	CONSTRUCTION
DATE	DESCRIPTION	OR RECORDING
DATE	DESCRIPTION	SHEET
DATE	DESCRIPTION	OF



Sediment Logs



5.3.6 Sediment Logs

Definition

Aspen wood excelsior, straw, flax, compost, or other material that has been bound into a tight tubular roll.

Purpose

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

Appropriate Applications

- As check dams in roadway ditches and channels downstream of disturbed soils.
- Around storm drain inlets associated with disturbed areas.
- Outfalls of small drainage channels or structures.

Limitations

- Not practicable where large flows are involved.
- Offer a potential for accidental introduction of undesirable weed species if filled with straw.
- Not suitable for rock subgrades where stakes cannot be securely installed.

Standards and Specifications

- Install as located on the plans or as directed by the Engineer. Typical installations are as follows:

Ditch grades greater than 3%	50-foot spacing
Ditch grades less than 3%	100-foot
- Materials shall be certified to be weed-free.
- Consideration shall be given to predation of wattles by herbivores. Some materials (e.g., straw) are more palatable to wildlife and cattle than others (e.g., excelsior).
- Consideration shall be given to required lifespan of logs. Excelsior logs wrapped in polyethylene, jute or shredded coconut may extend lifespan up to 3 years.

Installation

- Install as shown on the plans, or as directed by the Engineer in accordance with the manufacturer's instructions.
- Prepare subgrade to prevent undercutting.
- Sediment logs shall be staked with hardwood or pine stakes. Tops of stakes shall be sunk to top of logs.
- Overlap ends of sediment logs a minimum 24 inches when using more than one length.

Inspections and Maintenance

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for split, torn or unraveling of logs and evidence of erosion due to failure of the installation to reduce flow velocities.
- Dispose of sediment when it reaches one-third the height of the log. Removed sediment shall be incorporated into the project at locations approved by the Engineer or removed from the right-of-way.

PROJECT NO.	SHEET NO.	DATE	SCALE	SHEET	AS BUILT
9	9				

NOTES

Sediment logs shall be located as indicated in plans or as directed by the Engineer. They shall be selected, installed, and maintained with manufacturer's specifications and good engineering practices.

Lay sediment log across prepared channel. Trenching or burial of Sediment Logs is not required. The intimate contact between the bottom of the log and the ground is mandatory. The logs shall be installed in the swale or channel bottom and shall continue up the side slopes 2'-0" above the high flow line, all perpendicular to the flow of water.

Stake with 1" x 1" x 46" min. hardwood stakes on 2-foot centers. The stake shall be placed through the downstream side only 2" into the log. It is only necessary for the stakes to grab one or two inches of the bedding. Do not drive the stakes through the bedding of the log. The stakes must be driven into the ground 24". Center stakes shall be placed in an 'X' pattern.

Make sure no gaps exist between the soil and the sediment logs. Repair any rills or gullies promptly. In rock conditions the Engineer will evaluate the placement of sediment logs.

Slopes steeper than 4:1 shall apply rock riprap for channel/ditch lining or check dams when suitable.

Detail E1

SEDIMENT LOG STORM DRAIN PROTECTION
SECTIONAL VIEW B-B (N. T. S., Typ.)

PLAN

SECTION A-A
(N. T. S., Typ.)

TYPICAL OVERLAP
(N. T. S., Typ.)

During Construction

One stake to be placed at butt joint so that stake on both sides will have intimate contact between top and bottom (typical).

Stake (2" - 4") wedges of soil to be bolted against upstream side of sediment log to prevent undermining.

Stake (2" - 4") wedges of soil to be bolted against downstream side of sediment log to prevent undermining.

Labels in diagrams: Stake (Typ.), Sediment Log - 10' length, Cut Or Fill Slope, Intimate Contact Between Sediment Log And The Ground, High Flow Line, 6" Min. From Edge Of Pavement, 2' (Typ.), 1" x 1" x 46" Hardwood Stake, Storm Drain Inlet, Sediment Log, Concrete Apron B, 2" (Typ.), Flow, Downstream Side, 24", 20" Dia., Tight, No Gaps, 24" Min., Flow, Flow.

DESIGN	DATE	BY	SCALE	PROJECT NO.	TRACES NO.
DRAWN	21-FEB-2000	W. J. G.	AS SHOWN	9	OF
CHECKED	21-FEB-2000	W. J. G.	AS SHOWN		
IN CHARGE	21-FEB-2000	W. J. G.	AS SHOWN		
TEAM LEADER	21-FEB-2000	W. J. G.	AS SHOWN		
SCALE	AS SHOWN				

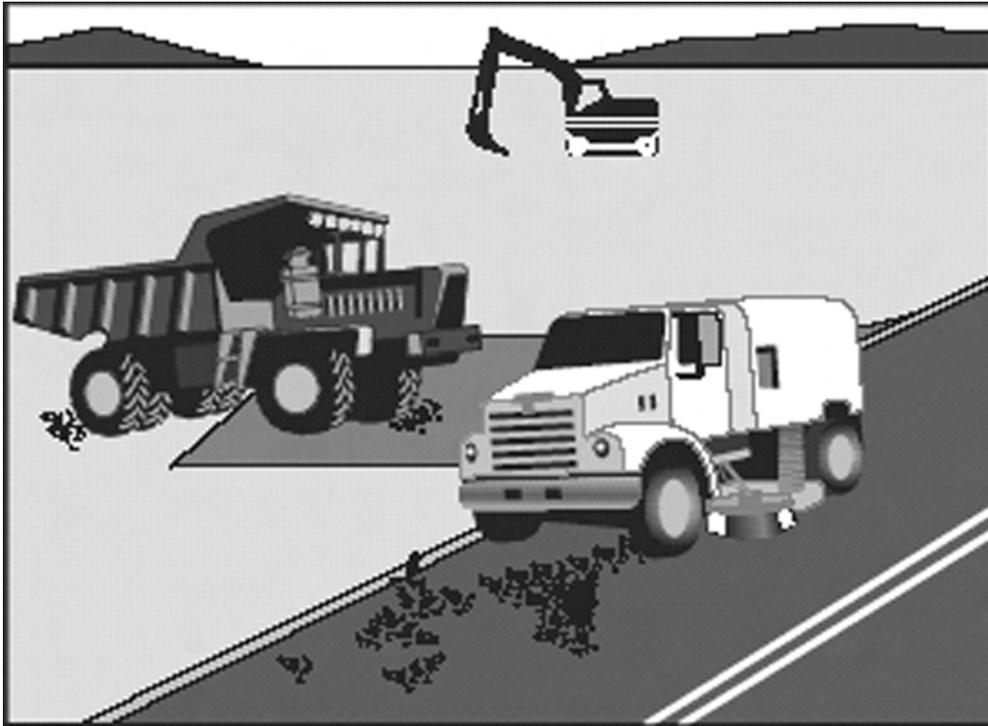
NOTES

Sediment log and stakes to be removed once construction activities are complete. Contractor to dispose of sediment logs and dispose of trapped sediment material and to fill shallow trench created by sediment log.

\\Vg\eng\Users\va3956\DWG\Sediment_Log.dwg 1/27/2000



Street Sweeping and Vacuuming



5.3.7 Street Sweeping and Vacuuming

Definition

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

Purpose

- To keep sediment from entering a storm drain or watercourse.

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 or sticky.

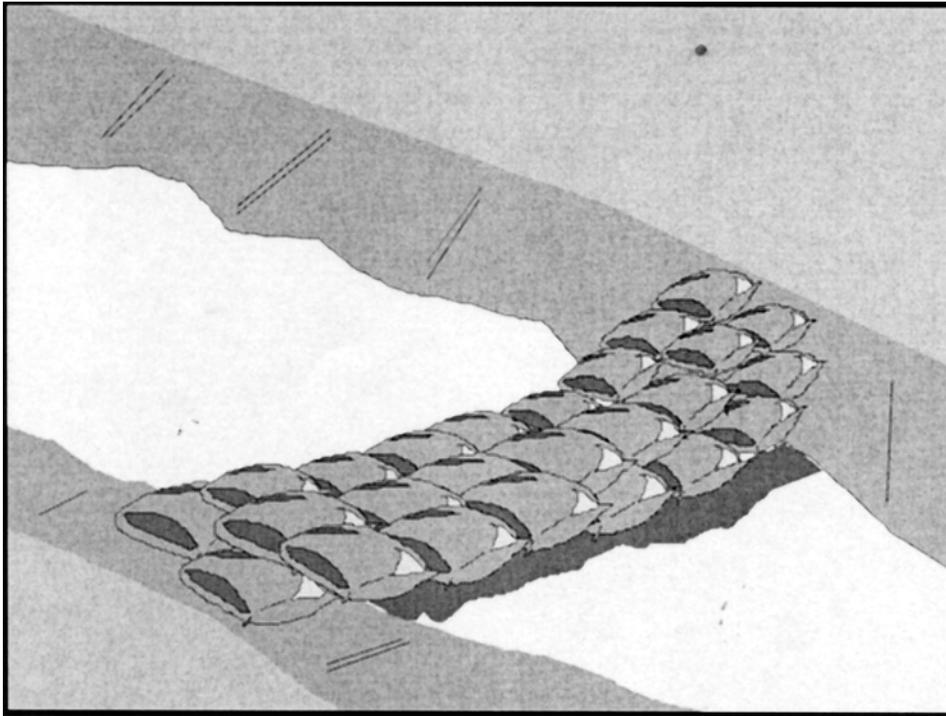
Standards and Specifications

- If not mixed with debris or trash, consider incorporating removed sediment back into project.

Inspections and Maintenance

- Inspect daily construction ingress and egress and other paved areas of sediment accumulation; sweep as necessary or as required by the Engineer.
- Dispose of sweeper waste at an approved dumpsite.

Sand Bag Barrier



5.3.8 Sand Bag Barrier

Definition

A sandbag barrier is a temporary linear sediment barrier consisting of stacked sandbags, designated to intercept and slow the flow of sediment-laden sheet flow runoff.

Purpose

- Sandbag barriers allow sediment to settle from runoff before water leaves the construction site. Sandbags can also be used where flows are moderately concentrated, such as ditches, swales, and storm drain inlets to divert and/or detain flows.

Appropriate Applications

- Along the perimeter of a site.
- Along streams and channels.
- Below the toe of exposed and erodible slopes.
- Down slope of exposed soil areas.
- Around stockpiles.
- Across channels to serve as a barrier for utility trenches or provide a temporary channel crossing for construction equipment, to reduce stream impacts.

- Parallel to a roadway to keep sediment off paved areas.
- At the top of slopes to divert roadway runoff away from disturbed slopes.
- To divert or direct flow or create a temporary sediment basin.
- During construction activities in stream beds when the contributing drainage area is less than 5 acres.
- When extended construction period limits the use of either silt fences or straw bale barriers.
- Along the perimeter of vehicle and equipment fueling and maintenance areas or chemical storage areas.
- To capture and detain non-storm water flows until proper cleaning operations occur.
- When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.
- To temporarily close or continue broken, damaged or incomplete curbs.
- This BMP may be implemented on a project-by-project basis in addition to other BMPs when determined necessary and feasible by the Engineer.

Limitations

- Limit the drainage area upstream of the barrier to 5 acres.
- Degraded sandbags may rupture when removed, spilling sand.
- Installation can be labor intensive.
- Limited durability for long term projects.
- When used to detain concentrated flows, maintenance requirements increase.

Standards and Specifications

Materials

- *Sandbag Material:* Sandbag shall be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight 135 g/m² (four ounces per square yard), mullen burst strength exceeding 2,070 kPa (300 psi) in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70 percent in conformance with the requirements in ASTM designation D4355. Use of burlap is not acceptable.
- *Sandbag Size:* Each sand-filled bag shall have a length of 450 mm (18 in), width of 300 mm (12 in), thickness of 75 mm (3 in), and a mass of approximately 15 kg (33 lb.). Bag dimensions are nominal, and may vary based on locally available materials. Alternative bag sizes shall be submitted to the Engineer for approval prior to deployment.

Sand Bag Barrier

- *Fill Material:* All sandbag fill material shall be non-cohesive, Class 1 or Class 2 permeable material free from clay and deleterious material, conforming to the provisions in Section 68-1.025 “Permeable Material”, of the Standard Specifications. The requirements for the Durability Index and Sand Equivalent do not apply. Fill material is subject to approval by the Engineer.

Installation

When used as a linear control for sediment removal:

- Install along a level contour.
- Turn ends of sandbag row up slope to prevent flow around ends.
- Generally, sandbag barriers shall be used in conjunction with temporary soil stabilization controls up slope to provide effective control.

When used for concentrated flows:

- Stack sandbags to required height using a pyramid approach.
- Upper rows of sandbags shall overlap joints in lower rows.
- Construct sandbag barriers with a setback of at least 3 feet from the toe of a slope.
- Where it is determined to be not practicable due to specific site conditions, the sandbag barrier may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practicable.

Maintenance and Inspection

- Inspect sandbag barriers before and after each rainfall event, and weekly throughout the rainy season.
- Reshape or replace sandbags as needed, or as directed by the Engineer.
- Repair washouts or other damages as needed, or as directed by the Engineer.
- Inspect sandbag barriers for sediment accumulations and remove sediments when accumulation reaches one-third the barrier height. Removed sediment shall be incorporated in the project at locations designated by the Engineer or disposed of outside the highway right-of-way in conformance with the Standard Specifications.
- Remove sandbags when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilize the area.



Storm Drain Inlet Protection



5.3.9 Storm Drain Inlet Protection

Definition

A sediment filter or a temporary or permanent detention area around a storm drain drop inlet.

Purpose

- Prevent sediment from entering storm drain system.

Appropriate Applications

- Use where storm drains are operational prior to permanent stabilization of disturbed drainage area.

Limitations

- Ponding can occur at the inlet with possible short term flooding.
- Can typically handle limited volumes of runoff and sediment. Therefore, requires frequent maintenance. If larger volumes of runoff are anticipated, direct runoff into Desilting Basins or Sediment Traps.

Standards and Specifications

Planning Considerations

- Identify existing and/ or proposed storm drain inlets that must be protected during storm events.
- Inlet protection is only appropriate for drainage areas of less than 1 acre. Route storm water to other sediment trapping devices for areas larger than 1 acre.
- Ensure that ponding will not encroach into highway traffic.

Materials:

Gravel or stone filters

- Gravel or stone filters may be held in place by wire mesh, concrete block or contained in bags.
- Gravel or stone shall be washed to remove sand and sediment that could wash into the storm drain system.

Filter Fabric

- Filter Fabric may be secured over the top of a drainage inlet with rocks or placed around the inlet and installed using silt fence specifications.
- Do not place fabric under the grate as the collected sediment may fall into the drain when the fabric is retrieved.
- Fabric placed on inlets surrounded by concrete or asphalt shall be anchored sufficiently to prevent runoff from pulling fabric away from inlet.
- Commercially available filter fabric inlet protection shall be installed according to manufacturer's specifications.

Sediment logs

- Sediment logs may be wrapped around storm drain inlets because of their flexible nature.
- Secure with stakes if inlet apron is not paved.

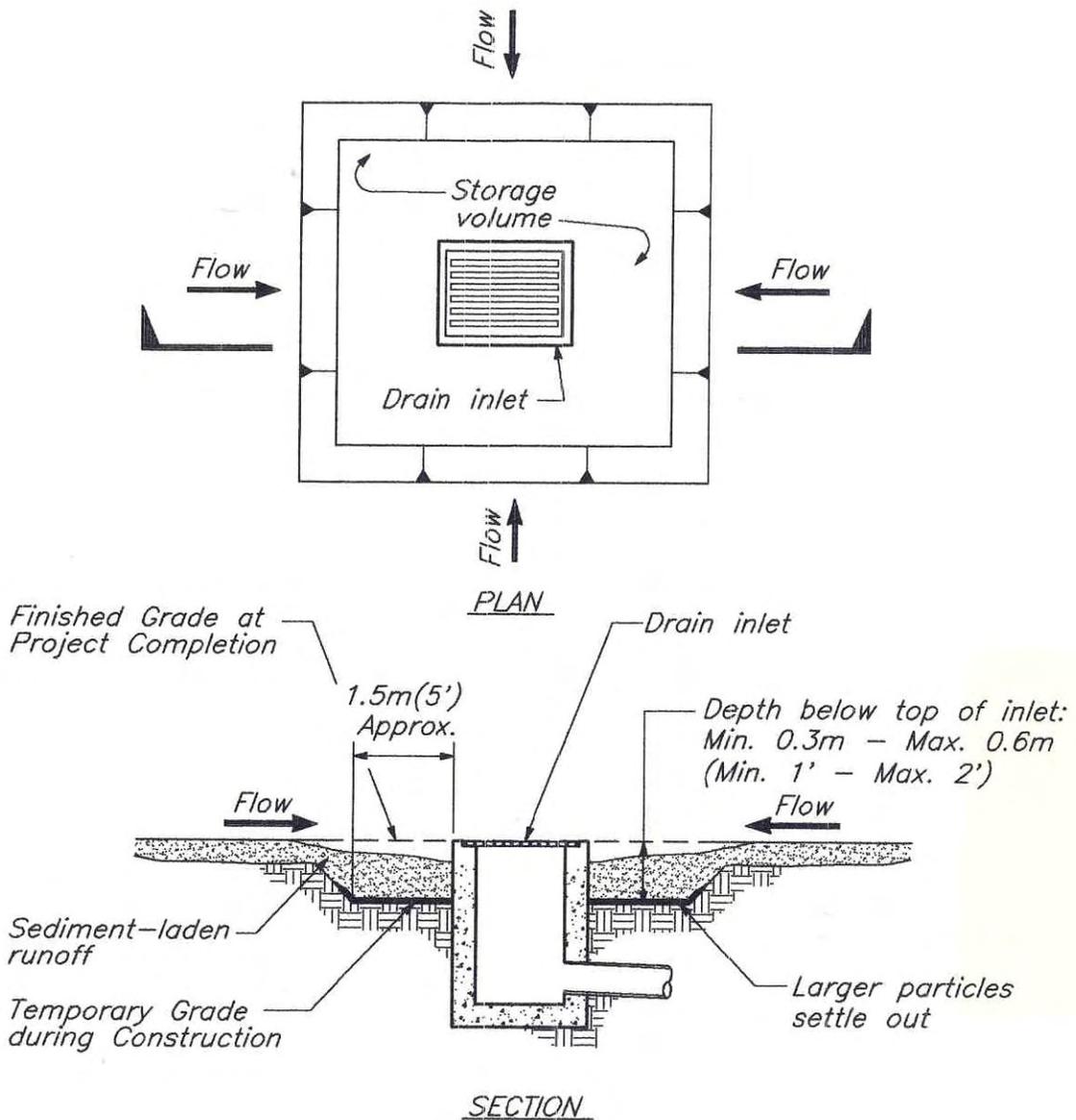
Excavated drop inlet sediment traps

- Excavated drop inlet sediment traps are appropriate when inlet is not surrounded by concrete or asphalt and drainage area is not greater than 1 acre.
- Inlet sediment traps should include sediment sumps of 1-2 feet in depth with side slopes a maximum of 1:2(v:h).

Storm Drain Inlet Protection

Inspections and Maintenance

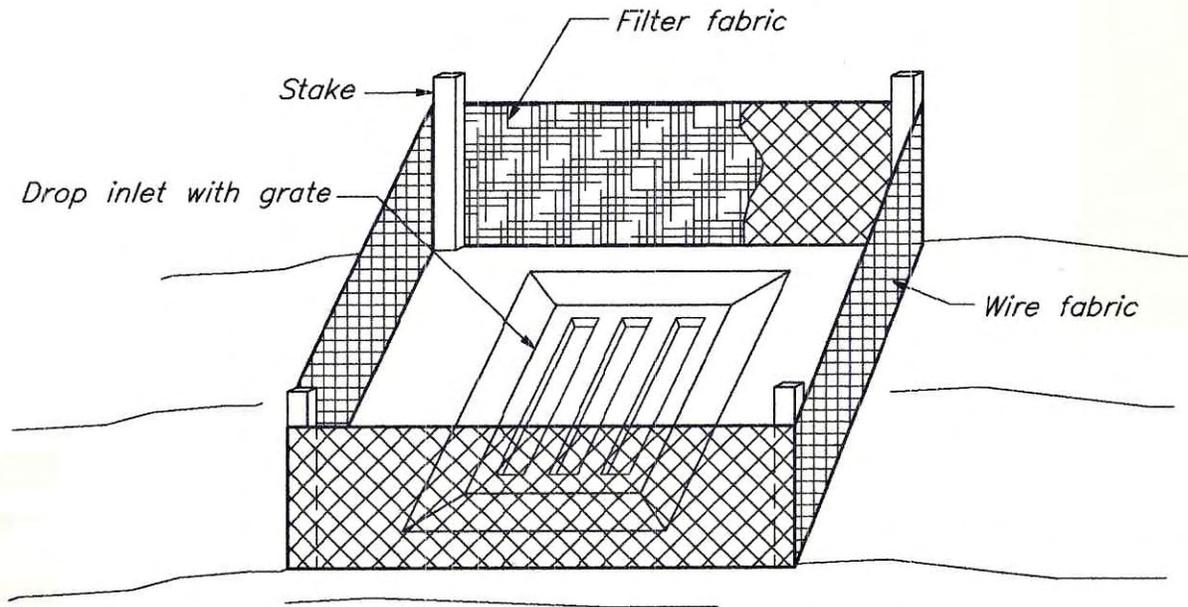
- Follow inspection schedule required in CGP Part IV.H.
- Inspect for damage, failure to filter sediment, accumulation of sediment that should be removed, and damage from temporary flooding that may have occurred during a storm event. Repair as necessary.
- Replace filter fabric if it becomes clogged.
- Remove sediment after each rainfall event and as specified in the contract documents or as directed by the Engineer.
- Remove all inlet protection devices within 30 days after site is stabilized or when inlet protection is no longer needed. Regrade and stabilize disturbed areas as necessary.



This method of inlet protection is applicable where heavy flows are expected and where an overflow capability and ease of maintenance are desirable.

STORM DRAIN INLET PROTECTION

not to scale



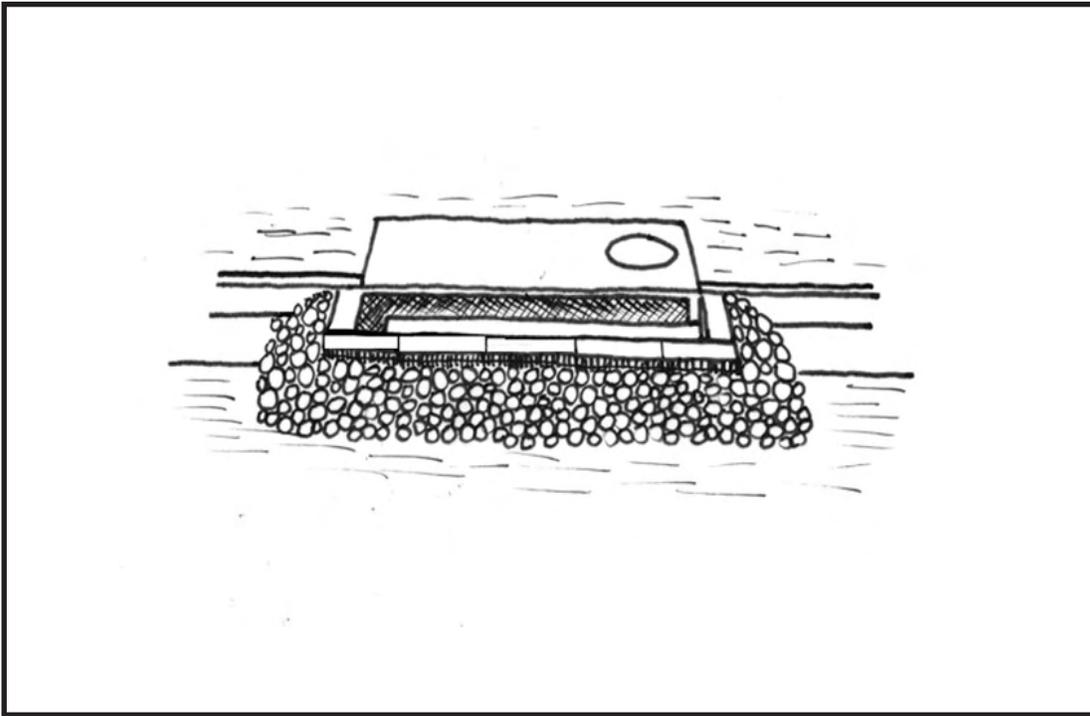
PERSPECTIVE

STORM DRAIN INLET PROTECTION

not to scale



Curb Inlet Protection



5.3.10 Curb Inlet Protection

Definition

A temporary filtering device placed around completed curb inlets before final stabilization has been achieved.

Purpose

- To prevent sediment from entering the storm water system.

Appropriate Applications

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

Limitations

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

Standards and Specifications

Materials

- Gravel or stone held in place by wire mesh, concrete block or contained in bags is the traditional method of protecting curb inlets from sediment. Gravel or stone should be washed to remove sand and sediment that could wash into the storm drain system.
- The erosion control industry has developed two types of products for this purpose: (1) filtering devices that remain at street level and are installed across the curb inlet; (2) filtering devices that are placed within the catch basin. Follow manufacturer's specifications when installing specific curb inlet protection products.

Inspections and Maintenance

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for damage, failure to filter sediment, accumulation of sediment that should be removed, and damage from temporary flooding that may have occurred during a storm event.
- Repair as necessary.



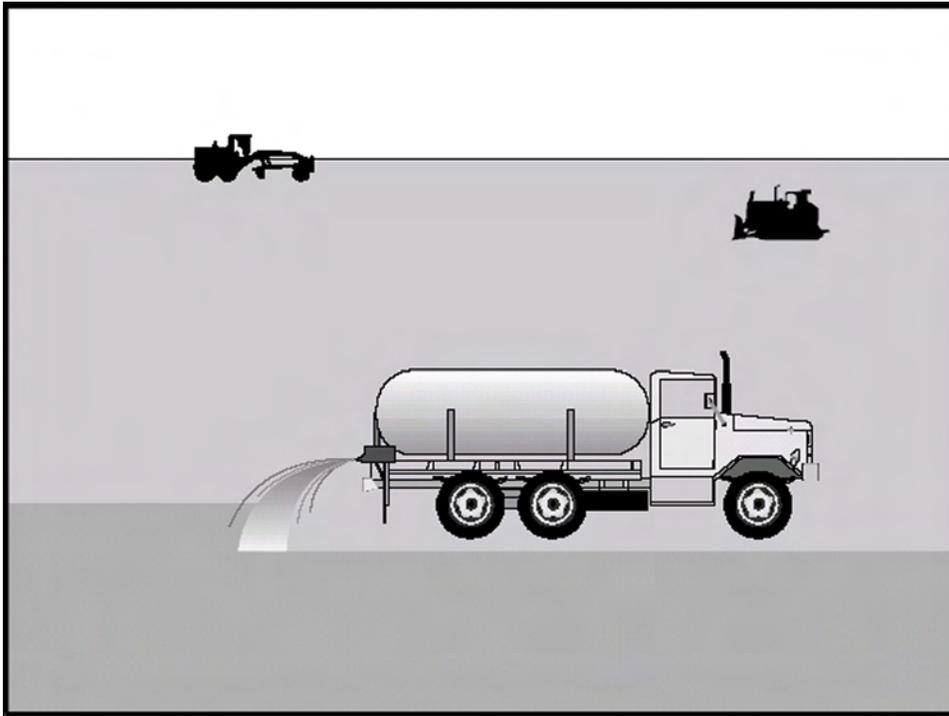
TEMPORARY BEST MANAGEMENT PRACTICES

5.4 WIND EROSION CONTROL BEST MANAGEMENT PRACTICES

Wind erosion control consists of applying water or other dust palliatives as necessary to prevent or alleviate dust nuisance. Temporary Soil Stabilization BMPs described earlier in this chapter may also be appropriate.

5.4.1 Wind Erosion Control 120

Wind Erosion Control



5.4.1 Wind Erosion Control

Definition

The application of water or chemical dust palliatives as necessary to prevent or alleviate dust nuisance.

Purpose

- To prevent the movement of soil particles by the wind causing air pollution and eventual sediment release into the waters of the U.S.

Appropriate Applications

- Implement on all soil surfaces exposed to wind including stockpiles.

Limitations

- Effectiveness depends on soil, temperature, humidity, and wind velocity.
- May cause surface to become slippery.

Standards and Specifications

- Follow federal, state, and local air quality regulations and guidelines.
- 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 whenever feasible.
- Materials applied as temporary soil stabilizers and soil binders, such as erosion control blankets or mulches, will also provide wind erosion benefits.
- Follow ADOT standard Specifications for Road and Bridge Construction.

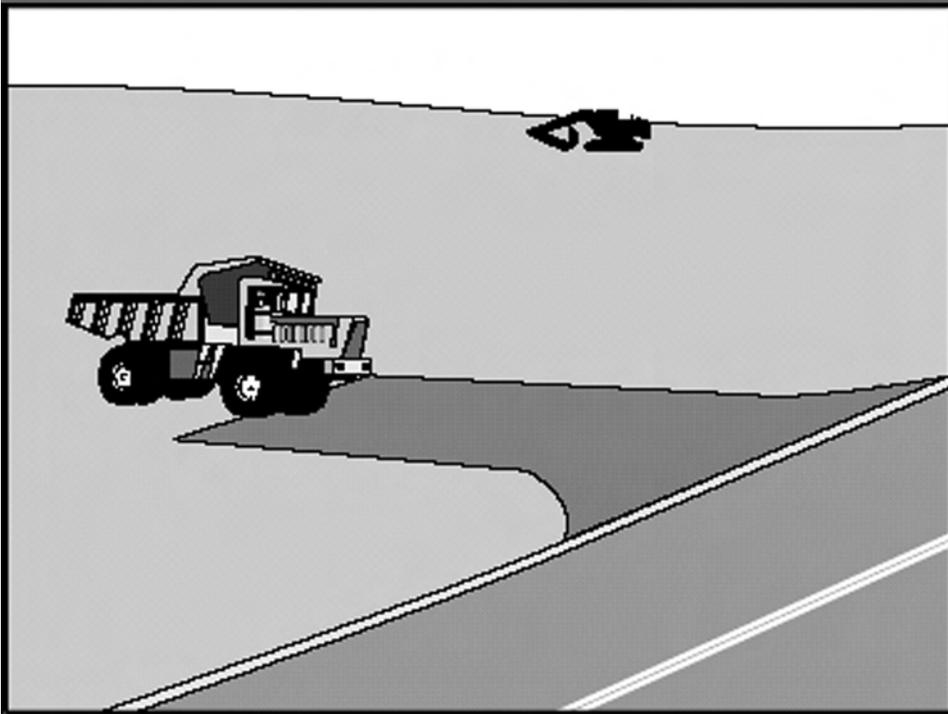


5.5 TRACKING CONTROL BEST MANAGEMENT PRACTICES

Tracking control consists of preventing or reducing vehicle tracking from entering a storm drain or watercourse and includes the following:

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Stabilized Construction Entrance/Exit



5.5.1 Stabilized Construction Entrance/Exit

Definition

A temporary stabilized vehicular entrance, located where traffic will enter and exit a construction site.

Purpose

- To reduce or eliminate the tracking of sediment onto public right-of-way, streets, sidewalk, or parking areas where it can potentially be washed into local storm drains or become airborne pollution.

Appropriate Applications

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

Limitations

- Entrances must be planned and reviewed as part of the project traffic control plan.

- Increases construction cost
- Not very effective at removing sediment from equipment leaving the construction site.

Planning Considerations

- Entrances are more effective if designed in conjunction with tire wash area.
- Water source for tire wash must be provided.

Design and Sizing Criteria

- Entrances must be properly graded to prevent runoff from leaving the construction site.
- Entrances should drain to a sediment trap or sediment basin
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.
- Place aggregate over geotextile fabric to prevent sediment from the base material from migrating into the aggregate.
- Aggregate should be angular, fractured rock.
- Aggregate should be 12 inches deep, 3 to 6 inches in size and 50 feet long.

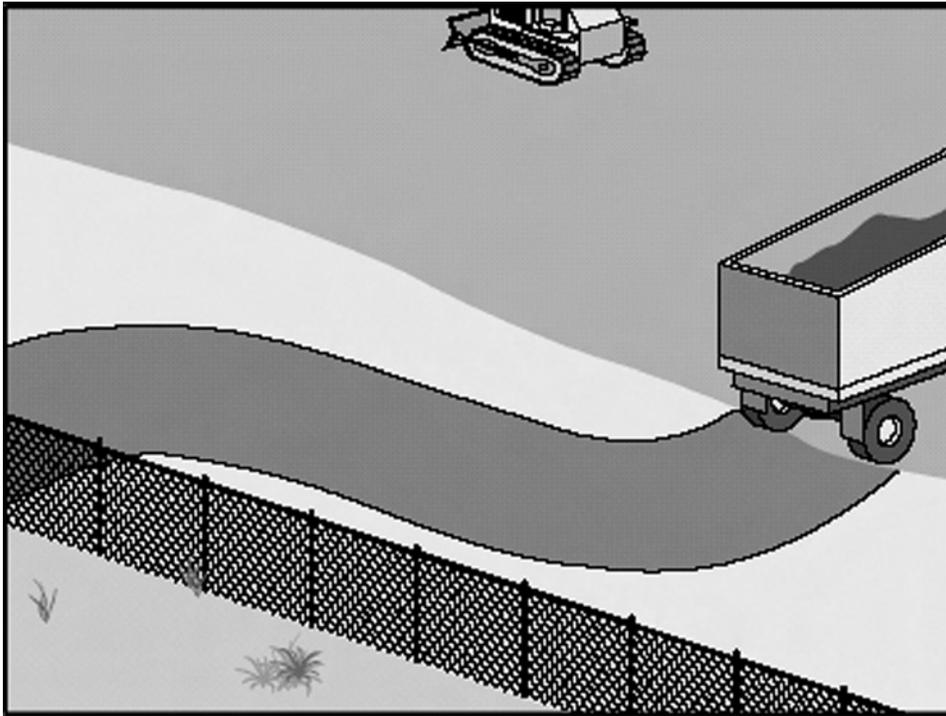
Inspections

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for amount of sediment being tracked onto the road and verify that the gravel is clean and not filled with sediment.

Maintenance

- Gravel mat shall be replaced by top dressing with additional stone when surface voids are no longer visible.
- All sediment deposited on paved roadways must be removed within 24 hours (Refer to Street Sweeping and Vacuuming BMP).
- Sediment shall be removed from sediment traps as specified in maintenance standards for the specific BMP used.
- The gravel and filter fabric will be removed upon completion of the construction and disturbed soil areas resulting from removal shall be permanently stabilized.

Stabilized Construction Roadway



5.5.2 Stabilized Construction Roadway

Definition

A stabilized construction roadway is a temporary access road connecting existing public roads to a remote construction area.

Purpose

- It is designed for the control of dust and erosion created by vehicular tracking.

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 water bodies
- Where poor soils are encountered

This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Engineer.

Limitations

- Materials will likely need to be removed prior to final project grading and stabilization.
- Site conditions will dictate design and need.
- May not be applicable to very short duration projects.
- Limit speed of vehicles to control dust.

Standards and Specifications

- 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. The use of cold mix asphalt or asphalt concrete (AC) millings for stabilized construction roadway is not allowed.
- Coordinate materials with those used for stabilized construction entrance/exit points.
- 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. A crushed aggregate greater than 3 inches, but smaller than 6 inches shall be used.

Maintenance and Inspection

- Inspect routinely for damage and repair as needed, or as directed by the Engineer.
- Keep all temporary roadway ditches clear.
- When no longer required, remove stabilized construction roadway and re-grade and repair slopes.



5.6 NON-STORM WATER BEST MANAGEMENT PRACTICES

Non-storm water management Best Management Practices are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their sources before they come in contact with storm water. These practices involve day-to-day operations of the construction site and are usually under the control of the contractor. These BMPs are also referred to as “good housekeeping practices”, which involve keeping a clean, orderly construction site and include the following:

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Water Conservation Practices



5.6.1 Water Conservation Practices

Definition

Procedures and practices that minimize the harmful effects to water and water quality during the construction of a project.

Purpose

- To conserve and protect a critical resource.

Appropriate Applications

Project Design

- Limit as much as possible changes to the natural patterns of water movement.
- Limit as much as possible the amount of impervious surfaces added to the site.
- Consider the use of multiple small water management practices that can be implemented as close to the point where water comes in contact with newly cleared land as possible.

Project Construction

- Direct construction water runoff to areas where it can soak into the ground.
- Manage runoff as close to the source as possible.
- Look for ways to conserve wherever water is used on a project.

Standards and Specifications

- Use alternative methods for dust control and cleaning of construction areas to avoid the use of water.
- Avoid using water to clean construction areas.
- Use water harvesting techniques to water areas that are being revegetated.

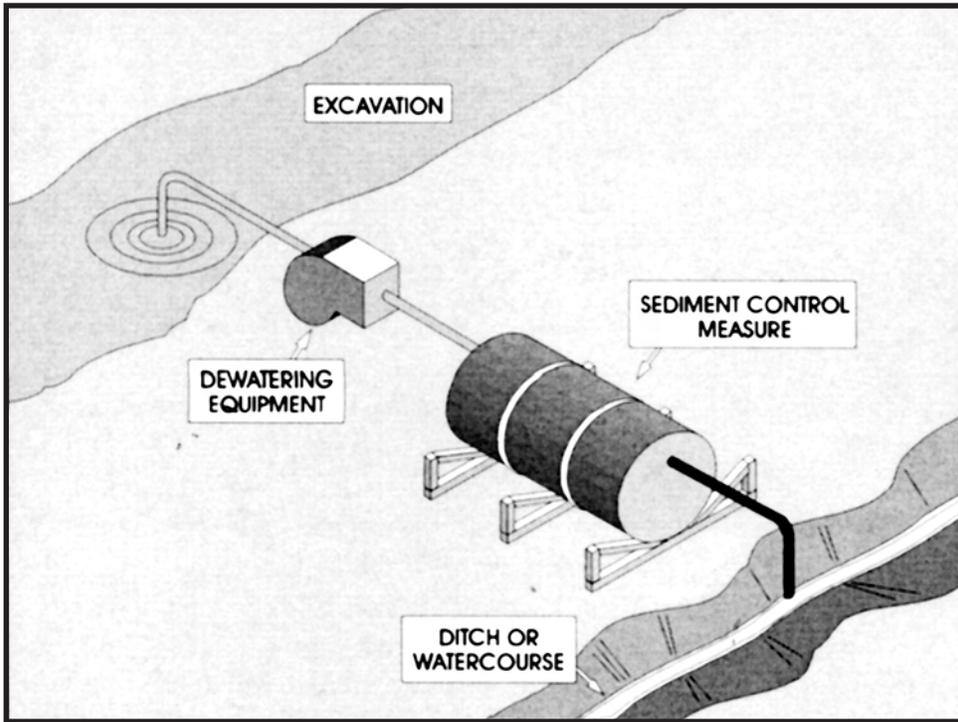
Inspections

- Inspect water equipment for leaks at least weekly.

Maintenance

- Keep water equipment in good working condition.
- Repair leaks promptly.

Dewatering Operations



5.6.2 Dewatering Operations

Definition and Purpose

Dewatering operations are practices that manage the discharge of pollutants from groundwater and accumulated precipitation dewatering operations.

Appropriate Applications

These practices are implemented where groundwater or accumulated precipitation will be discharged from a construction site. 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 water body. 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 local permits.
- Avoid dewatering discharges where possible by using the water for dust control, by infiltration, etc.

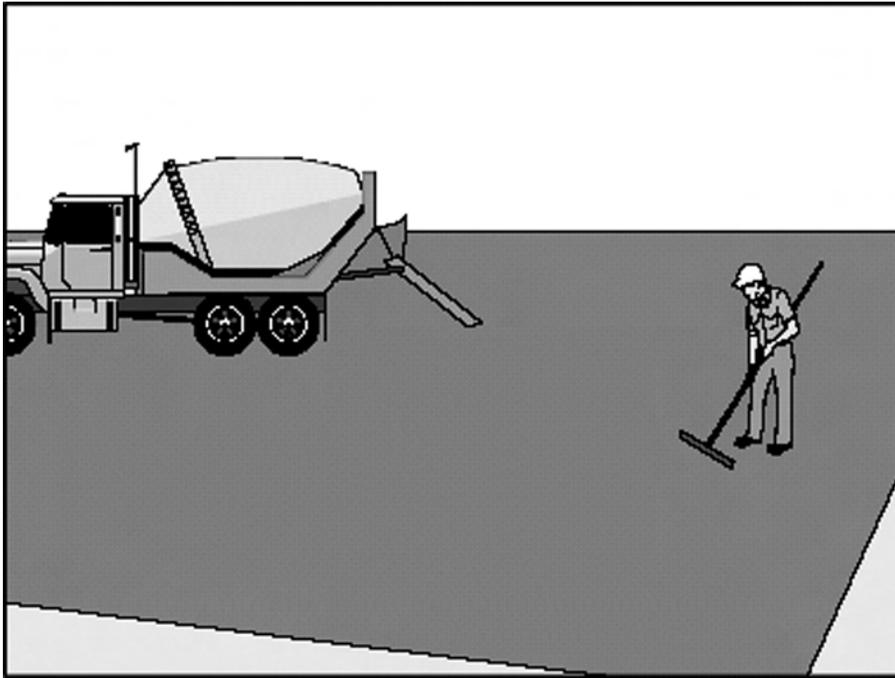
Standards and Specifications

- 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.
- 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 by a device designed to remove soil particles down to 0.02 mm in size. Desilting basins (see BMP) are an example of a temporary treatment device.
- A filtration device may be substituted for a desilting basin if the contractor can demonstrate to the Engineer's satisfaction that the filtration device provides equivalent or greater removal of suspended solids than the basin.
- Filter bags may be used for small-scale dewatering operations.

Inspection and Maintenance

- Inspect filtering device frequently and repair or replace once the sediment build-up prevents the structure from functioning as designed.
- Accumulated suspended solids removed from a dewatering device shall be spread on the project site and stabilized at locations designated by the Engineer or shall be properly disposed of outside the highway right of way in conformance with the Standard Specifications.

Paving and Milling Operations



5.6.3 Paving and Milling Operations

Definition

Procedures implemented during paving surfacing, resurfacing, or sawcutting to reduce or eliminate pollution of storm water.

Purpose

- Water use during paving and milling operations can contain pollutants and must not be allowed to enter storm water systems or drainage ways.

Appropriate Applications

- These procedures are implemented where paving, surfacing, resurfacing, or sawcutting, may pollute storm water 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.

Standards and Specifications

- Substances used to coat asphalt transport trucks and asphalt trucks and asphalt

spreading equipment shall not contain soap and shall be non-foaming and non-toxic.

- Place drip pans or absorbent materials under paving equipment while not in use, to catch and/or contain drips and leaks.
- When paving involves asphaltic concrete (AC), the following steps shall be implemented to prevent the discharge of milling residue, uncompacted or loose AC, tack coats, equipment cleaners, or unrelated paving materials:
- Minimize the washing of sand or gravel from new asphalt into storm drains, streets, and creeks by sweeping where practical.
- Old or spilled asphalt must be disposed as approved by the Engineer.
- AC millings, pieces, or chunks used in embankments or shoulder backing must not be allowed 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.
- Any AC chunks and pieces used in embankments must be placed above the water table and covered by at least 1 foot of material.
- Use only non-toxic substances to coat asphalt transport trucks and asphalt spreading equipment.
- Drainage inlet structures and manholes shall be covered with filter fabric during application of seal coat, tack coat, slurry seal, and/or fog seal.
- Seal coat, tack coat, slurry seal, or fog seal shall not be applied if rainfall is predicted to occur during the application or curing period.
- Clean asphalt coated equipment off-site whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in BMP “Solid Waste Management”. Any cleaning on site shall follow BMP “Vehicle and Equipment Cleaning”.
- Do not wash sweepings from exposed aggregate concrete into storm drain system. Collect and return 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 “Concrete Waste Management” or pump the water to the sanitary sewer if allowed by the local wastewater authority.
- Do not allow saw-cut Portland Concrete Cement (PCC) slurry to enter storm drains or watercourses. Residue from milling operations shall not be allowed to flow across the pavement, and shall not be left on the surface of the pavement. See also BMP “Concrete Waste Management” and BMP “Liquid Waste Management”.

Paving and Milling Operations

- When approved by the Engineer, stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses.
- Disposal of PCC and AC waste shall be in conformance with the Standard Specifications. See also BMP “Concrete Waste Management”.

Thermoplastic Striping

- All thermoplastic striper and pre-heater equipment shutoff valves shall be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the storm water drainage system, or watercourses.
- The pre-heater shall be filled 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.
- Contractor shall 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

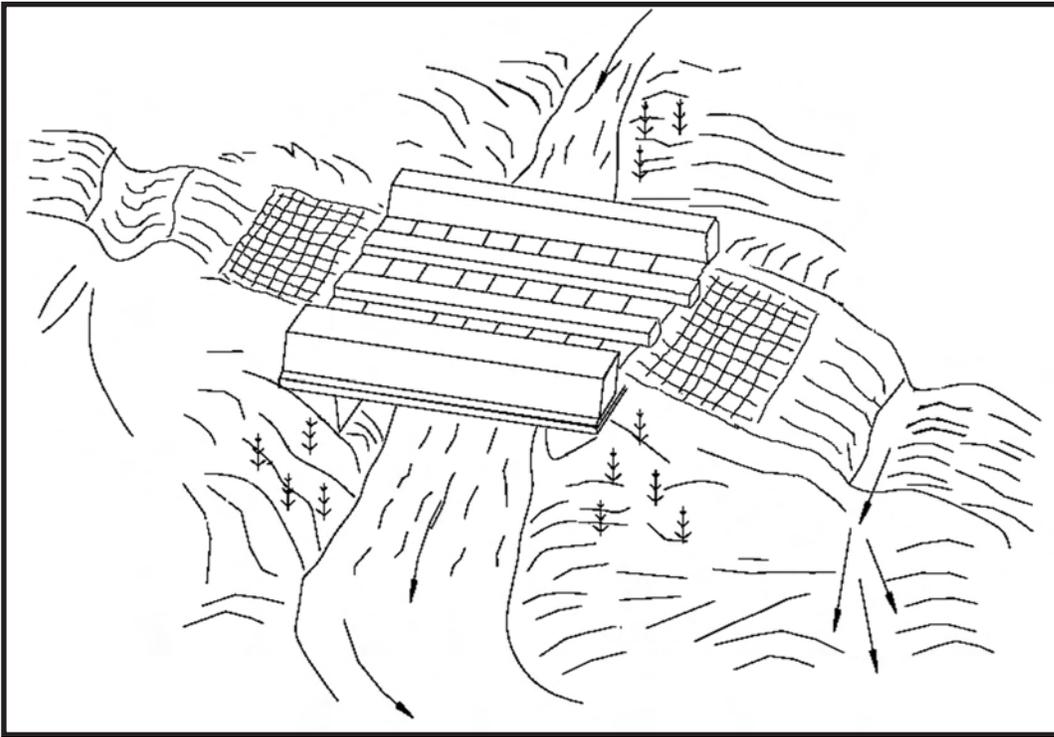
- Do not transfer or load bituminous material near drain inlets, the storm water drainage system or watercourses.
- Melting tanks shall be loaded with care and not filled to beyond six inches from the top to leave room for splashing when vehicle is deadheaded.
- When servicing or filling melting tanks, 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 Specification.

Maintenance and Inspection

- Inspect and maintain machinery regularly to minimize leaks and drips.
- Ensure that employees and subcontractors are implementing appropriate measures during paving operations.
- Maintain machinery regularly to minimize leaks and drips.



Temporary Stream Crossings



5.6.4 Temporary Stream Crossing

Definition

A structure that is placed across a waterway that allows vehicles to cross the waterway during construction.

Purpose

- To eliminate erosion and downstream sedimentation caused by vehicles moving through the streambed.

Appropriate Applications

- In all cases where construction equipment or vehicles need to frequently 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.

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. See BMP “Dewatering Operations”.
- 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.

Standards and Specifications

General Considerations

Location of the temporary stream crossing shall address:

- Site selection where erosion potential is low.
- Areas where the side slopes from highway runoff will not spill into the side slopes of the crossing.

The following types of temporary stream crossings shall be considered:

- Culverts – Used on perennial and intermittent streams.
- Fords – Appropriate during the dry season in arid areas. Used on dry washes and ephemeral streams. Avoid use on perennial streams.
- Bridges – Appropriate for streams with high flow velocities, steep gradients and/or where temporary restrictions in the channel are not allowed.
- Must allow for storm event-generated runoff.

Design and installation requires knowledge of stream flows and soil strength. Designs shall be prepared under 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. See BMP “Sediment Trap”.
- Avoid oil or other potentially hazardous waste materials for surface treatment.

Temporary Stream Crossings

Construction Considerations

- 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 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.
- Any temporary artificial obstruction placed within flowing water shall only be built from material, such as clean gravel or sandbags, which will cause little or no siltation.

Specific Considerations

- Culverts are relatively easy to construct and able to support heavy equipment loads.
- Fords are the least expensive of the crossings, with maximum load limits.
- Temporary fords are not appropriate if construction will continue through rainy season, if thunderstorms are likely, or if the stream is perennial.
- Bridges are generally more expensive to design and construct but provides the least disturbance of the stream bed and constriction of the waterway flows.
- Refer to Stored Specification 104SWDEQ or 104SWEPA for design and sizing criteria.

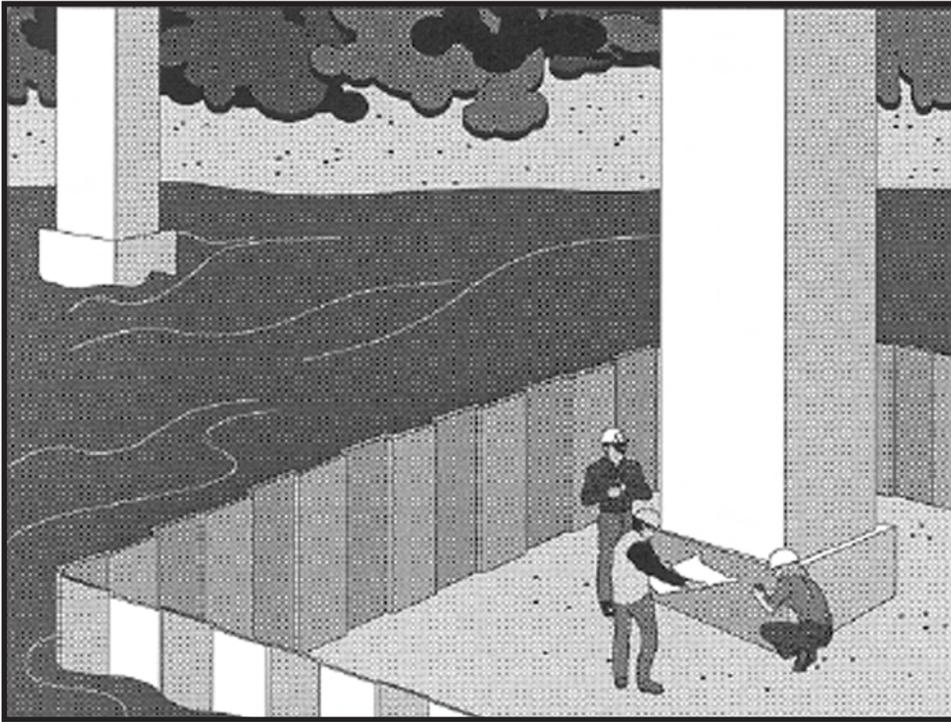
Inspections

- Inspect periodically to ensure that the bridge, streambed, and banks are maintained and not damaged.

Maintenance

- Maintenance shall be performed, as needed to ensure that the structure, streambed and banks are stable.

Clear Water Diversion



5.6.5 Clear Water Diversion

Definition and Purpose

- Clear water diversion consists of 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.

Appropriate Applications

- Implemented where appropriate permits have been secured and work must be performed in a running stream or water body.

Limitations

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

- Diversion/encroachment activities may constrict the waterway, which can obstruct flood flows and cause flooding or washouts.

Standards and Specifications

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 water body 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 water body, 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.

Clear Water Diversion

The cobble shall be removed upon completion of project activities. Drip pans shall be placed under all vehicles and equipment placed on structures over water bodies 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. See also the project special provisions for scheduling requirements.
- Scheduling shall also consider seasonal releases of water from dams, 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 sandbags 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 “Earth Dikes/Drainage Swales”.
- In high flow velocity areas, stabilize slopes of embankments and diversion ditches using an appropriate liner, in accordance with BMP “Geotextiles, Plastic Covers and Erosion Control Blankets/ Mats”, 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. See also BMP “Rock Outlet Protection”.

Temporary Dry Construction Areas

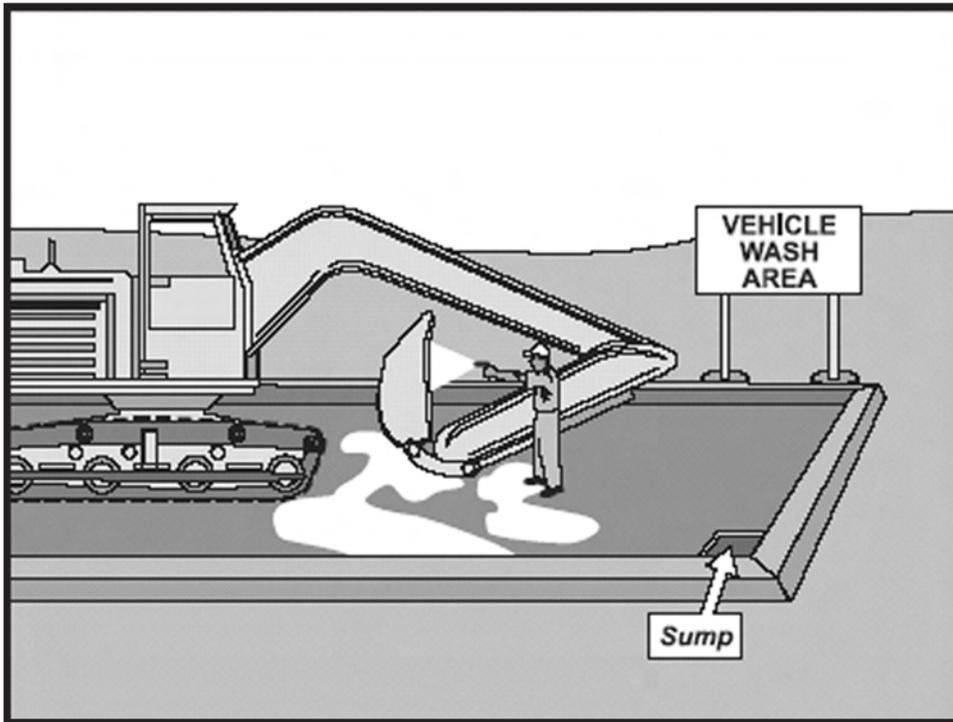
- When dewatering behind temporary structures to create a temporary dry construction area, such as coffer dams, pass pumped water through a sediment settling device, such as a portable tank or settling basin, before returning water to the water body. See also BMP “Dewatering Operations”.
- If the presence 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.

Maintenance and Inspection

- Inspect diversion/encroachment structures before and after significant storms, and at least once per week while in service.

Vehicle and Equipment Cleaning



5.6.6 Vehicle and Equipment Cleaning

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.

Appropriate Applications

- These procedures are applied on all construction sites where vehicle and equipment cleaning is performed.

Standards and Specifications

- On-site vehicle and equipment washing is discouraged, but may be necessary to eliminate spread of invasive species to areas outside of project site.
- Cleaning of vehicles and equipment with soap, solvents or steam shall not occur on the project unless the Engineer has been notified in advance and the resulting

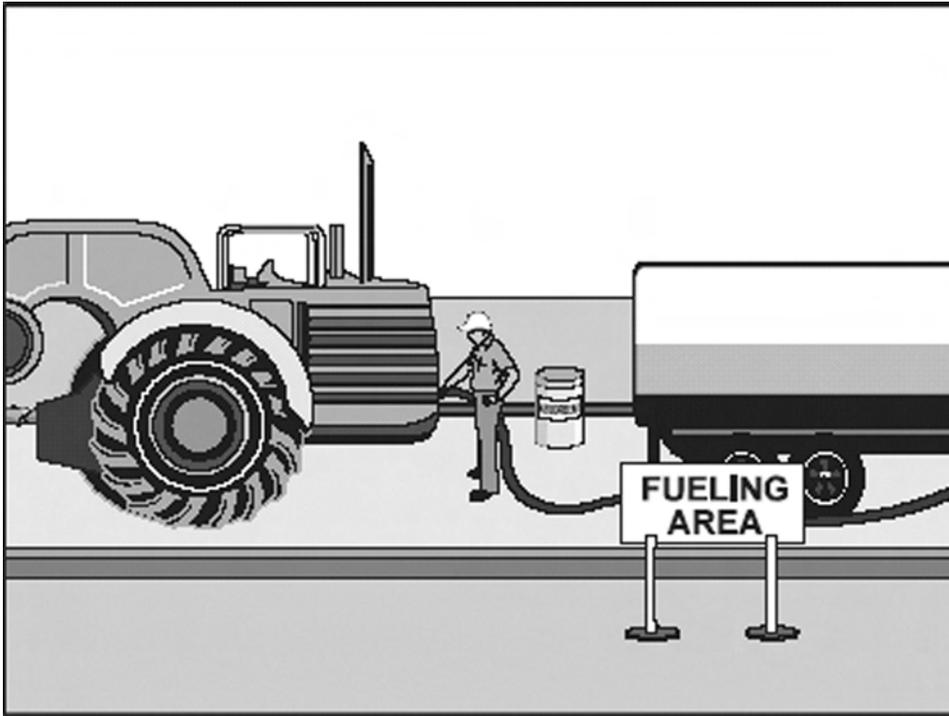
wastes are fully contained and disposed of outside of the highway right-of-way in conformance with the Standard Specifications. Resulting wastes shall not be discharged or buried within the highway right-of-way.

- When equipment/vehicle washing/cleaning must occur on-site and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning shall have the following characteristics and shall be arranged with the Erosion Control Coordinator:
 - A washout area shall be an excavated pit, which will later be backfilled or where the concrete wash can harden and be properly disposed of.
 - Locate wash out areas close to the active construction site on the project.
 - Locate wash out pits away from storm drains, open ditches, or receiving waters.
 - Use only when necessary.
 - When cleaning vehicles/equipment with water:
 - Use as little water as possible. Consider using high pressure sprayers, which require less water.

Maintenance

- Inspect sump regularly and remove liquids and sediment as required or as directed by the Engineer.

Vehicle and Equipment Fueling



5.6.7 Vehicle and Equipment Fueling

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.

Appropriate Applications

- These procedures are applied 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.

Standards and Specifications

- When fueling must occur on-site, the contractor shall select and designate an area to be used, subject to approval by the Engineer.

- Federal, state and local requirements shall be observed for any stationary aboveground storage tanks.
- Mobile fueling of construction equipment throughout the site shall be minimized. Whenever practical, equipment shall be transported to the designated fueling area.
- Spill prevention, containment and countermeasures shall be included in the SWPPP if the volume of projectsite fuel in a single container exceeds 660 gallons, or if the total fuel storage volume at any one site exceeds 1,320 gallons.
- Designated fueling areas shall be protected from storm water 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 runoff, runoff and to contain spills.
- 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.
- 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.”

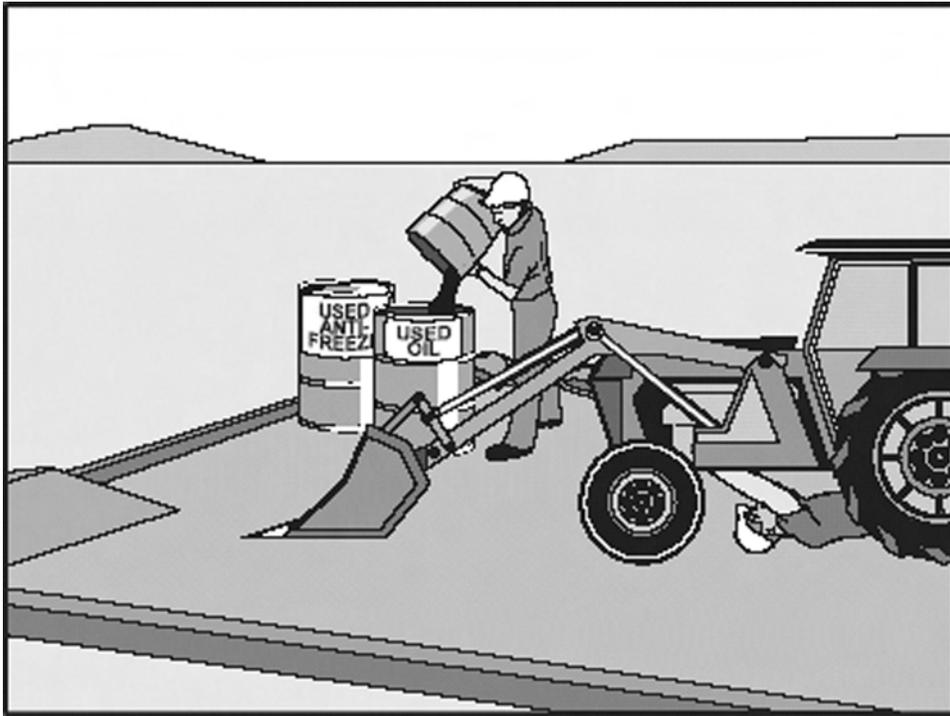
Inspections

- Vehicles and equipment shall be inspected daily for leaks. Leaks shall be repaired immediately or problem vehicles or equipment shall be removed from the project site.
- Fueling areas and storage tanks shall be inspected on a regular basis.

Maintenance

- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.
- Keep an ample supply of spill cleanup material on the site.

Vehicle and Equipment Maintenance



5.6.8 Vehicle and Equipment Maintenance

Definition

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

Purpose

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

Appropriate Applications

- On any construction site where heavy equipment and truck storage and maintenance yards are located on-site.

Limitations

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

Standards and Specifications

- Plan for the proper recycling or disposal of used oils, hydraulic fluids, gear lubricants, batteries, and tires.

- Use appropriate, leak-proof containers for fuels, oils and lubricants to provide for proper disposal.
- Use steam or 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.
- Equipment maintenance and wash-out areas should be located at least 50 feet away from drainages.
- Provide spill containment areas around stored oil and chemical drums.
- Provide a contained wash-out area to wash down heavy equipment (Refer to BMP “Designated Wash-out Area”).

Inspections

- Inspect equipment for damaged hoses and leaky gaskets, and repair or replace as needed.
- Inspect equipment maintenance areas and wash-out areas regularly.
- Inspect fluid containers for leaks.

Maintenance

- Repair leaky fluid containers immediately.



5.7 WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BEST MANAGEMENT PRACTICES

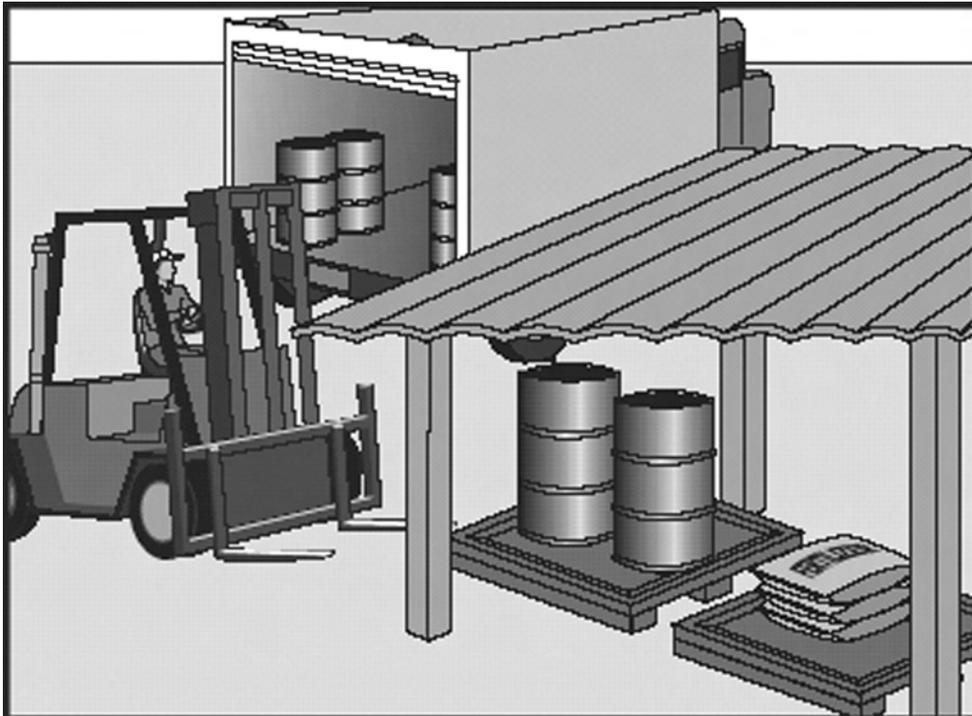
Waste management and materials pollution control BMPs, like non-storm water management BMPs, are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with storm water. These BMPs also involve day-to-day operations of the construction site and are under the control of the contractor, and are additional “good housekeeping practices”, which involve keeping a clean, orderly construction site and include the following:

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Materials pollution (also called materials handling) consists of implementing procedural and structural BMPs for handling, storing and using construction materials to prevent the release of those materials into storm water discharges. The objective is to reduce the opportunity for rainfall to come in contact with these materials. These controls shall be implemented for all applicable activities, material usage and site conditions. Materials handling practices include the following BMPs:

- Material Delivery, Storage;
- Material Use; and
- Stockpile Management.

Material Delivery and Storage



5.7.1 Material Delivery and Storage

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.

Appropriate Applications

Following materials that are stored on construction site:

- Soil
- Pesticides and herbicides
- 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

- Space limitation may preclude indoor storage.
- Storage sheds must meet building and fire code requirements.

Standards and Specifications

General

- Train employees and subcontractors on the proper material delivery and storage practices.
- Temporary storage area shall be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) shall be supplied to the Engineer for all materials stored.

Material Storage Areas and Practices

Liquids and petroleum products shall be handled in conformance with the following provisions.

- 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 “Stockpile Management.”

Material Delivery and Storage

- Minimize the material inventory stored on site by maintaining only a few days supply.
- Store material indoors when available.
- Post proper storage instructions in conspicuous locations near storage areas.
- Do not store hazardous drums, boxes, or bagged materials directly on the ground. Place these items on pallets and, when possible, under cover in a secondary containment.
- Maintain 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.

Material Delivery Practices

- Employees trained in emergency spill clean-up procedures shall be present when dangerous 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.

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.

Inspections

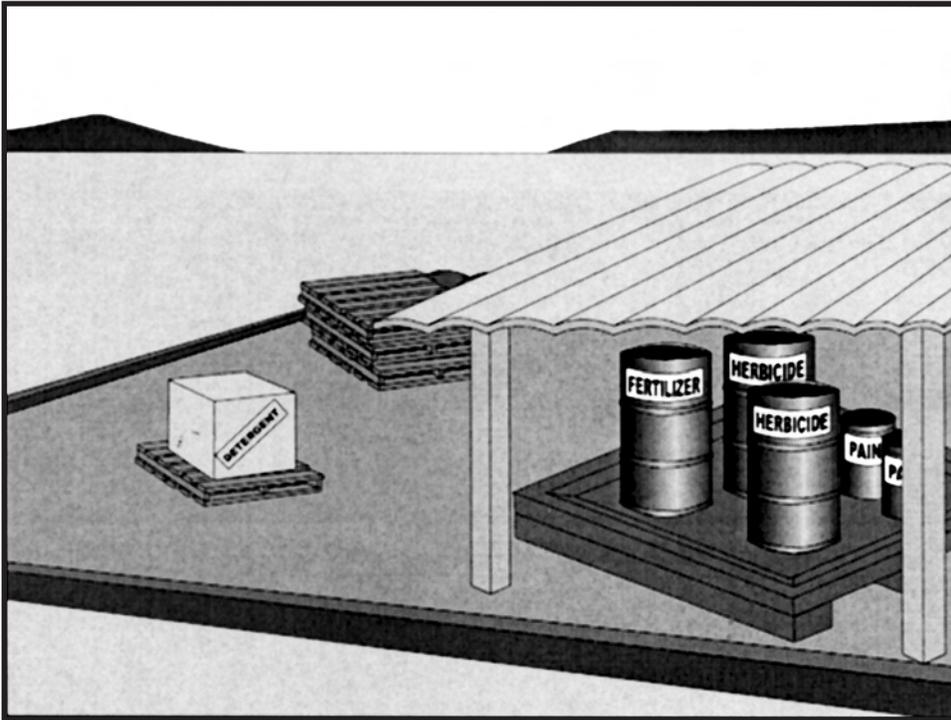
- Containers and storage areas shall be inspected weekly for spills and damage.
- Inspect before and after rainfall events.

Maintenance

- 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 storm water.



Material Use



5.7.2 Material Use

Definition and Purpose

- These are 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.

Appropriate Applications

This BMP applies to all construction projects. These procedures apply when the following materials are used or prepared on site:

- Pesticides and herbicides
- 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

- Safer alternative building and construction products may not be available or suitable in every instance.

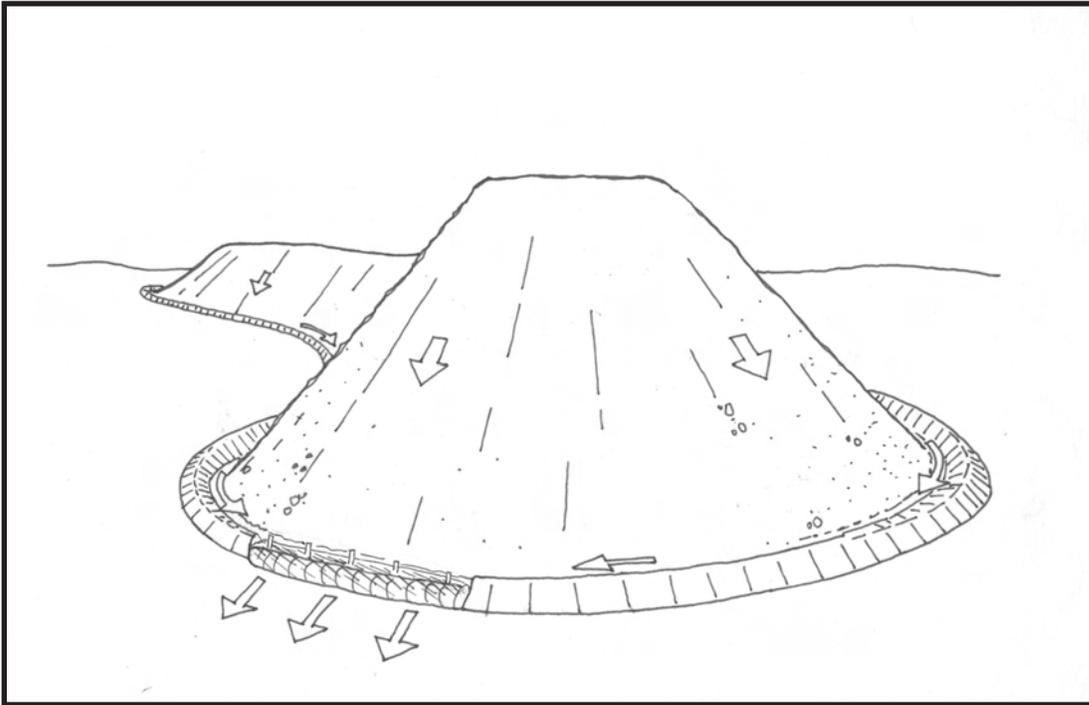
Standards and Specifications

- Material Safety Data Sheets (MSDS) shall be supplied to the Engineer for all materials.
- Latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are 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 herbicides and pesticides shall be performed by a licensed applicator.
- Contractors are required to complete the “Report of Chemical Spray Forms” when spraying herbicides and pesticides.
- 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.

Maintenance and Inspections

- Spot check employees and subcontractors monthly throughout the job to ensure appropriate practices are being employed.

Stockpile Management



5.7.3 Stockpile Management

Definition

Procedures and practices to reduce or eliminate storm water contact with construction site stockpiles of soil 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 pollution of storm water from stockpiles

Appropriate Applications

- Implement on all projects that stockpile soil and paving materials

Standards and Specifications

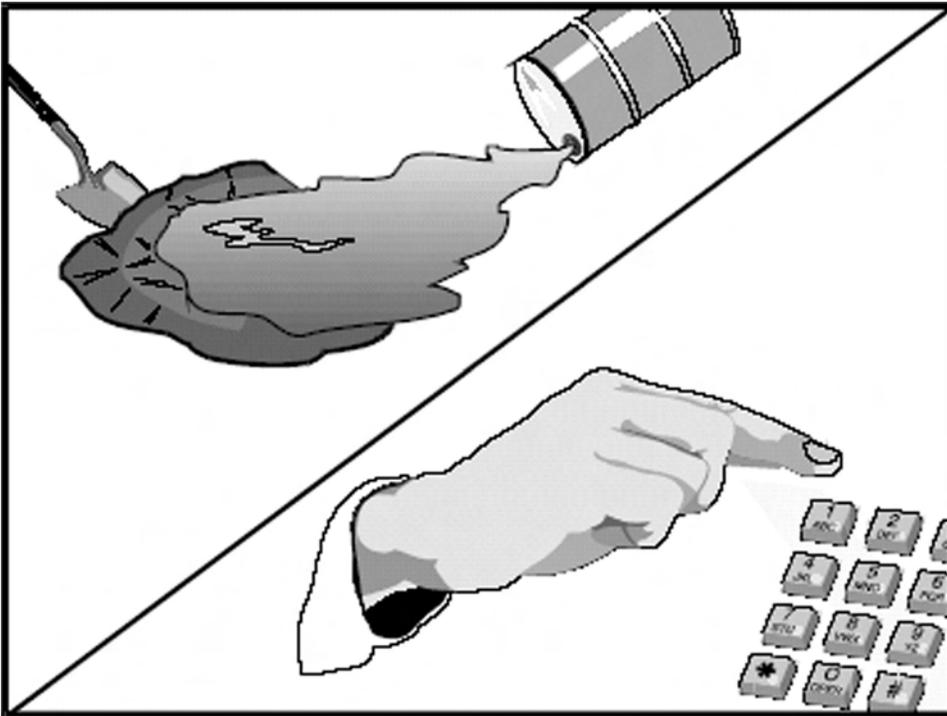
- Locate stockpiles away from concentrated flows of storm water, drainage courses, and inlets.
- Protect all stockpiles from storm water run-on using a temporary perimeter sediment barrier such as berms, dikes, silt fences, or sandbag barriers.
- Cover or protect with soil stabilization measures if rain is predicted.
- Implement wind erosion practices as appropriate.

-
- “Cold mix” stockpiles shall be placed on and covered with plastic or comparable material at all times.

Maintenance

- Repair and/or replace perimeter controls and covers as needed or as directed by the Engineer.

Spill Prevention and Control



5.7.4 Spill Prevention and Control

Definition and Purpose

Procedures and practices implemented to prevent and control spills in a manner that minimizes discharges of spilled materials to the drainage system or watercourse.

Appropriate Applications

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

Limitations

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

Standards and Specifications

- A spill prevention and control plan shall be developed for the project and implemented throughout construction. The plan should include:
 - Procedures for storage and use that will prevent spills.
 - Procedures for spill clean up including minor and significant/hazardous spills..
 - Procedures for the containment of spills.

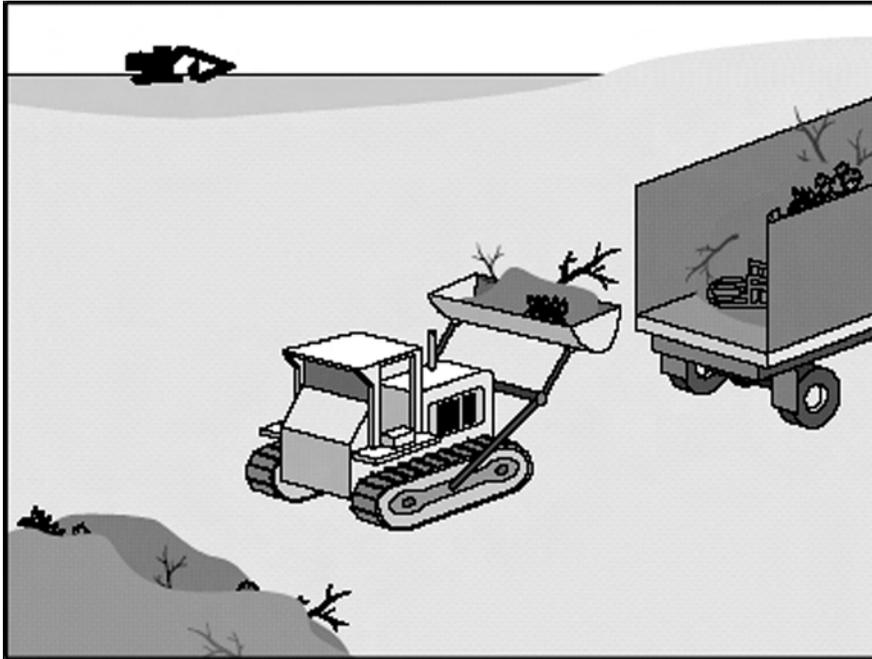
Procedures for the disposal of spilled materials and the material used for clean up.
Employee education programs.

- 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 “Liquid Waste Management.”
- The 24-hour direct access to ADEQ’s Emergency Response Duty Office is (602) 771-2330 or toll free at (800) 234-5677.
- Information for the handling of potential pollutants on construction sites is available from ADEQ Waste Management Program.
- General Information: Patty Sharit (602) 771-4153

Maintenance and Inspection

- Verify weekly that spill control clean up materials are located near material storage, unloading and use areas.
- To prevent spills do regular preventive maintenance on tanks and fuel lines.
- Update spill prevention and control plan if changes occur in the types of chemicals on site.

Solid Waste Management



5.7.5 Solid Waste Management

Definition

The regular collection and disposal of accumulated solid wastes generated at a construction site.

Purpose

- To control a major cause of pollution on construction sites.
- To prevent the contamination of storm water from stockpiled waste materials.
- To prevent the clogging of storm drain systems.

Appropriate Applications

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

Standards and Specifications

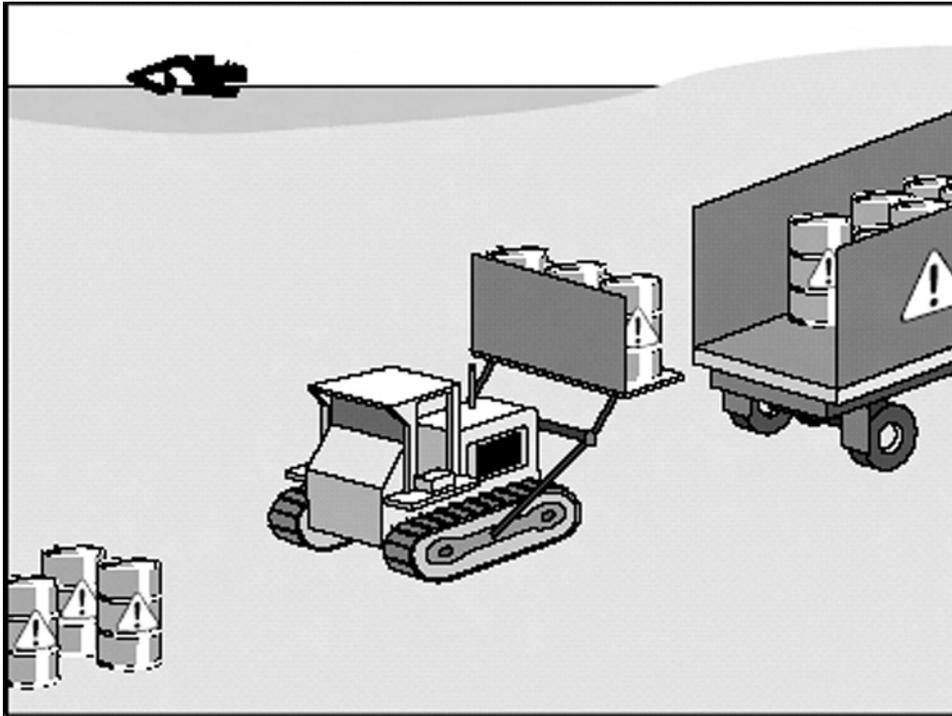
- The Contractor's Erosion Control Coordinator shall oversee and enforce proper solid waste procedures and practices.
- Material that is to be stockpiled or disposed of offsite shall be in accordance with Subsection 107.11.

- Solid waste storage areas shall be located at least 50 feet from drainages and shall not be located in areas prone to flooding or ponding.
- Divert storm water away from stored solid waste with temporary berms or dikes or by other means.
- 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.
- Prohibit littering by employees, subcontractors and visitors. Litter from work areas within the construction limits of the project shall be collected and placed in watertight dumpsters at least weekly regardless of whether the litter was generated by the contractor, the public or others.
- Watertight trash receptacles shall be provided in the contractor's yard, field trailer areas and other locations where workers congregate for lunch and break periods.
- Dumpster washout on the project site is not permitted.
- Notify trash-hauling contractors that only watertight dumpsters are permitted for use on project site.
- Disposal of construction debris and all domestic garbage must be coordinated with the local jurisdiction.
- Consider using inert waste material as fill.
- Consider separating green waste to be composted and used as mulch.

Inspections and Maintenance

- Check for and remove litter and debris from drainage grates and other drainage structures.
- Regular on-site trash collection.
- 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.

Hazardous Waste Management



5.7.6 Hazardous Waste Management

Definition

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

Purpose

- To control the release of hazardous materials.
- To prevent the contamination of storm water.
- To prevent a delay in the project schedule due to environmental investigations/enforcement actions.

Appropriate Applications

- Required for all construction activities that use hazardous materials and generate hazardous waste. Hazardous wastes are generated from the use of:
 - Petroleum products
 - Concrete curing compounds
 - Septic wastes
 - Paints and stains
 - Wood preservatives

Asphalt products

Pesticides

Acids

Solvents

Roofing tar

Any materials deemed hazardous waste in Arizona.

- In the event of a spill of a hazardous material, the contractor shall follow the provisions of Subsection 107.07. In addition, 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.
- The contractor shall assist in any efforts to clean up hazardous material spills, as directed by the Engineer or other authorities. Soil contaminated from spills shall be disposed of according to applicable state and federal regulations.

Standards and Specifications

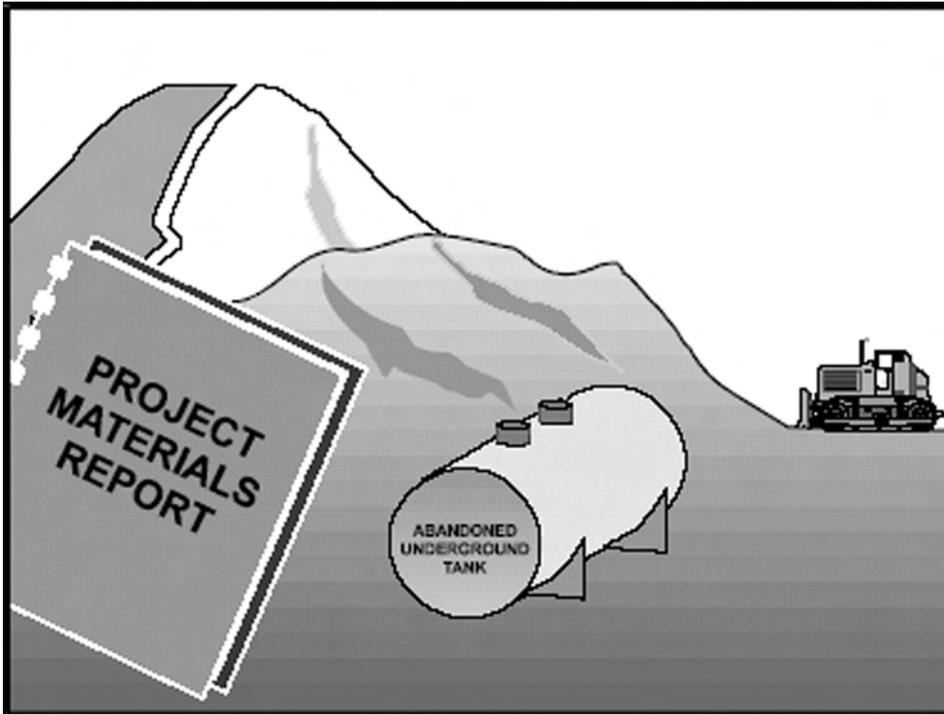
- Contractor must comply with all federal, state and local laws regarding hazardous materials on a construction site.
- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Identify hazardous materials that will be needed on the construction site and plan for storage, use and disposal.
- 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) and under cover.
- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- Dispose of waste within 90 days of being generated or as directed by the Engineer.
- Information about the requirements for the handling of hazardous waste on construction sites is available from the Arizona Department of Environmental Quality Waste Management Program.
 - General Information: Patty Sharit (602) 771-4153
- The 24-hour ADEQ Emergency Response Duty Office number is (602) 771-2330 or toll free (800) 234-5677.
- The National Response Center (800-424-8802) shall be notified of spills of Federal reportable quantities.

Hazardous Waste Management

Inspections and Maintenance

- The contractor's Erosion Control Coordinator shall monitor on-site hazardous waste storage and disposal procedures.
- Maintain a clean and orderly work environment.
- Maintain careful records of the storage, handling and disposal of hazardous materials.
- Perimeter controls, containment structures, covers and liners shall be inspected on a weekly basis and immediately repaired or replaced as needed.

Contaminated Soil Management



5.7.7 Contaminated Soil Management

Definition and Purpose

These are procedures and practices to minimize or eliminate the discharges of pollutants to the drainage system or to watercourses from contaminated soil.

Appropriate Applications

- Contaminated soil management is implemented on 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.
- It may also apply to 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 shall identify appropriate practices and procedures for the specific contaminants known to exist or discovered on site.

Standards and Specifications

Identifying Contaminated Areas

- 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; and
 - 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.

Education

- 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 for 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.

Handling Procedures for 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.

Contaminated Soil Management

- Avoid temporary stockpiling of contaminated soils or hazardous material.
- If temporary stockpiling is necessary:
 - Cover the stockpile with plastic sheeting or tarps;
 - Install a berm around the stockpile to prevent runoff from leaving the area; and
 - Do not stockpile in or near storm drains or watercourses.
- Contaminated material and hazardous material on exteriors of transport vehicles shall be removed and placed 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; and
 - Local regulatory agencies.

Procedures for Underground Storage Tank Removals

- Prior to commencing tank removal operations, obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies which have jurisdiction over such work.
- 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.
- Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).

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- 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 shall be transported to disposal facilities permitted to accept such waste.

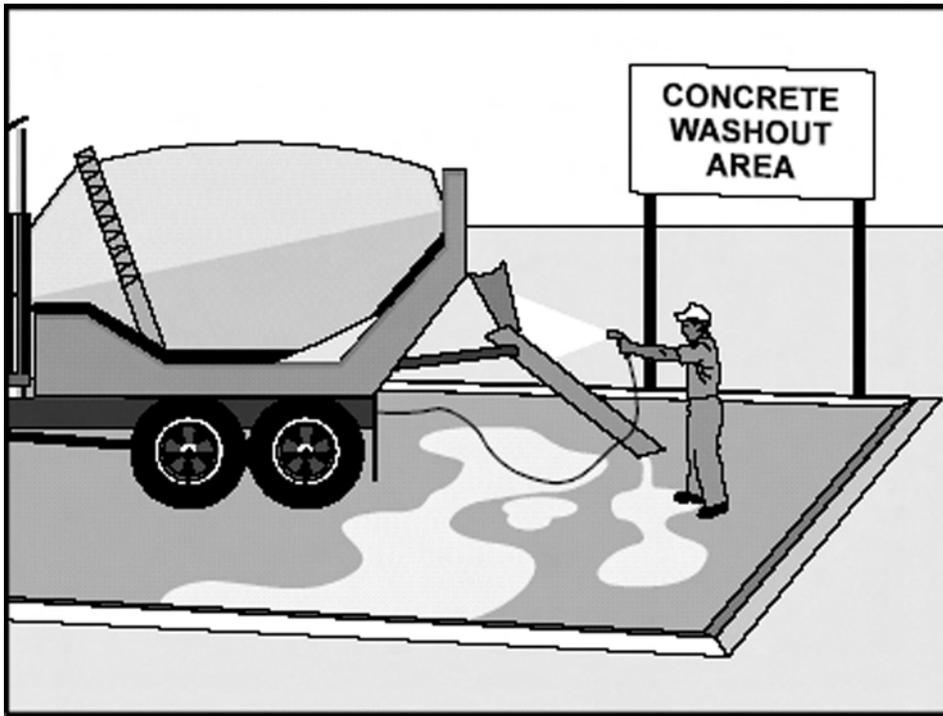
Water Control

- 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.
- If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, shall be discharged to clean, closed top, watertight holding tanks, treated, and disposed of in accordance with federal, state, and local laws.

Inspections and Maintenance

- 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.

Concrete Waste Management



5.7.8 Concrete Waste Management

Definition and Purpose

A temporary pit or bermed area for washout of concrete trucks, tools, mortar mixers, etc., to prevent fresh concrete or cement-laden mortar to enter a storm drainage system and/or receiving water.

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 the Engineer.

Limitations

- None identified.

Standards and Specifications

- Educate employees, subcontractors and suppliers on the concrete waste management techniques described herein.

Concrete Slurry Wastes:

- PCC and AC wastes shall not be permitted to enter storm drains or watercourses. Place temporary berms, sandbags or other BMPs around construction activity to capture and contain slurry runoff.
- PCC and AC wastes shall be collected and properly disposed of outside the highway right-of-way.
- Below-grade facilities are typical.
- Vacuum slurry residues and dispose in a temporary pit and allow to dry. Dispose of dry slurry residue properly.

On-site Temporary Concrete Washout Facility, Transit Truck Washout Procedures:

- Temporary concrete washout facilities shall be located a minimum of 50 feet from storm drain inlets, open drainage facilities and watercourses, unless determined unfeasible by Engineer. Each facility shall be located away from construction traffic or access areas to prevent disturbance or tracking.
- Temporary concrete washout facilities shall have a temporary pit (below grade) or bermed area (above grade) of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures. If located above grade, the washout area shall be lined with an impermeable material.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed and disposed of per BMP "Solid Waste Management."

On-site Temporary Concrete Washout Facility, Transit Truck Washout Procedures:

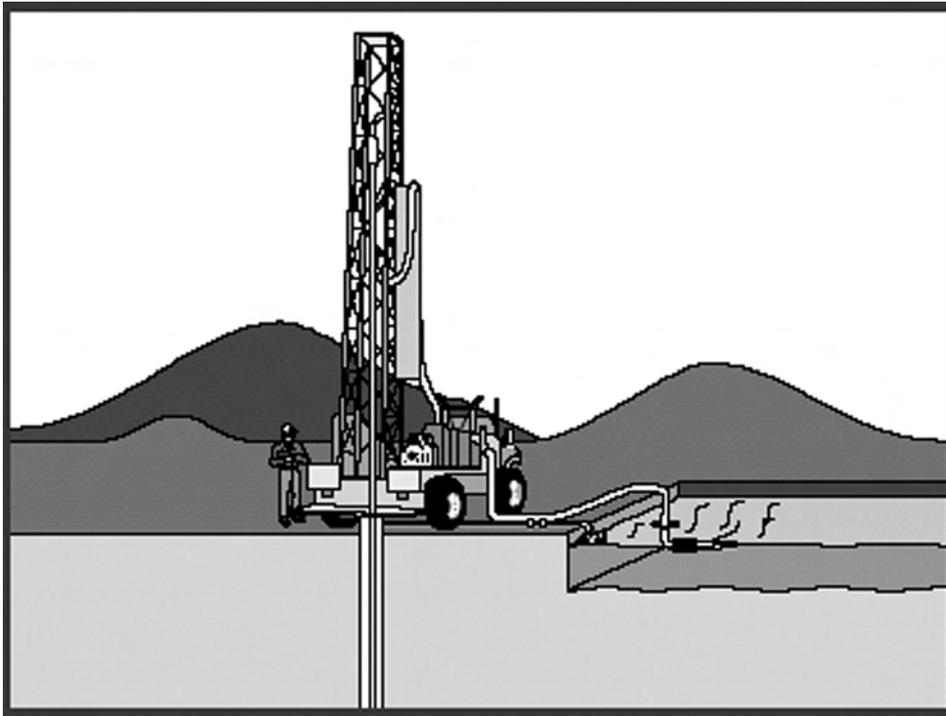
- When temporary concrete washout facilities are no longer required for the work, as determined by the Engineer, the hardened concrete shall be removed and properly disposed of. Materials used to construct temporary concrete washout facilities shall be the property of the contractor, shall be removed from the site of the work and shall be disposed of outside the highway right-of-way.
- Holes, depressions or other ground disturbance caused by the removal of the facilities shall be backfilled and repaired.

Concrete Waste Management

Inspections and Maintenance

- The contractor's Erosion Control Coordinator shall monitor on-site concrete waste storage and disposal procedures at least weekly.
- Temporary concrete washout facilities shall be maintained 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.

Liquid Waste Management



5.7.9 Liquid Waste Management

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.

Appropriate Applications

Liquid waste management is applicable to construction projects that generate any of the following non-hazardous byproducts, residuals, or wastes, such as:

- Drilling slurries and drilling fluids
- Grease-free and oil-free wastewater and rinse water
- Dredgings
- Other non-storm water 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 (see BMP “Dewatering Operations”), solid waste management (see BMP “Solid Waste Management”), hazardous wastes (see BMP “Hazardous Waste Management”), or concrete slurry residue (see BMP “Concrete Waste Management”).

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- Does not apply to non-storm water 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-storm water 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.

Standards and Specifications

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 non-hazardous 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-storm water 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 the "Vehicle and Equipment Cleaning" BMP for managing wash water and rinse water from vehicle and equipment cleaning operations.

Containing Liquid Wastes

- Drilling residue and drilling fluids shall not be allowed to enter storm drains and watercourses and shall be properly disposed of outside the highway right-of-way.
- If an appropriate location is available, as determined by the Engineer, 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 "Concrete Waste Management".

Liquid Waste Management

- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, shall be contained and not allowed 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 “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 water bodies, 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 (see BMP “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

- Typical method is to dewater the contained liquid waste using procedures such as described in BMP “Dewatering Operations” and BMP “Desilting Basin” and dispose of resulting solids per BMP “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, see BMP “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

- 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 BMP “Solid Waste Management”.
- Inspect containment areas and capturing devices frequently for damage, and repair as needed.



APPENDIX A

PERMITTING FORMS AND CHECKLISTS

A.1 SWPPP Checklist

A.2 Notice of Intent (NOI) Form

A.3 SWPPP Index Sheet (non-tribal lands)

A.4 SWPPP Index Sheet (tribal lands)

A.5 ADOT AZPDES Inspection Checklist

A.6 Methods for Determining Final Stabilization

A.7 Notice of Termination (NOT) Form

CONSTRUCTION SWPPP CHECKLIST

This optional form is intended to assist the applicant in the preparation of the Stormwater Pollution Prevention Plan (SWPPP). The "Permit Citation" column indicates where the particular requirement can be found in the AZPDES Construction General Permit (CGP). Use the "Location" column to note where the requirement can be found in the SWPPP. In the "OK?" column, indicate whether you think the SWPPP adequately addresses the corresponding requirements. Once this form has been completed, your SWPPP should meet ADEQ's CGP requirements. Although this checklist is intended to reflect ADEQ's requirements for an acceptable SWPPP, all responsibility for a complete SWPPP remains with the permittee. A full description of the required contents of the SWPPP, as well as additional permit requirements, may be found in the CGP at <http://www.adeq.state.az.us/environ/water/permits/download/constgp.pdf>.

The shaded areas are subject headers and are not intended to be filled out. SW = stormwater.

Your SWPPP does not have to follow the format of the checklist. Rather the purpose of this checklist is to ensure that your SWPPP contains all required components.

Sometimes a single section of your SWPPP may address more than one permit requirement. In this event, you may reference the applicable section within your SWPPP instead of repeating the same language in several locations. If your SWPPP does reference other sections, when completing this checklist you may want to provide more than one SWPPP location reference in last column of the checklist. (For example: The Inspections procedures are in Section E.2. of the SWPPP which also references Section B.1. In the "location" column write: Sections E.2. (p. 15) and B.1. (p. 10).)

Permit Citation	Description	OK ?	Location in SWPPP & Notes
Part IV.C.1.	Identify all operators for the project and the areas over which each operator has control		
	PROJECT DESCRIPTION		
Part IV.C.2.	Describe the nature of the construction activity:		
Part IV.C.2.a.	Describe the project and its intended use after NOT is filed		
Part IV.C.2.b.	Describe the intended sequence of disturbance activities		
Part IV.C.2.c.	Indicate the total area of site and estimate of total area expected to be disturbed (include off-site borrow and fill areas)		
Part IV.C.2.d.	Estimate the pre-construction and post-construction runoff coefficient and provide soil data and any existent data on the quality of the discharge		
Part IV.C.2.e.	Include a general location map (e.g. U.S.G.S. quadrangle, portion of a city or county map) showing 1 mile radius around site		

Permit Citation	Description	OK ?	Location in SWPPP & Notes
	SITE MAP		
Part IV.C.3.	Include a legible site map, complete-to-scale, of the entire site. Try to include the following on a single map, but use multiple maps, to the same scale, if needed		
Part IV.C.3.a.	Identify on the map drainage patterns and estimated slopes after grading		
Part IV.C.3.b.	Identify on the map areas of soil disturbance		
	Identify on the map areas not to be disturbed		
Part IV.C.3.c.	Identify on the map locations of structural and nonstructural controls identified in the SWPPP		
Part IV.C.3.d.	Identify on the map locations where stabilization practices are expected to occur		
Part IV.C.3.e.	Identify on the map locations of off-site material, waste, borrow areas, or equipment storage		
Part IV.C.3.f.	Identify on the map locations of all surface water bodies (including wetlands)		
Part IV.C.3.g.	Identify on the map locations where sw is discharged to a surface water (e.g. ephemeral waters or dry washes) and to MS4s		
Part IV.C.3.h.	Identify on the map locations and registration numbers of on-site drywells		
Part IV.C.3.i.	Identify on the map areas where final stabilization has been accomplished and no further construction phase permit requirements apply		
Part IV.C.4.	Identify on the map or in a narrative, the nearest receiving water(s), including ephemeral and intermittent streams, dry sloughs, arroyos. If applicable, identify the areal extent and describe any wetlands near the site that could be disturbed or potentially receive run-off from disturbed areas		
Part IV.C.5.	Identify on the map the location and describe sw or non-sw discharges at the site associated with non-construction activity and other pollutant sources such as fueling operations, asphalt plants, concrete plants		
Part IV.C.6.	Identify on the map and address offsite material storage areas or borrow areas used solely for the project		
	EROSION AND SEDIMENT CONTROLS		
Part IV.D.1.	Describe all pollution control measures (BMPs)		

Permit Citation	Description	OK ?	Location in SWPPP & Notes
Part IV.D.1.	For each major activity, describe the BMP, the general sequence for implementing BMPs, and which operator is responsible for each BMP. Include BMPs used at offsite material storage areas if the storage areas are used solely by the permittee for this project		
Part IV.D.2.a.	Describe the erosion and sediment controls designed to retain sediment on site to the extent practicable		
Part IV.D.2.b.	Describe the selection, installation and maintenance of BMPs per manufacturers' specifications and good engineering practices, including procedures for modifying or replacing BMPs if one is found to be ineffective or installed incorrectly		
Part IV.D.2.c.	Describe the practice and schedule to routinely remove offsite accumulation of sediment routinely		
Part IV.D.3.	Describe good housekeeping procedures to be used (prevent litter, debris and chemicals from being exposed to sw)		
	Stabilization Efforts		
Part IV.D.4.a.	Describe and identify interim and permanent stabilization practices for the site. Document where existing vegetation will be preserved		
Part IV.D.4.b.	Describe when the operator will initiate stabilization procedures in the timeframe provided in the permit, and what stabilization efforts will occur		
Part IV.D.4.c.	Describe record keeping efforts, include forms/checklists used for keeping the required data		
Part IV.D.4.c.i.	Maintain records of the dates when major grading activities occurred		
Part IV.D.4.c.ii.	Maintain records of when construction activities cease (temporarily or permanently)		
Part IV.D.4.c.iii.	Maintain records of when stabilization is initiated and completed and any reason for delays		
Part IV.D.5.	Describe structural practices used to divert flows from exposed soils, store flows and limit runoff and the discharge of pollutants from exposed areas to degree attainable. (Combination of sediment and erosion controls must be used)		
	If any structural controls are used in the floodplain, the SWPPP should document why effective controls could not alternatively be placed outside of the floodplain		
Part IV.D.5.a.i	Describe the location, size and retention capacity of the drainage basin(s) and the areas that drain into them		

Permit Citation	Description	OK ?	Location in SWPPP & Notes
	For a drainage area of \$10 disturbed acres, describe how and where a basin with storage for a 2yr, 24hr storm per disturbed acre drained will be used OR		
	Describe how and where a basin with 3600 ft ³ of storage per disturbed acre drained will be used OR		
	If a sediment basin is not attainable, then provide explanation within SWPPP		
	If basins are not used due to public safety concerns, describe the concerns and the alternative sediment controls to be used		
Part IV.D.5.a.ii.	For a drainage area of \$10 disturbed acres that can't meet size specified in Part IV.D.5.a.i, describe the smaller sediment basins and/or sediment traps to be used		
	For a drainage area of \$10 disturbed acres where sediment basin isn't attainable, describe how and where silt fences, vegetative buffer strips, or alternatives will be used on all side slope boundaries		
Part IV.D.5.a.iii.	For a drainage area of < 10 disturbed acres, describe how and where smaller sediment basins or sediment traps are used along with silt fences, vegetative buffer strips, or alternatives on all side slope boundaries OR		
	Describe how and where a sediment basin with storage for a 2yr, 24hr storm per disturbed acre drained will be used OR		
	Describe how and where a sediment basin with 3600 ft ³ of storage per disturbed acre drained will be used		
Part IV.D.5.b	Describe where and what type of velocity dissipation devices will be used at discharge locations and along outfall channel		
Part IV.D.6.	Describe post-construction sw management measures, if applicable		
	Describe where and what structural measures were placed in upland soils to the degree attainable		
	Confirm in the narrative whether structural measures comply with local or state sw management requirements		
Part IV.D.7.	Identify all allowable sources of non-sw discharges except for flows from fire-fighting activities		
	Describe how all non-sw discharges will be eliminated or reduced to the extent feasible		
	Describe how BMPs will be implemented for non-sw discharges		

Permit Citation	Description	OK ?	Location in SWPPP & Notes
	If superchlorinated wastewaters will be generated, describe how they will be dechlorinated or held on site until chlorine levels have dissipated, unless used for firefighting		
Part IV.D.8.a.	Describe measures to be used to prevent discharge of solid materials to waters of U.S.		
Part IV.D.8.b.	Describe measures to be used to minimize off-site vehicle tracking of sediments and the generation of on-site dust		
Part IV.D.8.c.	Describe the location and type of all construction and waste materials stored on site (Update SWPPP as necessary)		
Part IV.D.8.c.	Describe controls to be used to reduce pollutants from construction and waste materials stored on-site (including storage practices, and spill prevention and response practices)		
Part IV.D.8.d.	Describe pollutant sources from areas other than construction (including sw discharges from dedicated asphalt plants and concrete plants)		
	Describe controls and measures to be used to minimize the discharge of pollutants from those sources		
Part IV.D.8.e.	Describe measures to be used to sufficiently stabilize soil at culvert locations		
	MAINTENANCE OF CONTROLS		
Part IV.E.1.	Describe procedure and activities to be used to maintain all erosion and sediment controls and other protective measures in effective operating condition		
	Describe procedures and activities to be used to maintain BMPs as soon as possible, if site inspections identify BMPs are not operating effectively		
Part IV.E.2.	Describe procedures and activities to be used to modify or add BMPs before next storm event, if necessary or as soon as practicable		
Part IV.E.3.	Describe procedures and activities to be used to remove sediment from traps or ponds when design capacity is reduced by 50%		
	AZPDES PERMIT AND OTHER SOIL AND EROSION CONTROL REQUIREMENTS		
Part IV.F.	Include copy of AZPDES permit (AZG2003-001), NOI and ADEQ authorization as part of the SWPPP		

Permit Citation	Description	OK ?	Location in SWPPP & Notes
	Include other agreements with any state, local or federal agencies that affect the provisions or implementation of the SWPPP		
Part IV.G.	Describe whether SWPPP is consistent with federal, state, or local soil and erosion control or sw management requirements		
	INSPECTIONS		
Part IV.H.1.	Describe routine inspection schedule and procedures to ensure BMPs are functional and SWPPP is being implemented		
	Indicate if the inspection frequency is to be at least once every 7 calendar days OR		
	Indicate if the inspection frequency is to be at least once every 14 days and also within 24 hours of the end of each storm event of \$0.5 inches		
Part IV.H.2.	If the site is eligible for reduced inspection frequency indicate why it is eligible and how it will be inspected once each month AND anytime rain is predicted AND within 24 hours of the end of a storm event of \$0.5 inches		
Part IV.H.3.	Indicate who the qualified personnel will be to perform inspections and describe the persons' qualifications		
Part IV.H.4.	Describe all areas to be inspected including all disturbed areas of site, and areas used to store materials exposed to precipitation		
	Describe inspection procedures how inspectors will look for evidence of, or potential for, pollutants entering drainage system		
	Describe in inspection procedures how inspectors will observe sedimentation and erosion control measures		
	Describe inspection procedures and how inspectors will look at accessible discharge points, and ascertain whether erosion control measures are effective		
	Describe in inspection procedures how inspectors will look at nearby stream downstream locations when discharge points are inaccessible		
	Describe in inspection procedures how inspectors will look for sediment tracking at entrances and exits		
	Describe how inspectors will document all findings and what the inspection form will look like		

Permit Citation	Description	OK ?	Location in SWPPP & Notes
Part IV.H.5.	Describe how inspectors will complete an inspection report for each inspection that includes inspection date; name, title and qualifications of each qualified person making the inspection; weather information for period since last inspection; location of discharges of sediment or other pollutants; list of BMPs that need to be maintained, failed to operate or prove inadequate; list of additional needed BMPs; corrective actions required; sources of all non-sw and control measures; and materials storage areas with evidence of pollutant discharge		
Part IV.H.6.	Describe how and where the inspection records will be maintained for at least three years; how the report will document noncompliance or certify full compliance; and indicate who will be authorized to sign the report		
Part IV.H.7.	Describe how the SWPPP will be modified when needed, within 7 calendar days of inspection. BMPs must be modified or added before next storm event or as soon as practicable		
MODIFICATIONS TO SWPPP			
Part IV.I.1.	Describe how the SWPPP will be modified within 15 business days after change in design, construction, operation or maintenance at site that has a significant effect on discharge or not previously addressed in SWPPP		
Part IV.I.2.	Describe how the SWPPP will be modified within 15 business days if it is determined that discharge is causing or contributing to WQ exceedances OR SWPPP is ineffective		
SIGNATURES AND NOTICE OF SWPPP			
Part IV.J.1.	The Operator must sign the SWPPP		
	Describe how and where a copy of the SWPPP will be retained on site. A copy is to be submitted to ADEQ with the NOI if the site is within 1/4 mile of a Unique or impaired waters.		
Part IV.J.2.	Describe how and where the operator will post a sign at main entrance to site containing: AZPDES authorization number (or copy of NOI authorization), construction site contact name and telephone number, brief project description, location of SWPPP if the site is inactive or does not have an on-site storage location		



NOTICE OF INTENT (NOI)

For Coverage Under AZPDES Permit No. AZG2003-001 for
Construction Activity Discharges to Waters of the United States

FOR COVERAGE, A COMPLETE AND ACCURATE NOI MUST BE SUBMITTED TO:

Stormwater Program- Water Permits Section/ NOI
Arizona Department of Environmental Quality
1110 West Washington, 5415B-3, Phoenix Arizona 85007

Is this NOI a revision to one previously filed under the 2003 AZPDES Construction General Permit?
___ YES ___ NO If yes, provide your current authorization No. _____

Is the Site Located on Indian Country Lands?
___ YES ___ NO

I. OWNER/OPERATOR (Applicant) INFORMATION

Operator Name: _____ Phone: _____

Operator's Business Name _____

Operator's Address: _____

City: _____ State: |__| |__| | Zip Code: _____

OPERATOR STATUS: Federal ___ State ___ Other Public ___ Private ___ Tribal ___

II. CONSTRUCTION SITE INFORMATION

Project/Site Name: _____ Phone: _____

Type of Project (subdivision, school, commercial, etc.) _____

If a subdivision, has state or local subdivision approval been obtained? ___ YES ___ NO

If yes, provide the subdivision approval number: _____

Is the project part of a greater plan of development? ___ YES ___ NO

Does the project have/need other environmental permits or approvals? If so, list and provide the permit/approval number (attached sheet, if necessary):

Site physical location (include address, if applicable and directions from nearest municipality):

City: _____ County: _____ Zip Code: _____

Provide the latitude/longitude of the construction site at the point nearest the receiving water:

Latitude: |__| |__| |__| |__| |__| |__|
(Degrees, minutes, seconds)

Longitude: |__| |__| |__| |__| |__| |__|
(Degrees, minutes, seconds)

NOI for Coverage under AZPDES Permit No. AZG2003-001

Estimated Project Start Date _____ Estimated Completion Date _____

Estimate of total acres (to the nearest 1/2 acre) to be disturbed with the entire construction project _____

Estimate of total acres (to the nearest 1/2 acre) to be disturbed by your operations _____

List all non-stormwater discharges expected to be associated with construction-related activities:

III. DISCHARGE LOCATION

Identify the closest receiving waters to construction site: (including dry washes, named waterbodies, and unnamed tributaries): _____

Is there a potential for any discharges from the site to enter a municipal storm sewer system (MS4), canal, or a privately-owned conveyance? YES NO

If yes, enter name of MS4 or conveyance owner: _____

If this is a linear construction project (i.e., utility lines, pipelines, etc.) is any portion of the planned project within 1/4 mile of any impaired or unique water? YES NO N/A (not linear construction)

IV. Permit authorization can not occur until a Stormwater Pollution Prevention Plan (SWPPP) has been developed and implemented according to the terms of the Construction General Permit, AZG2003-001:

I confirm that a SWPPP meeting the requirements of this general permit has been developed and will be implemented prior to commencing construction activities at this site.

The SWPPP may be viewed at the following location: _____

To view the SWPPP, contact: (name and phone of contact person) _____

This project may discharge within 1/4 mile of an impaired or unique waterbody, so a copy of my SWPPP is enclosed with this NOI as required. The SWPPP will be implemented prior to commencing construction activities at this site.

V. CERTIFICATION BY AUTHORIZED SIGNATORY (PER PART VII.K.1 OF THE PERMIT)

"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 gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage this system, or those persons direction 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 I certify that the operator will comply with all terms and conditions stipulated in General Permit No. AZG2003-001 issued by the Director."

Printed Name: _____ Title: _____

Signature: _____ Date: _____

Business Name: _____

Address: _____

Phone: _____

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): _____

- D. Project Description: _____
- _____
- _____
- _____
- _____

II. HYDROLOGIC INFORMATION

- A. Project Size:
 Length (Mi.) _____
- Area (Ac.) _____
- B. Area to be Graded (Ac.): _____
- C. Runoff Coefficient:
 Existing _____
- Developed _____
- 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, ripped 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 Matting
 - _____ 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: (Refer to Project Plans 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:
 ADEQ's AZPDES Inspection checklist and AZPDES Compliance Evaluation Report will be completed by the contractor, or his representative, and will be kept on file. If repairs are necessary, they shall be initiated within 24 hours of the inspection report.

VII. CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

- A. This Storm Water Pollution Prevention Plan has been prepared in accordance with ADOT's EROSION AND POLLUTION CONTROL MANUAL FOR HIGHWAY DESIGN AND CONSTRUCTION, published by ADOT, Highways Division. (June 1995)
- _____ No other Federal, State or Local Regulations Apply.

PART 2 - To be completed by ADOT & CONTRACTOR

I. SCHEDULE OF MAJOR ACTIVITIES

- A. Project Schedule: _____
- Start Date: _____
- End Date: _____
- B. Construction Sequencing Schedule: (Attach Additional Sheets)
- Construction Activity _____
- _____
- _____
- _____
- _____
- _____
- _____

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:
- _____ 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 BMPs 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 Hazardous Materials Specialist at ADOT's Safety and Health Section (Ph. # (602)712-7744 or Pager # (520) 320-8772). If a reportable quantity is discharged in 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. 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.
- B. The operator/contractor as defined in AZPDES should sign the SWPPP in accordance with Part VII. K, and retain the plan on-site at the construction site or other location easily accessible during normal business hours.

Signature: _____

Date: _____

Name: _____

Title: _____

Company: _____

C. ADOT Resident Engineer

Signature: _____

Date: _____

Name: _____

Title: _____

ADOT District: _____

D. MUNICIPALITY (For local Government Project)

Signature: _____

Date: _____

Name: _____

Title: _____

Municipality: _____

VI. OTHER REQUIREMENTS

- A. A copy of the General Permit is 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.

DESIGN	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION ROADSIDE DEVELOPMENT SECTION
DESIGN			
DRAWN			
CHECKED			
TEAM LEADER			
ROUTE	MP	LOCATION	AZPDES SWPPP INDEX SHEET
TRACS NO.			SHEET _____ OF _____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

PART 2 - To be completed by ADOT & CONTRACTOR

I. SCHEDULE OF MAJOR ACTIVITIES

- A. Project Schedule: _____
 Start Date: _____
 End Date: _____
- B. Construction Sequencing Schedule: (Attach Additional Sheets)
 Construction Activity _____

V. MEASURES TO CONTROL EROSION AND SEDIMENT

- A. Temporary Erosion and Sediment Controls (Refer to the following SWPPP Site Plan and Specifications)
 _____ Erosion Control Matting
 _____ 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: (Refer to Project Plans 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: _____

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): _____

NO.1 DESCRIPTION OF REVISION

DATE

MADE BY

DATE

NO.2 DESCRIPTION OF REVISION

DATE

MADE BY

DATE

NO.3 DESCRIPTION OF REVISION

DATE

MADE BY

DATE

NO.4 DESCRIPTION OF REVISION

DATE

MADE BY

DATE

PART 1 - To be completed by the Landscape Architect or Design Engineer

II. HYDROLOGIC INFORMATION

- A. Project Size:
 Length (Mi.): _____
 Area (Ac.): _____
- B. Area to be Graded (Ac.): _____
- C. Receiving Water(s): _____

NO.1 DESCRIPTION OF REVISION

DATE

MADE BY

DATE

NO.2 DESCRIPTION OF REVISION

DATE

MADE BY

DATE

NO.3 DESCRIPTION OF REVISION

DATE

MADE BY

DATE

NO.4 DESCRIPTION OF REVISION

DATE

MADE BY

DATE

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, ripped 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.

III. POLLUTION CONTROL MEASURES

- A. Other Best Management Practices:
 _____ Solid Waste Management
 _____ Equipment Maintenance Procedures
 _____ Designated Washout Areas
 _____ Stabilized Construction Entrance
 _____ Protected Chemical and Material Storage Area
 _____ Other, Describe: _____

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: _____

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 actions 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.

VI. MAINTENANCE AND INSPECTIONS

- A. Frequency of inspections to meet either of the following requirements:
 _____ At least once every 7 calendar days (weekly), OR
 _____ At least 14 calendar days (biweekly) and within 24 hours after a rainfall of 0.5 in. or greater.

NOTE: RAINFALL GAUGE TO BE KEPT ON-SITE TO DETERMINE DEPTH OF RAINFALL

- B. Inspection Procedure:
 ADOT's NPDES inspection checklist will be completed by the ADOT resident engineer, or his representative, and will be kept on file. If repairs are necessary, they shall be initiated within 24 hours of the inspection report.

VII. CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

- A. This Storm Water Pollution Prevention Plan has been prepared in accordance with ADOT's EROSION AND POLLUTION CONTROL MANUAL FOR HIGHWAY DESIGN AND CONSTRUCTION, published by ADOT, Highways Division. (June 1995)
 _____ No other Federal, State or Local Regulations Apply.

B. Spill Response:

In the event of any accidental spill of chemicals or hazardous materials, contact the ADOT Hazardous Materials Specialist at ADOT's Health and Safety Section (Ph. # (602)712-7744 or Pager # (520) 320-8772). If a reportable quantity is discharged in 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. 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.
- B. The operator / contractor
 Signature: _____
 Date: _____
 Name: _____
 Title: _____
 ADOT District: _____
- C. ADOT Resident Engineer
 Signature: _____
 Date: _____
 Name: _____
 Title: _____
 ADOT District: _____
- D. MUNICIPALITY (For local Government Project)
 Signature: _____
 Date: _____
 Name: _____
 Title: _____
 Municipality: _____

VI. OTHER REQUIREMENTS

- A. A copy of the General Permit 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.

DESIGN	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION
DESIGN			INTERMODAL TRANSPORTATION DIVISION
DRAWN			ROADSIDE DEVELOPMENT SECTION
CHECKED			
TEAM LEADER			NPDES SWPPP INDEX SHEET
ROUTE	MP	LOCATION	
TRACS NO.			SHEET OF
			0F

ADOT AZPDES Inspection Checklist

Project: _____ Date: _____

() Monthly Inspection () Weekly Inspection () Rainfall Event Inspection

Rainfall: _____ inches Beginning of Last Storm Event _____ Duration _____

Inspected by: _____ Title _____

Qualifications _____ (attach or reference SWPPP)

- | Yes | No | Does not
Apply | |
|-----|-----|-------------------|---|
| () | () | () | Are there any BMPs called for on the SWPPP that are either not installed or installed improperly |
| () | () | () | Are there any operational storm sewer inlets that are not protected from sediment inflow? |
| () | () | () | Do any structural practices require repair or clean out to maintain adequate function? |
| () | () | () | Are there any on-site traffic routes, parking and storage of equipment and supplies that are located outside of areas specifically designated for those uses? |
| () | () | () | Are there any temporary soil stockpiles or construction materials located outside of the approved areas? |
| () | () | () | Do any seeded or landscaped areas require maintenance, irrigation, fertilization, seeding, or mulching? |
| () | () | () | Is there any evidence that sediment is leaving the site? |
| () | () | () | Is there any evidence of erosion on cut or fill slopes or in roadside ditches? |
| () | () | () | Is there any evidence of sediment, debris, or mud on public roads at intersections with site access roads? |
| () | () | () | Does the Storm Water Prevention Plan require revisions? |

If the answer is YES to any of the above, describe the location, and explain necessary maintenance actions or plan revisions (attach additional sheets if necessary).

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 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.

Signature: _____ Date: _____

Methodology for Determining “Final Stabilization”

“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). A NOT is submitted by the operator to terminate coverage for discharges from construction activities to waters of the U.S.

According to AZPDES, “Final Stabilization” means that either:

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% of the ground (e.g., arid areas, beaches), the 70% coverage criteria is adjusted as follows: if the native vegetation covers 50% of the ground, 70% of 50% ($.70 \times .50 = .35$) would require 35% total cover for final stabilization. On a beach with no natural vegetation, no stabilization is required.

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% of the total site disturbance area. For example, a project in a low rainfall area with 600,000 square feet of disturbance would require six sample plots (for a total sample area of 600 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 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, preferably of a circular shape (to reduce edge effect) 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, including plants on which the frame lands. 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 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.

The draft results of the above analysis shall be provided to the ADOT Roadside Development Section (Roadside) 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.” Once the results have been agreed to by Roadside, ___ copies of the memo shall be submitted to Roadside for distribution.



NOTICE OF TERMINATION (NOT)

Construction Activity Discharges to Waters of The United States

AZPDES Permit No. AZG2003-001

Submission of this NOT constitutes notice that the party identified on this form is terminating coverage under the AZPDES general permit, and 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, A COMPLETE AND ACCURATE NOT** must be submitted to:

Stormwater Program- Water Permits Section/ NOT

Arizona Department of Environmental Quality
1110 West Washington, 5415B-3
Phoenix, Arizona 85007

I. PERMITTEE INFORMATION

AZPDES/NPDES Stormwater Construction GP Authorization Number: _____

Name of Operator on Notice of Intent (NOI) submitted to ADEQ/EPA: _____

Operator Address: _____

Phone: _____

II. CONSTRUCTION SITE INFORMATION

Project/Site Name: _____

Site address if applicable, and the physical location (provide directions from nearest municipality):

City _____ Zip _____ County: _____

Provide the latitude/longitude of the construction site at the point nearest the receiving water:

Latitude: | | | | | | | | | | | | | |
(Degrees, minutes, seconds)

Longitude: | | | | | | | | | | | | | |
(Degrees, minutes, seconds)

III. COVERAGE IS BEING TERMINATED BECAUSE: (Check those below 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.
- For residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.
- The operator has obtained coverage under an alternative AZPDES permit.

IV. CERTIFICATION BY AUTHORIZED SIGNATORY (PER PART VII.K.2 OF THE PERMIT)

"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 a NPDES or 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: _____

Address (If different from above): _____

Signature: _____ Date: _____

APPENDIX B

ABBREVIATIONS, ACRONYMS AND DEFINITION OF TERMS

AASHTO American Association of State Highway Officials

ADEQ Arizona Department of Environmental Quality

ADOT The Arizona Department of Transportation

AZCGP (Arizona Construction General Permit)

This permit provides Authorization to Discharge Under the Arizona Pollutant Discharge Elimination System program, in compliance with the provisions of the Arizona Revised Statutes, Title 49, Chapter 2, Article 3.1, the Arizona Administrative Code, Title 18, Chapter 9, Articles 9 and 10 and the Clean Water Act as amended (33 U.S.C. 1251 et seq.).

AZPDES Arizona Pollutant Discharge Elimination System

BMP (Best Management Practices)

Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the U.S. BMPs also include treatment requirements, operating procedures, and practice to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage (EPA NPDES Glossary).

BIA Bureau of Indian Affairs

BLM Bureau of Land Management

CGP Construction General Permit (see AZCGP)

Contractor

The individual, partnership, firm, corporation, or any acceptable combination thereof, or joint venture, contracting with the Department (ADOT) for performance of work (ADOT Standard Specifications for Road and Bridge Construction).

Corps U.S. Army Corps of Engineers

CWA (Clean Water Act)

The Act established the basic structure for regulating discharges of pollutants into the waters of the United States. It gave EPA the authority to implement pollution control programs such as setting wastewater standards for industry. The Clean Water Act also continued requirements to set water quality standards for all contaminants in surface waters. The Act made it unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a permit was obtained under its provisions (EPA Clean Water Act History).

Discharge

The direct or indirect addition of any pollutant to the waters of the state from a facility. (AZ revised statutes 49 Chapter 2).

EPG

ADOT Environmental Planning Group

Engineer

The State Engineer, acting by and under the authority of the laws of the State of Arizona, or the State Engineer's representative in matters relating to contract development, administration and construction activities (ADOT Standard Specifications for Road and Bridge Construction)

EPA

Environmental Protection Agency

Erosion

Removal of soil particles by wind or water.

Erosion Control Coordinator

Appointed by the contractor and approved by ADOT. The erosion control coordinator 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 person 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.

FCGP

Federal Construction General Permit

FHWA

Federal Highway Administration

Final Stabilization

As defined in the CGP means that either:

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 (e.g., 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.

Impaired Waters

Under section 303(d) of the 1972 Clean Water Act, states, territories, and authorized tribes are required to develop lists of impaired waters. These impaired waters do not meet water quality standards that states, territories, and authorized tribes have set for them, even after point sources of pollution have installed the minimum required levels of pollution control technology. A list and map of impaired waters in the State of Arizona <http://www.adeq.state.az.us/environ/water/assessment/download/305-02/att5.pdf>

ISTEA 1991 Intermodal Transportation Efficiency Act

MS4 (Municipal Separate Storm Sewer System

[40 CFR 122.26(b)(8)]. A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

1. Owned and operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the U.S.;
2. Designed or used for collecting or conveying storm water;
3. Which is not a combined sewer; and
4. Which is not part of a publicly owned treatment works (POTW).

NPDES (National Pollutant Discharge Elimination System)

The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of CWA (EPA NPDES Glossary).

Non-point source pollution

Any conveyance, which is not a point source from which pollutants are or may be discharged to navigable waters (AZ revised statutes 49 Chapter 2).

NOI (Notice of Intent)

An application to notify the permitting authority of a facility's intention to be covered by a general permit.

NOT (Notice of termination)

An application to notify the permitting authority of a facility's intention to terminate coverage by a general permit.

Operator – For the purpose of the 2003 Construction General Permit and in the context of storm water associated with construction activity, any party associated with a construction project that meets either of the following two criteria:

1. The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications
2. The party 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., authorized to direct workers at a site to carry out activities required by the SWPPP or comply with other permit conditions).

Point Source Pollution

Any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft from which pollutants are or may be discharged to navigable waters. Point source does not include return flows from irrigated agriculture. A.R.S. § 49-201(27).

Pollutant

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 and mining, industrial, municipal and agricultural wastes or any other liquid, solid, gaseous, or hazardous substances. A.R.S. § 49-201(28)

Section 401 of the Clean Water Act

Enables the States to review federal permit activities affecting the nations waters and to ensure that proposed activity does not adversely affect the environment and that it meets the states water quality standards.

Section 404 of the Clean Water Act

Regulates the discharge of dredged or fill materials within the water of the United States and establishes a program to issue permits.

Sedimentation

The accumulation of soil particles that have been transported away from their natural location by wind or water action.

Storm water

The runoff from storms, snow melt runoff, and surface runoff and drainage [40 CFR 122.26(b)(13)].

SWPPP (Storm Water Pollution Prevention Plan)

A SWPPP is a written document that describes the construction operator's activities to comply with the requirements in the CGP. The SWPPP is intended to facilitate a process whereby the operator evaluates potential pollutant sources at the site and selects and implements appropriate measures designed to prevent or control the discharge of pollutants in storm water runoff (EPA NPDES Glossary).

Tribal Lands

In this document, is defined at 40 Code of Federal Regulations (CFR) 122.2 to mean:

1. All land within the limits of any Indian reservation under the jurisdiction of the United States government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation;
2. All dependent Indian communities with the borders of the United States whether within the originally or subsequently acquired territory thereof, and whether within or without the limits of a state; and
3. All Indian allotments, the Indian titles to which have not been extinguished, including rights-of-ways running through the same.

TMDL (Total Daily Maximum Load)

Specifies the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and allocates pollutant loadings among point and nonpoint pollutant sources (EPA NPDES Glossary).

Unique Waters

Outstanding state resource waters as established by ADEQ under A.A.C. R18-11-112. A list of unique waters in the State of Arizona. <http://www.adeq.state.az.us/environ/water/permits/download/uniquewat.pdf>

Waters of the U.S.

All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters subject to the ebb and flow of the tide. Waters of the U.S. include all interstate waters and intrastate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds. [See 40 CFR 122.2 for the complete definition.]

APPENDIX C

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