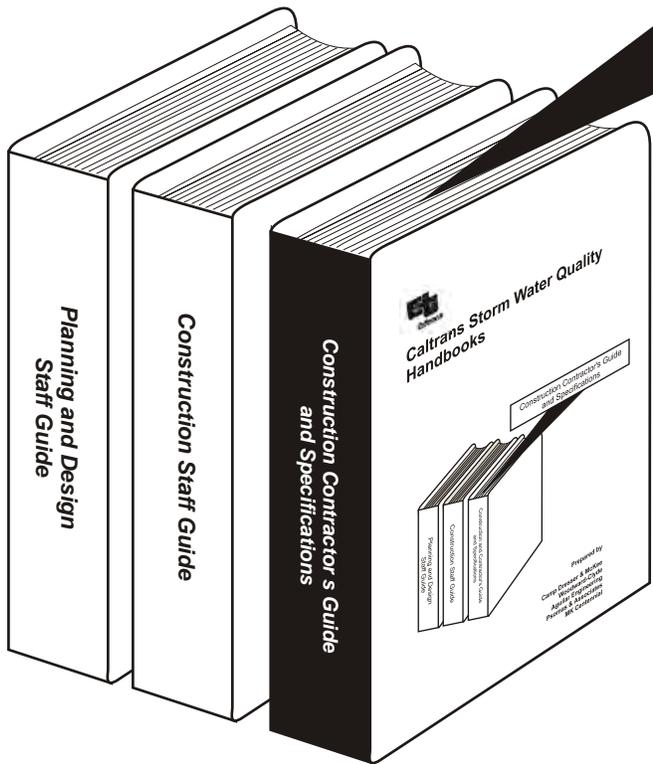




# Caltrans Storm Water Quality Handbooks

**Construction Contractor's Guide and Specifications**



Prepared by

Camp Dresser & McKee  
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MK Centennial

April 1997

# ADDENDUM TRANSMITTAL

		ADDENDUM NO. CC97-01
HANDBOOK TITLE	APPROVED BY	DATE ISSUED
Caltrans Storm Water Quality Handbooks <b>Construction Contractor's Guide and Specifications, April 1997 Edition</b>	Environmental Engineering J. Steven Borroum, Chief	August 30, 1997
SUBJECT AREA	ISSUING UNIT	Page 1 of 3
Storm Water Quality; New and Revised Management Practices	Environmental Program Office of Environmental Engineering	
SUPERSEDES	DISTRIBUTION	REFERENCE MEMO
Corresponding portions of Handbook dated April, 1997	All Handbook Holders	

## Purpose

This addendum is being issued to provide the latest developments in Caltrans storm water quality management practices.

## Background

The Caltrans Storm Water Quality Handbooks are part of an evolving program. Caltrans will issue addenda to this handbook as new practices are developed and existing practices improved.

## Description

Changes made by this addendum are described below, by handbook section:

### **Table of Contents**

1. Revised to reflect removal of Attachment N of Appendix B, and the addition of Table 3-1.

### **Section 1**

1. Revised Table 1-1 to include potential pollutants from water diversion/encroachment activities and liquid wastes.
2. Revised Table 1-2 to reflect changes to CD8(2)-Paving Operations, CD16(2)-Concrete Waste Management, and to include new CD45(2)-Clear Water Diversion and Encroachment and CD46(2)-Liquid Waste Management.
3. Fixed typographic error in the first bullet paragraph in the first column.

## **Section 2**

1. Revised table in WPCP Section 30.2.1 to include CD45(2)-Clear Water Diversion and Encroachment and CD46(2)-Liquid Waste Management.

## **Section 3**

1. Revised Section 3.1 to discuss submittal of a schedule of values for the water pollution control portion of the contract. This schedule of values is now a separate submittal to accompany the SWPPP, rather than an item included in the SWPPP.
2. Added Table 3-1 to provide an example of what a schedule of values for water pollution control may look like.
3. Revised SWPPP Section 500.2.3.6 to include CD46(2)-Liquid Waste Management.

## **Section 5**

1. Revised Table 5-1 to include new CD45(2)-Clear Water Diversion and Encroachment and CD46(2)-Liquid Waste Management.

## **Appendix B**

1. Revised page B-1 to reflect the removal of Attachment N.
2. Attachment E, Part 5 - Included CD45(2)-Clear Water Diversion and Encroachment and CD46(2)-Liquid Waste Management as a minimum requirement for non-storm water management and waste management and disposal. The contractor shall implement this BMP for all applicable activities, material usage, and site conditions on the project site.
3. Deleted Attachment N, Cost Breakdown for Water Pollution Control. This item is no longer a part of the SWPPP. It is now a separate submittal to accompany the SWPPP.

## **Appendix C**

1. Included new CD45(2)-Clear Water Diversion and Encroachment and CD46(2)-Liquid Waste Management to the list of working details.
2. Modified CD8(2)-Paving Operations to address coating asphalt transit trucks and asphalt paving equipment with anti-adhesion agents, and for reusing asphalt chunks or grindings in embankments.
3. Revised CD16(2)-Concrete Waste Management to directly address wet portland cement concrete waste, portland cement concrete slurries, and asphalt concrete slurries that may result from sawcutting, coring, grinding, grooving, and transit truck washout.

4. Included new CD45(2)-Clear Water Diversion and Encroachment to provide guidance on how to conduct diversions/encroachments of water bodies to minimize impacts on the water quality.
5. Included new CD46(2)-Liquid Waste Management to address management of non-hazardous liquid wastes, such as drilling fluids, rinse water, and dredgings, which may be generated on a construction site.

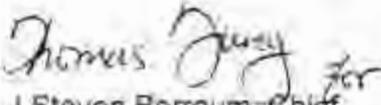
**Handbook Impact**

<b>Remove Old Page(s)</b>	<b>Insert New/Revised Page(s)</b>
Table of Contents, Pages i, ii, iii	Table of Contents, Pages i, ii, iii
1-5, 1-6, 1-9, 1-10, 1-11, 1-12	1-5, 1-6, 1-9, 1-10, 1-11, 1-12
2-15, 2-16	2-15, 2-16
3-1, 3-2, 3-11, 3-12	3-1, 3-2, 3-11, 3-12
5-3	5-3
Appendix B: B-1, Attachment E, Page 4 of 4, Attachment N	Appendix B: B-1, Attachment E, Page 4 of 4
Appendix C: Page C-1,C-2, CD8(2), CD16(2)	Appendix C: Page C-1, C-2, CD8(2), CD16(2), CD45(2), CD46(2)

Insert the new CD45(2)-Clear Water Diversion and Encroachment and CD46(2)-Liquid Waste Management into Appendix C of the Construction Contractor's Guide and Specifications, immediately following CD44(2)-Illicit Discharge/Illegal Dumping Reporting

If you have any questions regarding these changes, please call Thomas Fung, Environmental Program, Office of Environmental Engineering, at (916) 653-2115 (CALNET 453-2115).

# HANDBOOK CHANGE TRANSMITTAL

HANDBOOK CHANGE TRANSMITTAL		NO.
HANDBOOK TITLE	APPROVED BY	DATE ISSUED
Caltrans Storm Water Quality Handbooks <b>Construction Contractor's Guide and Specifications</b>	 J. Steven Borroum, Chief Environmental Engineering	April 30, 1997
SUBJECT AREA	ISSUING UNIT	EFFECTIVE DATE
Storm Water Quality	Environmental Program	April 30, 1997
SUPERSEDES	DISTRIBUTION	REFERENCE MEMO
Handbook Dated May 10, 1996	All Handbook Holders	

## Implementation Instructions

Remove the entire contents of the *Construction Contractor's Guide and Specifications*, including original pages dated May 10, 1996 and all addendum pages issued to date, and insert the enclosed replacement contents dated April 1997.

**Special Notice:** The April 1997 *Construction Contractor's Guide and Specifications* update transmitted herewith is designed for use on projects bid using April 1997 updates to SSP 7.34 or SSP 7.34.5. Handbook holders on projects which include Special Provisions calling out the May 10, 1996 edition (including amendments) of the *Construction Contractor's Guide and Specifications* are advised to insert the contents removed in accordance with this transmittal into a separate notebook and to continue using said materials until project completion.

If you have any questions regarding these changes, please call Thomas Fung, Environmental Program, Office of Environmental Engineering, at (916) 653-2115 (CALNET 453-2115).

## General Changes Throughout the Handbook

1. General editing was accomplished throughout the document for improved clarity, consistency in style and terminology, consistency with the other Storm Water Quality Handbooks, and for consistency with recent changes in the SSP 7.34 and SSP 7.34.5.
2. Changed Good Management Practice (GMP) to Best Management Practice (BMP).
3. Changed sediment source control BMPs to soil stabilization BMPs and changed sediment treatment control BMPs to sediment control BMPs.

### Specific Changes by Handbook Section

#### Section 1

1. Clarified that a SWPPP will meet the requirements of Standard Specifications Section 7-1.01G-Water Pollution for the preparation and implementation of a water pollution control program (Section 1.1).
2. Significantly revised discussion of erosion and sedimentation processes (Section 1.3.1).
3. Revised Table 1-1 to correlate various construction activities to potential pollutants (Section 1.3.2).
4. Clarified that much of the information needed by the Contractor to prepare the WPCP or SWPPP will be available from Caltrans, prior to bidding or at the pre-construction conference. Clarified that if information is unavailable from Caltrans, then it is the Contractor's responsibility to obtain the information through alternative sources (Section 1.4.1.1).
5. Strengthened cross-reference to working details in Appendix C when discussing development of SWPPP and WPCP (Section 1.4.1.2).
6. Revised Table 1-2 to include CD43(2)-Fiber Rolls and CD44(2)-Illicit Discharge/Illegal Dumping Reporting (Section 1.4.1.2).
7. Revised explanation of use of erosion and sediment controls to reduce the discharge of sediment from construction sites (Section 1.4.1.3).
8. Revised step by step procedure for selecting erosion and sediment controls (Section 1.4.1.3).
9. Expanded discussion of early construction of permanent, post-construction controls for use as temporary controls (Section 1.5).

## Section 2

1. Linked requirement to prepare a WPCP to the Special Provisions (Section 2.1).
2. Revised format of WPCP Section 10 to require additional information and to provide provisions for the RE's approval.
3. Revised format of WPCP Section 30 to clarify objectives of BMPs and minimum requirements, and provide space for description of locations of site conditions affecting selection of BMPs. Provided a form for WPCP inspection, maintenance, and repair program.
4. Table 30-1 was simplified.
5. Revised WPCP Section 30 lists of minimum BMP requirements and BMPs requiring consideration. Clarified that BMPs listed for non-storm water management and waste management and disposal must be selected when applicable activities occur on the construction site.
6. Added emphasis in WPCP Section 30 to preparation of water pollution control drawings.
7. Changed inspection frequency in WPCP Section 30 to bi-weekly, before and after storms, and at 24-hour intervals during extended storm events.

### **Section 3**

1. Linked requirement to prepare a SWPPP to the Special Provisions (Section 3.1).
2. Revised format of SWPPP Section 100 to include a table of contents.
3. Revised format of SWPPP Section 200 to provide provisions for RE's approval and certification of SWPPP and to include the SWPPP Amendment Log.
4. Revised format of SWPPP Section 500.3 to clarify objectives of BMPs and minimum requirements.
5. Table 500-1 was simplified.
6. Changed terminology in SWPPP Section 500.4 from non-storm water management to non-storm water management and waste management and disposal. Clarified that BMPs listed for non-storm water management and waste management and disposal must be selected when applicable activities occur on the construction site.
7. Clarified in SWPPP Section 500.6 that persons involved in BMP inspection, maintenance, and repair must be trained in storm water pollution prevention.
8. Moved discussion of post-construction storm water management to SWPPP Section 500.9.
9. Changed inspection frequency in SWPPP Section 500.10 to bi-weekly, before and after storms, and at 24-hour intervals during extended storm events.
10. Revised format of SWPPP Section 600 to provide provisions for the RE's approval and certification of amendments.

### **Section 4**

1. Clarified that the WPCP or SWPPP must be implemented throughout the duration of the project. Clarified requirements for implementation of erosion and sediment controls during the winter season and the Contractor's responsibility to prevent sediment discharges outside the winter season as a result of tracking and wind erosion. Added discussion of protection of nonactive construction areas (Section 4.1).
2. Added reference to the working details in Appendix C as a source of information on BMP inspection requirements (Section 4.2).

### **Section 5**

1. Clarified the intent and use of working details contained in Appendix C.
2. Added CD43(2)-Fiber Rolls and CD44(2)-Illicit Discharge/Illegal Dumping Reporting to list of BMPs. Clarified primary purposes of some BMPs.

### **Appendix A**

1. Added definition of local permit and nonactive construction area. Revised Appendix A for consistency with other Handbooks.

### **Appendix B**

1. Attachment B - Used different project for example WPCDs. Attachment C - Simplified use of runoff coefficient calculation sheet. Attachment E - Revised to clarify minimum requirements and BMPs requiring consideration. Attachment F, H, I, J, L, M - Provided copy-ready forms. Attachment I - Revised to provide for consistency for when additional information needs to be provided. Attachment J - Revised to include RE's findings and certification. Attachment M - Eliminated unnecessary text. Attachment N - Revised to include limiting notes.

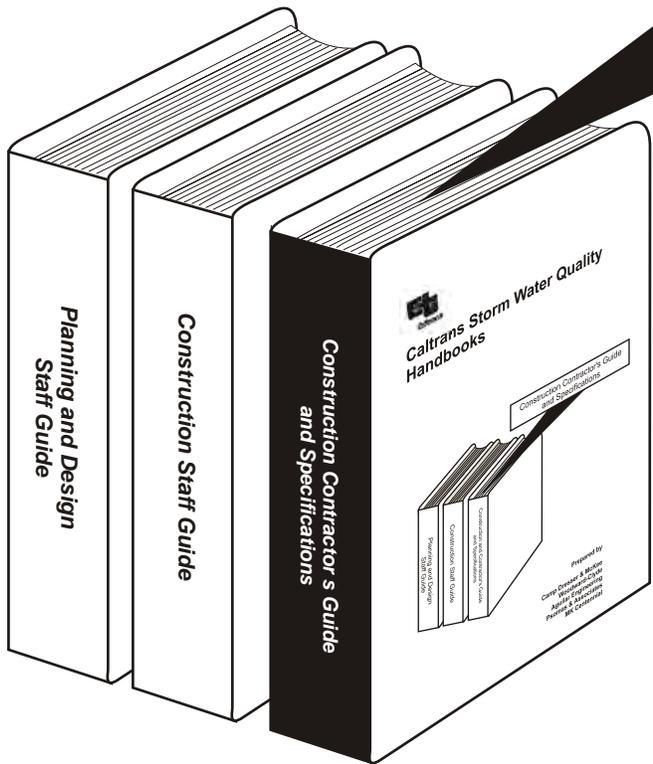
### **Appendix C**

1. Revised BMP definitions and purposes for consistency.
2. Revised BMP objectives to reflect proposed use of BMPs.
3. Provided guidance on limitation on use of CD37(2) - Straw Bale Barriers.



# Caltrans Storm Water Quality Handbooks

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# Section 1

## Introduction

### 1.1 Use of This Handbook

Caltrans requires contractors to prepare and implement a program to control water pollution during the construction of all projects. Standard Specifications Section 7-1.01G - Water Pollution, requires a Water Pollution Control Program (WPCP) for all projects. Larger projects, defined as those resulting in 2 ha (5 ac) or more of soil disturbance, require a Storm Water Pollution Prevention Plan (SWPPP) as specified in the Special Provisions. When a SWPPP is required for a project, it will satisfy the requirements for a WPCP in addition to meeting other permit requirements. This Handbook is intended to provide background information on the program to control water pollution and to standardize the process for preparing and implementing WPCPs and SWPPPs.

- # Section 1 provides background about storm water regulations, construction sites and their impact on water quality, and guidance in selecting pollution control measures.
- # Section 2 provides specifications for preparing a WPCP.
- # Section 3 provides specifications for preparing a SWPPP.
- # Section 4 provides specifications for implementing a WPCP or SWPPP.
- # Section 5 provides an introduction to and guidance for use of Best Management Practices (BMPs) and associated working details that could be included in a WPCP

or SWPPP.

- # Appendix A provides a listing of frequently used abbreviations and acronyms and the definitions of terms used throughout this Handbook.
- # Appendix B provides attachments for use in preparing a SWPPP.
- # Appendix C provides working details for temporary construction BMPs.

### 1.2 Storm Water Regulations

Federal regulations for controlling pollutants in discharges of storm water runoff were issued by the U.S. Environmental Protection Agency (EPA) in 1990. These regulations require that a National Pollutant Discharge Elimination System (NPDES) permit be obtained for storm water discharges associated with significant construction activities. In California, the EPA has delegated its authority to issue NPDES permits to the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCB).

Recognizing the substantial administrative burden associated with permitting individual construction sites throughout California, the SWRCB elected to adopt a single statewide general permit for construction activities (General Permit) that applies to construction projects where clearing, grading, and excavation results in soil disturbance of 2 ha (5 ac) or more of total land area. The General Permit requires owners of land where construction activity occurs to develop a SWPPP that meets the following requirements:



- # Identifies pollutant sources that may affect the quality of storm water discharges from the construction site, and
- # Identifies and commits to implementing storm water pollution prevention measures, also known as Best Management Practices (BMPs), to reduce pollutants in storm water discharges from the construction site both during construction and after construction is completed.

Coverage under the General Permit is obtained by Caltrans by filing with the SWRCB a Notice of Intent (NOI) to comply with the General Permit. Failure to obtain coverage or to comply with any condition of the General Permit may result in civil penalties of up to \$25,000 per day of violation under the Clean Water Act and civil and criminal penalties under the California Water Code.

In some areas of the state, RWQCBs have issued local permits directly to Caltrans Districts. The requirements for construction sites covered by local permits are generally similar to and supersede the General Permit requirements. Throughout the remainder of this Handbook, the term "Permit" shall be considered as a reference to either the General Permit or local permit, whichever is applicable.

Projects requiring a SWPPP are identified by Caltrans and the specific requirements for the preparation and implementation of a SWPPP are included in the Special Provisions.

Projects that do not require a SWPPP are required to prepare a WPCP in accordance with Caltrans Standard Specifications and Special Provisions.

## 1.3 Construction Sites and Their Impacts on Water Quality

Improperly managed construction sites can be a significant source of pollution to adjacent receiving waters. Impacts are caused primarily by two factors: (1) sediment that is washed into the receiving waters as the result of erosion on the construction site; and (2) other pollutants that come into contact with storm water runoff as a result of contractor activities on site.

The development of a WPCP or SWPPP to reduce pollutants from a construction site requires a basic understanding of the erosion and sedimentation processes and the factors that influence them, as well as an understanding of how other construction activities impact water quality. This section of the Handbook provides basic information on how these pollutants get into storm water runoff, and serves as background for Section 1.4 which addresses the selection of BMPs that prevent pollutants from contacting runoff and that remove pollutants from runoff.

### 1.3.1 Erosion and Sedimentation Process

Soil erosion is the process by which soil particles are removed from land surfaces, by wind, water or gravity. Natural erosion generally occurs at slow rates; however, the rate of erosion increases when land is cleared or altered and left disturbed.

Clearing and grubbing activities during construction remove vegetation and disrupt the structure of the soil surface, leaving the soil susceptible to rainfall and runoff erosion, stream and channel erosion, and wind erosion if left untreated. Ultimately, the material suspended by erosion settles during the process of sedimentation.

### 1.3.1.1 *Rainfall and Runoff Erosion*

The rainfall and runoff erosion process begins when raindrops impact the soil surface and dislodge minute soil particles. These soil particles then become suspended in the water droplet. The sediment laden water droplets accumulate on the soil surface until a sufficient quantity has developed to begin flowing under the forces of gravity.

The initial flow of sediment laden water generally consists of a thin, slow moving sheet, known as sheet flow. While sheet flow is generally not highly erosive on its own, it does begin the transport of previously suspended sediment. Due to irregularities in the soil surface and uneven topography, sheet flow will usually begin to concentrate into rivulets, where the flow picks up velocity and erosive energy as a result of gravitational forces.

The increasing erosive energy of water flowing in rivulets will begin to cut small grooves, or rills, in the soil surface. Rill erosion of the soil surface tends to concentrate flows, which then flow faster and gain erosive energy as a result of gravitational forces. In turn, the rills become deeper and larger, and may join together with adjacent rills. Typically, rills run parallel to the slope and each other, are small enough to be stepped across, and are generally enlarged by direct erosion of the rill's sides and bottom by the action of flowing water.

The joining together of several adjacent rills, or sufficient enlargement of a single rill, begins gully erosion. Gully erosion of the soil surface tends to further concentrate flows, which then flow faster and gain erosive energy as a result of gravitational forces. Typically, gullies run parallel to the slope, may have one or more lateral branches, are generally too large to step across, and are enlarged by four key actions. First, gullies often have a head at the upstream

end which progresses its way upstream as water flowing into the gully erodes away the lip of the head. Second, the flow in a gully tends to under cut the banks. Once sufficiently under cut, the banks collapse into the gully where the collapsed soil is then washed away. Third, when banks collapse into the gully, flowing water is diverted around the temporary blockage of soil. This temporary blockage of soil increases velocities along one or both banks, which results in increased bank erosion. Fourth, the concentration of flows in the gully can result in scour of the gully floor until a stable slope is obtained.

While the most common instigator of water erosion is rainfall, water erosion can also result from excessive or improper use of water and from snowmelt. Unless carefully managed, use of water for irrigation, dust control, soil compaction, washing, and jetting activities can result in water induced erosion similar to that described above. Likewise, snowmelt often results in erosion, especially snowmelt from disturbed soils.

### 1.3.1.2 *Stream and Channel Erosion*

Erosion within streams and channels is generally precipitated by one or more of the following factors which disrupt the delicate balance required for stable streams and channels.

Disturbing the banks of streams and channels is often required during construction. Once vegetation or other bank protection measures are disturbed, flows may begin to erode the unprotected soil.

Disturbing the flow within a stream or channel is often necessary to facilitate construction activities. By diverting flows within the channel, velocities are generally increased in some areas to compensate for decreases in



other areas. The increases in velocity may exceed that normally experienced by the channel, resulting in bank erosion and bottom scour.

Increasing the quantity and rate of flow to streams and channels often results from construction activities and construction of facilities that increase the quantity and rate of runoff as well as how runoff is conveyed to the discharge point. The increased quantity and rate of flow can cause bank erosion and bottom scour.

Changing the sediment balance in a stream or channel often results as a project transitions from construction to post-construction. Overly aggressive post-construction stabilization of a site may reduce the sediment load in discharges to less than that found in pre-project flows. As a result, the post-construction discharge may exhibit the “hungry water” effect and erode the banks and scour the bottom of streams and channels in an attempt to balance its sediment carrying capacity. While many post-construction sites may exhibit less erosion and sediment discharge than the pre-construction site, it would be rare to find an active construction site with less erosion and sediment discharge than the pre-construction site. Accordingly, the sediment balance phenomenon is not a justification for not controlling construction site erosion.

#### 1.3.1.3 Wind Erosion

Dust is defined as solid particles or particulate matter small enough to remain suspended in the air for a period of time and large enough to eventually settle out of the air. Dust from a construction site originates as inorganic particulate matter from rock and soil surfaces and material storage piles. The majority of dust generated and emitted into the air at a

construction site is related to earth moving, demolition, construction traffic on unpaved surfaces, and wind over disturbed soil surfaces.

#### 1.3.1.4 Factors Influencing Erosion

There are five primary factors that influence erosion: soil characteristics, vegetative cover, topography, climate, and rainfall.

*Soil characteristics* that determine the erodibility of the soil include particle size, particle gradation, organic content, soil structure, and soil permeability. Soil characteristics affect soil stability, and infiltration capacity. The less permeable the soil, the higher the likelihood for increased runoff and erosion. Soils with a high percentage of silt and clays are generally the most erodible. Organic matter creates a favorable soil structure, improving its stability and permeability. This structure increases infiltration capacity, delays the start of erosion, and reduces the amount of runoff.

*Vegetative cover* plays an important role in controlling erosion by shielding the soil surface from the impacts of falling rain, slowing the velocity of runoff (thereby permitting greater infiltration), maintaining the soil’s capacity to absorb water, and holding soil particles in place.

*Topography*, including slope length, height, and steepness are key elements in determining the volume and velocity of runoff. As slope length, height, and/or steepness increases, so does the velocity of runoff and the erosion potential.

*Climate* is a key factor that influences erosion. High rainfall areas and areas with freeze/thaw cycles have significant effects on soil stability and structure. Micro climates in mountainous or hilly areas are influenced by the slope aspect relative to the sun.



*Rainfall*, including the frequency, intensity, and duration are fundamental factors in determining the quantity and rate of erosion. When storms are frequent, intense, or of long duration, erosion risks are high. In California, the erosion risk period is typically highest in the winter wet season (typically October through April) except in and near the Sierra Nevada Mountains and southern deserts, where summer thunderstorms may occur.

### 1.3.1.5 Sedimentation

Once soil particles are eroded by and suspended in water or wind, they can be carried from a few inches or feet to many miles before conditions are such that the forces of gravity will cause the soil particles to settle. The settling of soil particles is known as the process of sedimentation. Excessive levels of sedimentation can plug storm drains, block streams and channels, damage habitat, and in some cases result in formation of habitats in undesirable locations. Generally, sedimentation can be forced to occur by creating conditions that slow the flow of water or air, allowing particles to settle. Conversely, sedimentation can be prevented by creating conditions of rapid and or turbulent flow which prevent particles from settling.

### 1.3.2 Other Construction Activity

#### Pollutants

Sediment from erosion is the pollutant most frequently associated with construction activities. However, other pollutants of concern include nutrients, trace metals, pesticides, oil and grease, fuels, other toxic chemicals, and miscellaneous wastes. These pollutants originate from a variety of construction activities, as shown in Table 1-1, and when carried by storm water runoff to receiving waters, may cause environmental harm.

Construction Activity	Pollutants						
	Sediment	Nutrients	Trace Metals	Pesticides	Oil, Grease, Fuels	Other Toxic Chemicals	Miscellaneous Waste
<b>Construction Practices</b>							
Dewatering Operations	*					*	
Water Diversion/ Encroachment	*	*					*
Paving Operations	*			*	*	*	*
Structure Construction/Painting			*			*	*
<b>Material Management</b>							
Material Delivery and Storage	*	*	*	*	*	*	
Material Use		*	*	*	*	*	
<b>Waste Management</b>							
Solid Waste	*	*					*
Liquid Waste	*						*
Hazardous Waste						*	
Contaminated Spills	*					*	
Concrete Waste							*
Sanitary/Septic Waste							*
<b>Vehicle/Equipment Management</b>							
Vehicle/Equipment Cleaning					*	*	
Vehicle/Equipment Fueling					*	*	
Vehicle/Equipment Maintenance					*	*	



### 1.3.2.1 *Nutrients*

Phosphorous and nitrogen from fertilizers, pesticides, construction chemicals, and solid waste are often generated by construction site activities. These nutrients can be carried by storm water runoff to receiving waters where they can result in excessive or accelerated growth of vegetation and algae, resulting in impaired use of the receiving water.

### 1.3.2.2 *Trace Metals*

Many artificial surfaces (e.g., galvanized metal, paint, or preserved wood) contain metals that can enter storm water runoff as the surfaces corrode, flake, dissolve, decay, or leach. Over half the trace metal load carried in storm water runoff is associated with sediments to which these eroded metals attach.

### 1.3.2.3 *Pesticides*

Herbicides, insecticides, and rodenticides may be used on construction sites. Unnecessary, excessive, or improper application of these pesticides may result in direct water contamination, indirect water pollution by aerosol drift, or erosion of treated soil and subsequent transport into receiving waters.

### 1.3.2.4 *Oil, Grease, Fuels*

Oil, grease, and fuels are widely used and can be spilled, leaked or dumped on the ground where they can be washed away by storm water runoff. Sources include leakage during normal vehicle use, hydraulic line failure, spills during fueling, and inappropriate disposal of drained fluids.

### 1.3.2.5 *Other Toxic Chemicals*

Synthetic organic compounds (adhesives, cleaners, sealants, solvents, etc.) are widely applied and may be improperly stored and disposed. Accidental spills and leakage or deliberate dumping of these chemicals onto the

ground or into storm drains (especially used crankcase oils and antifreeze) causes environmental harm in receiving waters.

### 1.3.2.6 *Miscellaneous Wastes*

Miscellaneous wastes include wash water from concrete mixers, paints and painting equipment cleaning activities, solid organic wastes resulting from trees and shrubs removed during land clearing, wood and paper materials derived from packaging of building products, food containers such as paper, aluminum, and metal cans, and sanitary wastes. The discharge of these wastes can lead to unsightly and polluted receiving waters.

## 1.4 Controlling Pollutants From Construction Sites

Construction site pollutants are controlled by the use of structural devices, such as silt fences and straw bales; and non-structural activities, such as good housekeeping and construction related waste management. Caltrans refers to these devices and activities as BMPs.

Pollution control through use of BMPs is not new to the construction industry. For example, the Associated General Contractors included water pollution control standards in their *Safety Manual* (1996). While BMPs have been used for years on construction projects, there is often little or no formal documentation. As a result of increased environmental awareness and regulatory requirements, Caltrans requires formal documentation of pollution control practices related to construction projects via a WPCP for all projects and a SWPPP on projects disturbing 2 ha (5 ac) or more of total land area or otherwise subject to the Permit. The contract Special Provisions will specify whether a WPCP or SWPPP needs to be developed for a particular project.



This section gives general guidance for assembling pollution control documentation and for selecting BMPs. The selection of specific BMPs will depend upon site conditions, material availability, contractor's preferences, and the Caltrans Resident Engineer's (RE's) approval. In some cases, the contract Special Provisions may require implementation of specific BMPs. Specifications for incorporation of contractor selected or specified BMPs into the WPCP or SWPPP are discussed in Section 2 and Section 3 of this Handbook, respectively.

#### 1.4.1 WPCP & SWPPP Development Guidance

When developing a WPCP or SWPPP, the contractor should take the time to assess site conditions, identify potential pollutant sources, and then identify the BMPs that will best suit the construction activities and meet Caltrans pollution control objectives. A well developed WPCP or SWPPP will provide sufficient flexibility to allow for minor field modifications without making formal plan amendments. However, the WPCP or SWPPP must provide sufficient detail to ensure that the BMPs can be properly implemented and maintained.

The contractor should bear in mind that the WPCP or SWPPP will be used throughout the life of the contract and that the plan may require occasional amendments so that the plan continuously reflects site conditions.

The contractor should also remember that the WPCP or SWPPP must be submitted to the RE for approval and that outside agencies may request the opportunity to review the plan; thus, the plan should be complete and orderly to allow for an efficient review process that will not delay the start of construction.

##### 1.4.1.1 Assembling Project Information

To develop the WPCP or SWPPP, the contractor should begin by gathering and making use of the following information:

1. Applicable sections of the project plans and specifications (typically layout, grading, stage construction, and drainage plans).
2. Copies of the soils/materials reports to evaluate soils types and identify existing hazardous materials or contaminated soils at the site.
3. A copy of the project drainage report to identify drainage patterns and tributary areas.
4. Copies of environmental permits obtained during project design (i.e., Department of Fish & Game, Army Corps of Engineers, Coastal Commission, etc.).
5. The project schedule (to evaluate specific activities during the winter season).
6. Site specific data such as site area, runoff coefficients, and pervious areas.
7. A list of pre-construction and post-construction permanent storm water quality control practices.

This information should be thoroughly reviewed so that the contractor can formulate a plan and incorporate the applicable information into the WPCP or SWPPP.

Much of the information the contractor will need can be obtained from Caltrans, either prior to bidding, or at the pre-construction conference. However, when any required information is unavailable from Caltrans, it will



be the contractor's responsibility to obtain it through alternative sources.

#### 1.4.1.2 Inventory of Contractor's Activities

The contractor should evaluate all activities that will be required to construct the project, and then prepare an inventory of those activities that may cause pollution. Generally, all soil-disturbing activities and most common construction operations have the ability to discharge sediment or other pollutants (See Table 1-1). For example, clearing and grubbing work and grading activities will create potential erosion and sediment discharge; concrete paving activities will create potential concrete waste discharges; and material and equipment storage activities will create potential chemical discharges.

Table 1-2 identifies BMPs that apply to various construction activities on a typical highway construction project. This matrix provides *guidance* (as opposed to specifications) for selecting BMPs for most highway construction projects.

For some activities, multiple BMPs are shown. The contractor should refer to Appendix C of this Handbook for working details of each BMP. The working details present the definition and purpose, appropriate applications, limitations, standards and specifications, and maintenance and inspection requirements for each BMP. Based on this information, the contractor selects the BMPs best suited to the construction site, and the activities planned thereon, and the stated objectives of the WPCP or SWPPP.

#### 1.4.1.3 Selection of Erosion and Sediment Control BMPs

Effective erosion and sediment control management first minimizes erosion by keeping the soil protected as much as possible and second, directs runoff from disturbed areas to locations

where sediment can be removed prior to discharge from the site. The use of soil stabilization BMPs to control erosion before it starts is the preferred method of sediment control. However, on active construction areas, there may not be sufficient time for soil stabilization BMPs to become established to the point at which they are fully effective before the onset of erosive events. In these situations, sediment control BMPs can provide a more immediate level of protection by removing suspended sediment from flows before being discharged. However, the best protection on active construction sites is generally obtained through simultaneous application of both soil stabilization BMPs and sediment control BMPs. This combination of controls is effective because it prevents most erosion before it starts and has the ability to capture sediments that become suspended before the transporting flows leave the construction site.

The following general steps are provided to aid the contractor in reviewing the project plans and choosing appropriate erosion and sediment control BMPs.

- Step 1 Using the project plans, review the site perimeter.
- # Disturbed areas or slopes that drain toward adjacent properties, storm drain inlets or receiving waters, should be protected with sediment controls, temporary linear barriers (silt fences, sand bags, straw bales, etc.) to reduce or prevent sediment discharge while construction in the area is active.
  - # Significant offsite flows (especially concentrated flows) that drain onto disturbed areas or slopes of the project site should be controlled through use of earth dikes, drainage swales, and lined ditches that will allow for controlled passage or



**Table 1-2  
Pollution Control BMPs for Typical Highway Construction Activities**

	BMPs																						
	WATER CONSERVATION PRACTICES	DEWATERING	PAVING OPERATIONS	STRUCTURE CONST./PAINTING	MATERIAL DELIVERY/STORAGE	MATERIAL USAGE	SPILL PREV./CONTROL	SOLID WASTE MANAGEMENT	HAZARDOUS WASTE MANAGEMENT	CONTAMINATED SOIL MANAGEMENT	CONCRETE WASTE MANAGEMENT	SANITARY/SEPTIC WASTE MANAGEMENT	VEHICLE/EQUIPMENT CLEANING	VEHICLE/EQUIPMENT FUELING	VEHICLE/EQUIPMENT MAINTENANCE	SCHEDULING	PRESERVATION OF EXIST. VEG.	TEMPORARY SEEDING/PLANTING	MULCHING	SOIL STABILIZERS	GEOTXT. MAT EROSION CONTROL BLANKETS	TEMPORARY STREAM CROSSING	
TYP. HWY CONST. ACTIVITIES	CD4	CD7	CD8	CD9	CD10	CD11	CD12	CD13	CD14	CD15	CD16	CD17	CD18	CD19	CD20	CD22	CD23	CD24B	CD25	CD26A	CD26B	CD28	
DEMO. PAVEMENT/ STRUCTURES								X	X	X	X		X										
CLEAR AND GRUB	X							X		X			X				X	X	X	X	X		
CONSTRUCT ACCESS ROADS			X																				X
GRADING	X									X			X				X		X	X	X	X	
CHANNEL EXCAVATION		X																	X				
CHANNEL PAVING			X			X		X	X		X												
TRENCHING/ UNDERGROUND DRAINAGE		X															X						
UNGRND DRG. FAC. INST.		X																					
DRAINAGE INLET RETROFIT																							
UTILITY TRENCHING																	X						
UTILITY INSTALLATION																							
SUBGRADE PREPARATION																							
BASE PAVING			X		X	X	X	X	X				X				X						
AC PAVING			X		X	X	X	X	X				X				X						
CONCRETE PAVING			X		X	X	X	X	X		X												
SAW CUTTING	X		X		X			X	X		X												
JOINT SEALING	X		X		X	X	X	X	X				X										
GRIND/GROOVE	X				X		X	X	X		X												
STRUCTURE EXCAVATION		X						X		X	X												
ERECT FALSEWORK					X	X		X					X										
BRIDGE/ STRUCTURE/ FOUNDATION CONSTRUCTION				X				X	X		X												
REMOVE FALSEWORK					X			X					X										
STRIPING					X	X	X	X	X				X				X						
MISC. CONCRETE WORK	X				X	X					X												
SOUND WALLS		X			X	X		X	X		X												
LANDSCAPING AND IRRIGATION	X	X																X	X				
DAILY CONTRACTORS ACTIVITIES	X				X	X	X	X	X		X	X	X	X	X								

X = BMPs applicable to activity



Section 1  
Introduction

Table 1-2 (continued)

Pollution Control BMPs for Typical Highway Construction Activities

TYP. HWY CONST. ACTIVITIES	BMPs																						
	CD28A STABILIZED CONST. ENTRANCE	CD28B STABILIZED CONST. ROADWAY	CD28C ENTRANCE/OUTLET TIRE WASH	CD30 VEGETATION BUFFER STRIPS	CD31 EARTH DIKES, DRAINAGE SWALES AND LINED DITCHES	CD32A SLOPE DRAINS	CD32B DITCHES AND BERMS	CD33A OUTLET PROTECT./VEL. DIS.	CD33B FLARED CULVERT END SECTIONS	CD34 CHECK DAMS	CD35 SLOPE ROUGH/TERR./ROUNDING	CD36 SILT FENCES	CD37 STRAW BALE BARRIERS	CD38 SAND BAG BARRIERS	CD38 BRUSH/ROCK FILTER	CD40 STORM DRAIN INLET PROTECT.	CD41 SEDIMENT TRAPS	CD42 SEDIMENT BASIN	CD43 FIBER ROLLS	CD44 ILLICIT DISCHARGE/ILLEGAL DUMPING DETECTION AND REPORTING	CD45 CLEAR WATER DIVERSION AND ENCROACHMENT	CD46 LIQUID WASTE MANAGEMENT	
DEMO. PAVEMENT/ STRUCTURES																X					X		
CLEAR AND GRUB				X			X			X	X	X	X	X	X	X	X	X	X		X		
CONSTRUCT ACCESS ROADS	X	X	X													X							
GRADING	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X		X		
CHANNEL EXCAVATION							X	X		X					X	X					X	X	X
CHANNEL PAVING								X								X							
TRENCHING/ UNDERGROUND DRAINAGE							X			X					X	X					X	X	
UNGRND DRG. FAC. INST.								X	X							X					X		
DRAINAGE INLET RETROFIT																X					X		
UTILITY TRENCHING							X									X					X		
UTILITY INSTALLATION																X					X		
SUBGRADE PREPARATION																X							
BASE PAVING																X							
AC PAVING																X							
CONCRETE PAVING																X							
SAW CUTTING																X							
JOINT SEALING																							
GRIND/GROOVE																X							
STRUCTURE EXCAVATION																X					X	X	
ERECT FALSEWORK																							
BRIDGE/ STRUCTURE/ FOUNDATION CONSTRUCTION																X						X	X
REMOVE FALSEWORK																X							
STRIPING																							
MISC. CONCRETE WORK																X							
SOUND WALLS																X							
LANDSCAPING AND IRRIGATION																X			X	X			
DAILY CONTRACTORS ACTIVITIES			X													X				X			X

X = BMPs applicable to activity



containment of flows. Outlet protection and velocity dissipation devices may also be needed to reduce scour.

- # Concentrated flows that are discharged off of the site should be controlled through inlet protection and velocity dissipation devices in order to prevent erosion of downstream areas.

**Step 2 *Using the project plans, identify areas that will be disturbed.***

- # Disturbed areas are subject to erosion by rainfall, concentrated flows, and wind. These areas should be protected with soil stabilization measures such as mulching, soil stabilizers, or temporary seeding. Generally, the winter rainy season is the most critical period for implementation of soil stabilization measures; minimizing disturbed areas in the winter season will help the contractor keep erosion checked.
- # Sediment control BMPs should also be deployed below significant erodible slopes.

**Step 3 *Using the project plans, identify internal swales and ditches.***

- # Highway projects are typically restricted by right-of-way width, thus, sheet flows from large disturbed areas are not common. More often, flows are directed toward internal swales, curbs, and ditches. Until the permanent facilities are constructed, temporary drainage facilities will be subjected to erosion from concentrated flows. These facilities should be stabilized through temporary check dams, geotextile mats, and even lining with concrete under extreme conditions.

**Step 4 *Using the project plans, identify drainage inlets and outlets.***

- # Drainage inlets, including drop inlets and pipe inlets, should be protected from sediment intrusion if the area draining to the inlet has been disturbed. On some projects (such as an HOV widening project in a flat area with many inlets) this might be the only sediment control method used while construction is active.
- # Drainage inlet and outlet protection can utilize silt fences, sand bags, sediment traps, straw bales, or other similar devices.
- # Internal drainage outlet points must also be protected to reduce scour from high velocity flows leaving pipes or other drainage facilities.
- # Inlet and outlet protection measures must not result in flooding of the traveled way.

These four simple steps should help the contractor to identify the most common erosion sources and locations for sediment control measures on a typical highway construction site.

**1.4.1.4 *Non-Storm Water Management and Waste Management and Disposal***

In addition to pollutants caused by erosion and sediment discharges, construction sites may discharge other pollutants resulting from construction activities. Non-storm water management and waste management and disposal covers a broad range of potential pollutant sources and activities, including paving operations, demolition, materials storage, equipment fueling, and other daily activities necessary for construction of the project.

By taking an inventory of construction activities, the contractor can identify potential pollutant sources and then select appropriate BMPs to address these sources. Appropriate BMPs are usually specific to the construction activity. For example, a project with concrete paving would specify BMP CD16(2) - Concrete Waste Management; a project that will require onsite storage of curing compounds would specify, among others, CD10(2) - Material Delivery and Storage.

## 1.5 Permanent, Post- Construction Pollution Controls

Highways are also potential sources of storm water pollution after construction has been completed. In cases where the potential pollutants in post-construction runoff pose a threat to adjacent receiving waters, permanent, post-construction control measures are required to reduce the pollutant load so that the receiving waters are protected. Permanent, post-construction control measures may include landscaping, swale paving, sediment basins, and a variety of other features. These permanent, post-construction control measures are selected by Caltrans design staff and incorporated into the plans, specifications, and estimates (PS&E) for the project. The contractor is responsible for properly constructing the permanent, post-construction control measures, and Caltrans is responsible for their long-term maintenance after acceptance of the project.

Under some circumstances the Special Provisions may require, or the contractor may elect, to schedule early construction of permanent, post-construction control measures in order to take advantage of their pollutant control capabilities during construction of the project. When this occurs, the contractor will

be required to restore the permanent, post-construction control measures to the line and grade shown on the plans prior to acceptance of the work.

An example of early construction of a permanent, post-construction control measure includes the establishment of final vegetative cover upon completion of a slope as opposed to saving the vegetation for the last item of work. The contractor would be required to restore this vegetation if it were to be damaged during its temporary use.



# Section 2

## Specifications for Preparing a WPCP

### 2.1 Preparation and Approval of a WPCP

For projects resulting in less than 2 ha (5 ac) of soil disturbance or not otherwise subject to the requirements of the NPDES program, the Special Provisions will require the contractor to prepare a Water Pollution Control Program (WPCP).

Preparation of a WPCP has been a requirement in Caltrans Standard Specifications for many years. The WPCP must comply with Caltrans Standard Specifications Section 7-1.01G - Water Pollution, and with the Special Provisions which require that the WPCP be prepared following the procedures set forth in this Handbook.

The procedures in this Handbook include requirements for selecting BMPs for various construction activities. Working details for the BMPs are discussed in Section 5 and are presented in Appendix C of this Handbook.

Once the contractor has completed preparation of the WPCP, the WPCP shall be submitted to the Caltrans Resident Engineer (RE) for review and approval. If revisions are required, as determined by the RE, the contractor must revise and resubmit the WPCP. Minor changes or clarifications to the initial submittal may be made and attached as amendments. The time frames for WPCP submittal, review, and resubmittal are specified in the Special Provisions. No activity having the potential to cause water pollution, as determined by the RE, shall be performed until the WPCP has been approved by the RE. In order to allow construction activities to proceed, the RE may

conditionally approve the WPCP while minor amendments are being completed.

The format of the WPCP includes the following sections:

- # Section 10.0 Project Description and Contractor's Certification
- # Section 20.0 Project Information
- # Section 30.0 Pollution Sources and Control Measures
- # Section 40.0 Amendments

In addition, the WPCP includes the following attachments:

- # Water Pollution Control Drawings
- # Maintenance, Inspection, and Repair Program
- # Inspection Log and Construction Site Inspection Checklists



## Section 10.0 Project Description and Contractor's Certification

1. Name of the Project: \_\_\_\_\_
2. Caltrans Contract Number for the Project: \_\_\_\_\_
3. Contractor Information
  - 3a. Name of Contractor: \_\_\_\_\_
  - 3b. Physical Office Address (Do not specify a postal box)  
Street Address: \_\_\_\_\_  
City, State, Zip Code: \_\_\_\_\_  
Phone: (      ) \_\_\_\_\_  
Facsimile: (      ) \_\_\_\_\_
  - 3c. Office Mailing Address  
Address: \_\_\_\_\_  
City, State, Zip Code: \_\_\_\_\_
  - 3d. Project Site Address  
Address: \_\_\_\_\_  
City, State, Zip Code: \_\_\_\_\_  
Phone: (      ) \_\_\_\_\_  
Facsimile: (      ) \_\_\_\_\_
4. Person Responsible for WPCP Implementation  
Name of Person: \_\_\_\_\_  
Title: \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City, State, Zip Code: \_\_\_\_\_  
Office Phone: (      ) \_\_\_\_\_  
Field Phone: (      ) \_\_\_\_\_  
Facsimile: (      ) \_\_\_\_\_  
Pager: (      ) \_\_\_\_\_



5. WPCP Preparer Information

Name of Preparer: \_\_\_\_\_

Address: \_\_\_\_\_

City, State, Zip Code: \_\_\_\_\_

Phone: (        ) \_\_\_\_\_

Facsimile: (        ) \_\_\_\_\_

The following certification shall be signed by the representative of the contractor taking responsibility for conditions of the statement:

*"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate 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."*

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name and Title

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For Use By Caltrans Only

**RESIDENT ENGINEER'S APPROVAL OF WPCP**

*I, and/or personnel acting under my direction and supervision, have reviewed this WPCP and find that it meets the requirements set forth in the Special Provisions, the Caltrans Storm Water Quality Handbooks - Construction Contractor's Guide and Specifications, and the Standard Specifications Section 7-1.01G - Water Pollution.*

\_\_\_\_\_  
RE's Signature

\_\_\_\_\_  
Date of WPCP Approval

\_\_\_\_\_  
Print RE's Name

(        ) \_\_\_\_\_  
RE's Phone Number



## Section 20.0 Project Information

Answer the following questions in a narrative format that can be easily understood by a person who is not familiar with the project.

1. Where is the project located? Provide descriptive items such as county, route, post mile, city, and street names.

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2. What are the major features that the project will provide?

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3. Project Schedule

Start and Finish Dates of Construction:

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Start and Finish Dates of Soil-Disturbing Activities:

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4. Are there any unique features relating to adjacent water bodies (i.e., in or around a wetland, river, stream, or estuary)?

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## Section 30.0 Pollution Sources and Control Measures

### 30.1 Erosion and Sediment Control

YES      NO      Does the work under this contract include soil-disturbing activities such as  
\_\_\_\_\_      \_\_\_\_\_ clearing and grubbing, grading, excavation, trenching, etc.? If yes, continue. If  
no, go to Section 30.1.2

Describe the soil-disturbing activities and general location (*example: trenching along shoulders, and regrading slopes at Pepper Avenue Interchange, etc.*).

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The contractor shall conduct operations to achieve the following minimum protective measures during the winter season.

- # Each active, soil-disturbed area of the project site, including stockpiled materials at storage or staging areas, shall be limited to the area specified in the Special Provisions. The RE may approve, on a case by case basis, expansions of the active area limits.
- # Active, soil-disturbed areas of the project site shall be fully protected using soil stabilization and sediment control BMPs at the end of each day, unless fair weather is predicted.
- # Nonactive construction areas that have the potential to erode due to previous construction activities shall be fully protected with soil stabilization and sediment control BMPs no later than 20 days prior to the beginning of the winter season or upon start of applicable construction activities for projects which begin either during or within 20 days of the winter season.
- # The contractor shall demonstrate the ability and preparedness to fully deploy soil stabilization and sediment control BMPs to protect all soil-disturbed areas before the onset of precipitation. This shall include stockpiling of soil stabilization and sediment controls materials, having a detailed plan to mobilize equipment and labor, and weather monitoring as described in the Special Provisions.



**30.1.1 Soil Stabilization Practices**

Soil stabilization BMPs shall be considered for both active construction areas and nonactive construction areas that have been previously disturbed. The objective of soil stabilization BMPs is to prevent or reduce erosion of disturbed soils on the construction site.

**30.1.1.1 Minimum Soil Stabilization BMP Requirements**

At a minimum, the contractor shall implement one or more of the following soil stabilization BMPs on all active and nonactive, soil-disturbed areas of the project site to meet the minimum protective requirements described above.

<b>BMP I.D.</b>	<b>BMP Description</b>	<b>Will BMP Be Used?</b>		<b>If No, State Reason</b>
		<b>Yes</b>	<b>No</b>	
CD23	Preservation of Existing Vegetation			
CD24B	Temporary Seeding and Planting			
NA	Permanent Seeding and Planting Per Project Specifications			
CD25	Mulching			
CD26A	Soil Stabilizers			
CD26B	Geotextiles, Mats/plastic Covers & Erosion Control Blankets			
CD30	Sodding, Grass Plugging, & Vegetative Buffer Strips			

**30.1.1.2 Soil Stabilization BMPs Requiring Consideration**

The contractor shall also consider, and implement as needed to meet objectives, the soil stabilization BMPs listed below:

<b>BMP I.D.</b>	<b>BMP Description</b>	<b>Will BMP Be Used?</b>		<b>If No, State Reason</b>
		<b>Yes</b>	<b>No</b>	
CD22	Scheduling			
CD28	Temporary Stream Crossing			
CD29A	Stabilized Construction Entrance			
CD29B	Stabilized Construction Roadway			
CD29C	Entrance/Outlet Tire Wash			
CD31	Earth Dikes/Drainage Swales & Lined Ditches			
CD32A	Slope Drains/Subsurface Drains			
CD32B	Top & Toe of Slope Diversion Ditches/Berms			
CD33A	Outlet Protection/Velocity Dissipation Devices			
CD33B	Flared Culvert End Sections			
CD34	Check Dams			
CD35	Slope Roughening/Terracing/Rounding			
CD37	Straw Bale Barrier			
CD43	Fiber Roll			

**30.1.1.3 Selected Soil Stabilization BMPs**

Describe the locations and scheduled applications of the soil stabilization BMPs that are checked above:

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**30.1.2 Sediment Control Practices**

YES            NO            Does the project involve the construction of significant erodible slopes as defined in Table 30-1? If yes, continue. If no, go to Section 30.1.3.

\_\_\_\_\_            \_\_\_\_\_

Describe location and extent of significant erodible slopes.

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Sediment control BMPs shall be considered on all significant sideslope and downslope boundaries of both active and nonactive construction areas that have been previously disturbed. The objective of sediment controls is to prevent a net increase in sediment load in storm water discharges from the construction site.

**30.1.2.1 Minimum Sediment Control BMP Requirements**

At a minimum, the contractor shall implement one or more of the following sediment control BMPs on all significant erodible sideslope and downslope boundaries of the construction area.

BMP I.D.	BMP Description	Will BMP Be Used?		If No, State Reason
		Yes	No	
CD36	Silt Fences			
CD37	Straw Bale Barrier			
CD38	Sandbag Barrier			

**30.1.2.2 Sediment Control BMPs Requiring Consideration**

The contractor shall also consider, and implement as needed to meet objectives, the sediment treatment control BMPs listed below.

<b>BMP I.D.</b>	<b>BMP Description</b>	<b>Will BMP Be Used?</b>		<b>If No, State Reason</b>
		<b>Yes</b>	<b>No</b>	
CD34	Check Dams			
CD39	Brush or Rock Filter			
CD40	Storm Drain Inlet Protection			
CD41	Sediment Traps			
CD42	Sediment Basins			
CD43	Fiber Rolls			

**30.1.2.3 Selected Sediment Control BMPs**

Describe the locations and scheduled applications of the sediment control BMPs that are checked above:

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Table 30-1  
Significant Erodible Slopes

Location	Slope 1:20 (V:H) to 1:4 (V:H)		Slope Steeper than 1:4 (V:H)	
	Height greater than 2m (6ft.) and less than 4m (12ft.)	Height greater or equal to 4m (12ft.)	Height greater than 1.2m (4ft.) and less than 2m (6ft.)	Height greater or equal to 2m (6ft.)
Desert Areas				
Winter Season	Yes	Yes	Yes	Yes
Note (1)				
All other areas	No	No	No	No
Nonwinter Season				
Note (1)	No	Yes	No	Yes
All other areas	No	No	No	No
Tahoe Basin (2)				
Winter Season	Yes	Yes	Yes	Yes
Nonwinter Season	No	Yes	No	Yes
Northwest California (3)				
Winter Season	Yes	Yes	Yes	Yes
Nonwinter Season	Yes	Yes	Yes	Yes
Remainder of California				
Winter Season	Yes	Yes	Yes	Yes
Nonwinter Season				
Note (1)	No	Yes	No	Yes
All other areas	No	No	No	No

Notes:

- (1) All areas within 400 m (1/4 mile) of perennial surface water or areas within 400 m (1/4 mile) of a storm drain system which discharge directly into perennial surface waters.
- (2) Northwestern California is defined as all of Caltrans District 1.
- (3) Desert areas are defined as the Colorado River Basin RWQCB jurisdiction and the North and South Lahontan RWQCB jurisdictions (excluding Mono and Antelope Areas, East and West Walker River, East and West Carson River, Truckee and Little Truckee River).
- (4) This table is intended to provide general guidance for determining significant erodible slopes for the purpose of determining the need for sediment control BMPs. Determining the erodibility of any slope requires consideration of other factors such as soil characteristics, vegetative cover, climate, and rainfall.
- (5) Slopes that are not considered significant erodible slopes, and therefore not initially protected, must be visually inspected throughout the construction process and protected if erosion is detected.

**30.1.3 Sediment Tracking Controls**

YES      NO      Will construction-related vehicles or equipment access public or private roads  
 \_\_\_\_\_      \_\_\_\_\_      from soil-disturbed areas of the project site and potentially cause tracking of  
    sediment? If yes, continue. If no, go to Section 30.1.4.

Describe the location of ingress and egress to the construction site.

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Sediment tracking control BMPs shall be considered for all points of ingress and egress to the project site where vehicles and/or equipment may track sediment onto public or private roads. The objective of the sediment tracking control is to prevent tracking of sediment onto public or private roads.

**30.1.3.1 Minimum Sediment Tracking Control BMP Requirements**

At a minimum, public and private roads shall be inspected regularly and cleaned when sediment from the construction site has been tracked onto paved roadway surfaces. Sediment tracking control shall be implemented throughout the duration of the project.

<i><b>BMP I.D.</b></i>	<i><b>BMP Description</b></i>	<i><b>Will BMP Be Used?</b></i>		<i><b>If No, State Reason</b></i>
		<i><b>Yes</b></i>	<i><b>No</b></i>	
NA	Road inspection and cleaning			



**30.1.3.2 Sediment Tracking Control BMPs Requiring Consideration**

The contractor shall consider, and implement as needed to meet objectives, the sediment tracking control BMPs that follow.

<b>BMP I.D.</b>	<b>BMP Description</b>	<b>Will BMP Be Used?</b>		<b>If No, State Reason</b>
		<b>Yes</b>	<b>No</b>	
CD29A	Stabilized Construction Entrance			
CD29B	Stabilized Construction Roadway			
CD29C	Entrance/Outlet Tire Wash			

**30.1.3.3 Selected Sediment Tracking Control BMPs**

Describe the locations and scheduled applications of the sediment tracking control BMPs that are checked above:

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**30.1.4 Wind Erosion Controls**

YES      NO      Does the project involve soil-disturbing activities? If yes, continue. If no, go to  
 \_\_\_\_\_      \_\_\_\_\_      Section 30.2.

YES      NO      Are the disturbed soils considered wind erodible? If yes, continue. If no, go to  
 \_\_\_\_\_      \_\_\_\_\_      Section 30.2.

YES      NO      Are significant wind and dry conditions anticipated? If yes, continue. If no, go  
 \_\_\_\_\_      \_\_\_\_\_      to Section 30.2.

Describe the location and extent of anticipated areas of soil-disturbance that may be subject to wind erosion.

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Wind erosion BMPs should be considered on all disturbed soils that are subject to wind erosion. The objective of wind erosion is to prevent the transport of soil from disturbed construction areas offsite by wind.

**30.1.4.1 Minimum Wind Erosion Control BMP Requirements**

If the answers to all of the above questions are yes, the contractor shall implement the following BMPs:

<b>BMP I.D.</b>	<b>BMP Description</b>	<b>Will BMPs Be Used?</b>		<b>If No, State Reason</b>
		<b>Yes</b>	<b>No</b>	
CD23	Preservation of Existing Vegetation			
NA	Dust Control per Standard Specifications Section 10			



**30.1.4.2 Wind Erosion Control BMPs Requiring Consideration**

The contractor shall consider, and implement as needed to meet objectives, the following additional BMPs if they are being proposed as erosion and sediment control BMPs and as long as they will not interfere with construction activities.

<b>BMP I.D.</b>	<b>BMP Description</b>	<b>Will BMP Be Used?</b>		<b>If No, State Reason</b>
		<b>Yes</b>	<b>No</b>	
CD24B	Temporary Seeding and Planting			
CD25	Mulching			
CD26A	Soil Stabilizers			
CD26B	Geotextiles, Mats/Plastic Covers and Erosion Control Blankets			
CD29B	Stabilized Construction Road			

**30.1.4.3 Selected Wind Erosion Control BMPs**

Describe the locations and scheduled applications of the wind erosion control BMPs that are checked above:

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**30.2 Non-Storm Water Management and Waste Management and Disposal**

Non-storm water management and waste management and disposal shall be considered for all applicable activities on the construction site, throughout the duration of the project. The objective of non-storm water management and waste management and disposal BMPs is to reduce the discharge of materials other than storm water to the storm drain system or to receiving waters.



30.2.1 *Minimum Non-Storm Water Management and Waste Management and Disposal BMP Requirements*

At a minimum, when applicable to contractor activities, material usage, and site conditions, the following BMPs shall be implemented.

<b>BMP I.D.</b>	<b>BMP Description</b>	<b>Will BMP Be Used?</b>		<b>If No, State Reason</b>
		<b>Yes</b>	<b>No</b>	
CD4	Water Conservation Practices			
CD7	Dewatering			
CD8	Paving Operations			
CD9	Structure Construction and Painting			
CD10	Material Delivery and Storage			
CD11	Material Use			
CD12	Spill Prevention and Control			
CD13	Solid Waste Management			
CD14	Hazardous Waste Management			
CD15	Contaminated Soil Management			
CD16	Concrete Waste Management			
CD17	Sanitary/Septic Waste Management			
CD18	Vehicle & Equipment Cleaning			
CD19	Vehicle & Equipment Fueling			
CD20	Vehicle & Equipment Maintenance			
CD44	Illicit Discharge/Illegal Dumping Detection and Reporting			
CD45	Clear Water Diversion and Encroachment			
CD46	Liquid Waste Management			



### 30.2.2 Selected Non-Storm Water Management and Waste Management and Disposal BMP

Describe the scheduled application of the selected BMPs as they apply to general or specific construction activities:

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### 30.3 Water Pollution Control Drawings

The contractor shall include in the WPCP water pollution control drawings (WPCDs) to illustrate the locations, applications, and deployment of the BMPs checked on the preceding sections.

The WPCDs shall include one or more drawings at a scale sufficient to clearly show on-site drainage patterns and the location of erosion and sediment control BMPs. BMPs shall be identified on the WPCDs using the standard symbols for each BMP. Standard symbols for BMPs are included in the working details in Appendix C. The WPCDs shall be no smaller than the "reduced plans" (approximately 11" x 17") issued by Caltrans. A sample WPCD is included in Appendix B, Attachment B. The sample WPCD is shown smaller than actual reduced plans.

The WPCDs shall include:

- # *Detail sheets* showing construction details for the BMPs that will be used. The details provided in Section 5 of this Handbook may be used, as appropriate.
- # *Location sheets*, usually modified layout, grading, stage construction, and/or drainage sheets, showing the locations of BMPs that will be used. Delineation shall be in the form of construction notes and/or symbols.



### *30.4 Maintenance, Inspection, and Repair*

A program for the regular inspection, maintenance, and repair of BMPs shall be included in the WPCP on the form that follows. The contractor's attention is directed to Appendix C of this Handbook, where the working details describe requirements for maintenance and inspection of BMPs.

At a minimum, the contractor shall inspect the site bi-weekly, before and after storm events, and at 24-hour intervals during extended storms. The results of the inspection and assessment shall be recorded on the Construction Site Inspection Checklist included in Appendix B, Attachment I. A copy of each completed Construction Site Inspection Checklist shall be provided to the RE and a copy attached to the onsite WPCP. Each inspection shall also be recorded on the Inspection Log included in Appendix B, Attachment I. The Inspection Log shall be attached to the onsite WPCP. A tracking or follow-up procedure shall follow any inspection that identifies deficiencies in BMPs.





### Section 40.0 Amendments

The WPCP shall be amended whenever there is a change in construction or operations that may cause the discharge of significant quantities of pollutants to surface waters, ground waters, municipal storm drain systems, or when deemed necessary by the RE. All WPCP amendments shall be transmitted in letter format and shall include revised WPCD sheets, as appropriate. WPCP amendments are subject to the approval of the RE.

The following items shall be included in the amendment, as appropriate:

- # Discuss who requested the amendment.  
*Example: Requested by the Regional Water Quality Board, Caltrans, or the Contractor.*
- # Describe location of proposed change.  
*Example: Relocate concrete washout away from drainage intake at Miller Ave. It is now located on the northeast section of the construction site, see revised map.*
- # Describe reason for change.  
*Example: Water from concrete washout was about to enter drainage inlet.*
- # Describe the original BMP proposed, if any.
- # Describe the new BMP proposed.
- # Include any revised WPCDs for detail or location changes.

Each amendment shall include the following certification by the contractor and RE approval block:

*"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 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."*

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name and Title

(      )\_\_\_\_\_  
Phone Number



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*For Use By Caltrans Only*

**RESIDENT ENGINEER'S APPROVAL OF WPCP AMENDMENT**

*I, and/or personnel acting under my direction and supervision, have reviewed this WPCP Amendment and find that it meets the requirements set forth in the Special Provisions, the Caltrans Storm Water Quality Handbooks - Construction Contractor's Guide and Specifications, and the Standard Specifications Section 7-1.01G-Water Pollution.*

\_\_\_\_\_  
RE's Signature

\_\_\_\_\_  
Date of WPCP Amendment Approval

\_\_\_\_\_  
Print RE's Name

(       ) \_\_\_\_\_  
RE's Phone Number



## Specifications for Preparing a SWPPP

### 3.1 Preparation and Approval of a SWPPP

For projects resulting in 2 ha (5 ac) or more of soil disturbance or otherwise subject to the NPDES program, the Special Provisions will require the contractor to prepare a Storm Water Pollution Prevent Plan (SWPPP).

The SWPPP must comply with Caltrans Standard Specifications Section 7-1.01G - Water Pollution and, in accordance with the Special Provisions, the procedures and format set forth in this Handbook.

This section of the Handbook provides a detailed, step-by-step procedure that the contractor shall use to prepare the SWPPP. Appendix B contains Attachments A through N that shall be used.

The SWPPP Checklist for Construction Activities in Appendix B, Attachment M provides a checklist of all items which must be included in the SWPPP. The SWPPP Checklist must be completed by the contractor to ensure that all required elements of the SWPPP have been addressed. The completed SWPPP Checklist shall be included in Section 700 of the SWPPP.

Once the contractor has completed preparation of the SWPPP, the SWPPP shall be submitted to the Caltrans Resident Engineer (RE) for review and approval. If revisions are required, as determined by the RE, the contractor must revise the SWPPP as noted. Minor changes or clarifications to the initial submittal may be made and attached as

amendments. The time frames for SWPPP submittal, review, and resubmittal are specified in the Special Provisions. No activity having the potential to cause water pollution, as determined by the RE, shall be performed until the SWPPP has been approved by the RE. In order to allow construction activities to proceed, the RE may conditionally approve the SWPPP while minor amendments are being completed.

The contractor must also prepare and submit with the SWPPP a schedule of values detailing the cost breakdown of the contract lump sum for water pollution control. The schedule of values shall reflect the items of work, quantities and costs for control measures shown in the SWPPP, except for critical temporary controls and permanent control measures which are shown on the project plans and for which there is a contract item of work. A sample schedule of values is shown in Table 3-1.

The step by step procedures in this section include the following items:

- # Section 100 Title Page and Contents
- # Section 200 Certification/Approval Page and Amendment Log
- # Section 300 Introduction/Project Description
- # Section 400 Reference Section
- # Section 500 Body of SWPPP
- # Section 600 Amendments
- # Section 700 Additional Caltrans Requirements
- # Section 800 Local Permit Requirements



Appendix B contains the following attachments:

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li># Attachment A Example Vicinity Map</li> <li># Attachment B Water Pollution Control Drawings</li> <li># Attachment C Computation Sheet for Determining Runoff Coefficients</li> <li># Attachment D Sample of Notice of Intent (NOI) and Waste Discharge Identification Number (WDID) Letter</li> <li># Attachment E BMP Consideration Checklist</li> <li># Attachment F Non-Storm Water Spill Log</li> <li># Attachment G Maintenance, Inspection, and Repair Program Sample</li> </ul> | <ul style="list-style-type: none"> <li># Attachment H Subcontractor Notification Letter and Log</li> <li># Attachment I Inspection Report and Log</li> <li># Attachment J Certifications: SWPPP Certification and Approval Annual Certification of Compliance SWPPP Amendment Certification and Approval</li> <li># Attachment K Notice of Non-Compliance</li> <li># Attachment L SWPPP Amendment Log</li> <li># Attachment M SWPPP Checklist</li> </ul> |
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**TABLE 3-1  
SAMPLE SCHEDULE OF VALUES <sup>(1)</sup>**

<b>Cost Breakdown for Water Pollution Control</b>				
<b>Contract No. _____</b>				
<i>Unit Description</i>	<i>Unit</i>	<i>Approximate Quantity</i>	<i>Unit Cost</i>	<i>Total Cost</i>
Temporary Sediment Basin	EA	1	800.00	800.00
Temporary Silt Fence	M	1000	10.00	10,000.00
Temporary Straw Bale	EA	800	14.00	11,200.00
Temporary Sand Bags	EA	400	3.00	1,200.00
Temporary Berm	M	300	3.00	900.00
Temporary Filter Inlet	EA	0	0	0
Temporary Flexible Downdrain	M	20	30.00	600.00
Energy Dissipator	EA	2	400.00	800.00
Lined Channel	M	0	0	0
Temporary Downdrain	M	0	0	0
Temporary Check Dams	EA	8	200.00	1,600.00
Temporary Gravel Construction Entrance	EA	3	1,500.00	4,500.00
Temporary Mulching	HA	4	3,750.00	15,000.00
Construction Waste Management	LS	1	5,000.00	5,000.00
<b>Total</b>				<b>51,600.00 <sup>(2)</sup></b>

Note: <sup>1</sup>This schedule of values is an example only. The unit costs shown may not reflect unit costs for water pollution control.  
<sup>2</sup>The total of all extended unit costs must equal the lump sum bid for water pollution control.

## Section 100 Title Page and Contents

The SWPPP shall include a title page and table of contents.

Elements to be included in the title page shall be as follows:

- # The name of the project. (*Example: I-880/Fremont Cushing Parkway Interchange Reconstruction*).
- # The contract number for the project. (*Example: 07-123456*).
- # Contractor's name, address, phone number, and contact person.
- # Contractor's job site address and phone number, if any.
- # Name, address, and phone number of person responsible for implementing the SWPPP.
- # The name of the entity that has prepared the SWPPP if an outside consultant is used.
- # Date of preparation

Elements to be included in the table of contents shall be as follows:

- # The section numbers and name of the eight SWPPP sections (*Example: Section 600 - Amendments*).
- # The major subsection numbers and names together with their beginning page numbers (*Example: Section 500.3 - Erosion and Sediment Controls, Page 500-6*).

## Section 200 Certification and Approval Page and Amendment Log

The SWPPP shall include a Certification and Approval page and Amendment Log.

The format for the SWPPP Certification and Approval page is shown in Appendix B, Attachment J.

- # The copy-ready SWPPP Certification and Approval form in Appendix B, Attachment J may be used.
- # If the SWPPP Certification and Approval form in Appendix B, Attachment J is not used, then it shall be reproduced in a similar format and identical content.
- # No changes or exceptions to the certification statements shall be permitted.
- # The contractor's portion of the SWPPP Certification and Approval form shall be signed by the representative of the contractor taking responsibility for conditions of the statement prior to submittal of the SWPPP to the RE for review and approval.

The format for the SWPPP Amendment Log is shown in Appendix B, Attachment L.

- # The copy-ready SWPPP Amendment Log form in Appendix B, Attachment L may be used.
- # If the SWPPP Amendment Log form in Appendix B, Attachment L is not used, then it shall be reproduced in a similar format and identical content.
- # For each amendment to the SWPPP, the SWPPP Amendment Log shall include: the amendment number (*Example: Amendment 1*); the date of amendment approval (*Example: 4/30/97*); a brief description of the amendment (*Example: Substitutes straw mulch for emulsions on all exposed slopes*); and shall identify who prepared the amendment (*Example: John Doe, Superintendent, ABC Construction*).
- # The SWPPP Amendment Log shall be kept in Section 200 of the SWPPP immediately following the SWPPP Certification and Approval form.
- # The details of the amendment, including the SWPPP Amendment Certification and Approval form, shall be included in Section 600 of the SWPPP.



## Section 300 Introduction/Project Description

The introduction shall answer the following questions in a narrative format that can be easily understood by a person who is not familiar with the project.

- # Where is the project located? Provide descriptive items such as county, route, post mile, city, and street names.
- # What are the major features that the project will provide? *Example: This project will provide a High Occupancy Lane Vehicle (HOV) for both the south bound and north bound directions of Highway 123.*
- # What are the estimated construction start and finish dates?
- # Are there any unique features relating to adjacent water bodies (i.e., in or around a wetland, river, stream, or estuary)?



## Section 400 Reference Section

The SWPPP may incorporate appropriate elements of other plans by reference to them. The reference section shall completely identify any documents that have been incorporated by reference. The contractor shall keep a copy of any reference documents with the SWPPP at the construction site. If the RWQCB requests copies of the SWPPP be provided for review, then copies of any reference documents shall likewise be provided.

*Example: The following documents are made a part of this SWPPP by reference:*

- # *Project layout plans (project 07-123456) dated 1/1/95*
- # *Project drainage report (project 07-123456) dated 6/1/94*
- # *Project materials report (project 07-123456) dated 3/1/94*
- # *Project hazardous waste report*
- # *Fish and game permit*
- # *Caltrans Storm Water Quality Handbooks- Construction Contractor's Guide and Specifications Working Details (list BMPs used)*



## Section 500 Body of SWPPP

### 500.1 Purpose and Objective

The SWPPP shall describe its purpose and objective, and shall include the following four statements:

# *The purpose of this SWPPP is to:*

- *Identify pollutant sources that may affect the quality of discharges of storm water associated with the construction activities of the project.*
- *Identify, construct, and implement storm water pollution control measures to reduce pollutants in storm water discharges from the construction site during construction and after construction.*

# *This SWPPP contains the required elements of Permit No. \_\_\_\_\_ issued by the \_\_\_\_\_.*

*Note: Information on the applicable Permit number and issuing agency are specified in the Special Provisions.*

# *The preparation of this SWPPP is based on the principles of BMPs and not numeric effluent limitations to control and abate the discharge of pollutants into receiving waters.*

# *The SWPPP will be amended whenever there is a change in construction or operations which may affect the discharge of significant quantities of pollutants into the receiving waters. The SWPPP will also be amended if it is in violation of any condition of the Permit or has not achieved the general objective of reducing pollutants in storm water discharges.*

### 500.2 Source Identification and Pollution Controls

#### 500.2.1 Area or Vicinity Map

The SWPPP shall include a map extending approximately 400 m (one-quarter mile) beyond the property boundaries of the construction site that shows the following: the construction site, surface water bodies (including known springs and wetlands), known wells, an outline of offsite drainage areas that discharge into the construction site, general topography, and the anticipated discharge location(s) where the construction site's storm water discharges to a municipal storm sewer system or other water body.

In order to fulfill the above requirement, a U.S. Geological Survey (USGS) quad or other suitable base map may be used for showing the project site and a 400 m (one-quarter mile) extension beyond the property boundaries of the construction site. Although USGS maps display much of the required information, the map must be modified to show the above requirements. An example vicinity map is shown in Appendix B, Attachment A.

The area or vicinity base map may be provided by Caltrans, or if not available from Caltrans, shall be prepared by the contractor.

#### *500.2.2 Water Pollution Control Drawings*

This section of the SWPPP shall include an attached site map or maps, commonly called the Water Pollution Control Drawings (WPCDs) that depict the elements discussed in Sections 500.2.2.1 to 500.2.2.12. Elements that are more appropriately referenced or delineated in narrative format, shall be described in this section rather than shown on the WPCDs.

The WPCDs shall consist of a series of one or more drawings at a scale sufficient to clearly show on-site drainage patterns and the location of soil stabilization and sediment control BMPs. BMPs shall be identified on the WPCDs using the standard symbols for each BMP. Standard symbols for BMPs are included in the working details in Appendix C. The WPCDs shall be no smaller than the "reduced plans" (approximately 11" x 17") issued by Caltrans. A sample WPCD is included in Appendix B, Attachment B. The sample WPCD is shown smaller than actual reduced plans.

The WPCDs shall include:

- # *A cover sheet* listing the BMPs that will be used, along with construction notes and/or a legend indicating the BMP symbols.
- # *Detail sheets* showing construction details for the BMPs that will be used. The details provided in Section 5 of this Handbook may be used, as appropriate.
- # *Location sheets*, usually modified layout, grading, stage construction and/or drainage sheets, showing the locations of BMPs that will be used.

#### **500.2.2.1 Location of Control Practices Used During Construction**

- # Show, on the WPCDs, the general or specific location of the soil stabilization and sediment control BMPs that will be used during construction.

#### **500.2.2.2 Areas Used to Store Soils, Materials, and Waste**

- # Show, on the WPCDs, known locations for the storage of soils, materials, and waste .
- # If exact locations are not known, describe in the form of construction notes the general soil, material, and waste storage procedures and the BMPs that will be employed to reduce pollutant discharges from soil or waste storage areas.

#### **500.2.2.3 Areas of Cut and Fill**

- # Show, on the WPCDs, approximate locations of cuts and fills or;
- # Reference, in the narrative, the appropriate layout, grading or other plans.

**500.2.2.4 Drainage Patterns and Slopes Anticipated after Grading Activities Are Completed**

- # Show, on the WPCDs, drainage patterns after grading activities have been completed. Drainage patterns shall be enhanced on the WPCDs using flow arrows as shown in the example in Appendix B, Attachment B.
- # Show, on the WPCDs, the location of slopes after grading activities are completed or;
- # Reference, in the narrative, the appropriate layout, grading or other plans.

*Example:*

*Slopes after grading activities are completed are shown on the project grading plans (Sheets G1-G19).*

**500.2.2.5 Areas of Soil Disturbance**

- # Show, on the WPCDs, areas of soil disturbance or;
- # Describe, in this section, disturbed areas and reference the appropriate layout, grading or other plans.

*Example:*

*The area of soil disturbance on this HOV widening project is limited to the median area as depicted on the project layout plans Sheets L1 through L17.*

**500.2.2.6 Surface Water Location**

- # Show, on the WPCDs, all on-site or nearby surface water locations. Surface water locations include: oceans, lakes, rivers, streams, estuaries, ponds, springs, and wetlands. Surface water locations may be intermittent or seasonal and are typically shown on the project layout, grading , or drainage plans or;
- # Describe, in the narrative, on-site or nearby surface water locations.

*Example:*

*This project is located approximately 400 m from the Pacific Ocean and is crossed by the Santa Ana River as shown on Sheet 6 of the WPCDs.*

**500.2.2.7 Areas of Potential Soil Erosion where Control Practices Will Be Used during Construction**

- # Show, on the WPCDs, areas where erosion is anticipated. These areas include slopes, disturbed soil areas, and unprotected drainage swales or other concentrated flow locations or;
- # Describe, in the narrative, areas where erosion is anticipated.

**500.2.2.8 Existing and Planned Paved Areas and Buildings**

- # Show, on the WPCDs, areas of concrete, asphalt, or other permanent coverage of the soils or;
- # Reference, in the narrative, the appropriate layout, grading or other plans where such areas are shown.

*Example:*

*The existing and planned paved areas are shown on the project layout plans, Sheets L1 - L16.*

**500.2.2.9 Locations of Post-Construction Control Practices**

- # Show, on the WPCDs, post-construction storm water pollution control practices or;
- # Describe, in narrative, these pollution control practices.

Post-construction pollution control practices are permanent BMPs that have been designed into the site. Locations of post-construction BMPs will typically be provided to the contractor by the RE. These facilities are usually shown on the project plans and specifications and may include, but are not limited to the following::

- # Permanent Seeding and Planting
- # Outlet Protection and Velocity Dissipation Devices
- # Infiltration
- # Earth Dikes, Drainage Swales, and Lined Ditches
- # Detention Basin and Retention Basin
- # Oil/Water Separators

**500.2.2.10 An Outline of the Drainage Area for Each On-Site Water Discharge Point**

- # Show, on the WPCDs, an outline of the drainage area for each on-site storm water discharge point or;
- # Describe, in the narrative, the general drainage patterns and give reference to the drainage report prepared during the design of the project, if it is available.

**500.2.2.11 Vehicle Storage and Service Areas**

- # Show, on the WPCDs, the areas that will be used for vehicle storage and service if vehicle storage and service will take place in specific designated areas, or;

- # Describe, in the narrative, the general procedure for storage and service of vehicles and the BMPs that will be employed to reduce pollutant discharge from these activities if operations necessitate overnight storage and off-hour servicing of vehicles or equipment throughout the site.

#### **500.2.2.12 Areas of Existing Vegetation**

- # Show, on the WPCDs, existing vegetation or give reference to the appropriate layout, grading, landscape, or other plans, or;
- # Describe, in the narrative, the extent, location, and nature of existing vegetation.

Existing vegetation on the site that will be preserved shall be protected as much as practicable from mechanical or other injury while the project is being constructed. The Special Provisions often designate specific areas which must be preserved and protected by isolation fencing.

#### **500.2.3 Narrative Descriptions**

The SWPPP shall include a narrative description of the practices that will be implemented for each of the elements discussed in Sections 500.2.3.1 to 500.2.3.7.

##### **500.2.3.1 Toxic Materials**

Describe all toxic materials known to have been treated, stored, disposed, spilled or leaked in significant quantities onto the construction site.

This information is often described in the Special Provisions. In addition, the soils/geotechnical report, project materials report or hazardous waste report prepared during the project design stage may reveal toxic materials that have been stored or disposed within the project limits. This information shall be included in the SWPPP to alert construction personnel of the possibility of discovering existing toxic or hazardous wastes. The applicable reports will typically be provided by the RE and must be reviewed thoroughly by the contractor.

The contractor shall carefully adhere to any Special Provisions related to contaminated soils or toxic substances on the site. See BMP CD15(2) - Contaminated Soil Management.

##### **500.2.3.2 Practices to Minimize Contact of Construction Materials, Equipment, and Vehicles with Storm Water**

Describe the BMPs that will be utilized for minimizing the contact of storm water with materials, equipment, and vehicles.

The working details for BMPs CD10(2) - Material Delivery and Storage, CD11(2) - Material Use, CD12(2) - Spill Prevention and Control, CD18(2) - Vehicle and Equipment Cleaning, CD19(2) - Vehicle and Equipment Fueling, and CD20(2) - Vehicle and Equipment Maintenance describe pollution control practices for materials, equipment, and vehicles. The contractor shall review

these BMPs and incorporate the appropriate practices.

#### **500.2.3.3 Construction Material Loading, Unloading, and Access Areas**

Describe the pollution control practices that will be employed for loading, unloading, and access areas.

The working details for BMPs CD10(2) - Material Delivery and Storage, CD29A(2) - Stabilized Construction Entrance, CD29B(2) - Stabilized Construction Roadway, and CD29C(2) - Entrance/Outlet Tire Wash describe typical pollution control practices for loading and unloading and access areas, respectively. The contractor shall review these BMPs and incorporate the appropriate practices. If there are specific locations (as opposed to locations throughout the project) for these areas, they shall be described in this section and shown on the WPCDs.

#### **500.2.3.4 Pre-Construction Control Practices**

Describe pre-construction practices (if any) to reduce sediment and other pollutants in storm water discharges from the project site. The SWPPP shall note any existing permanent control measures (e.g., sediment basins, oil/water separators, etc.) within the vicinity of the project that may be used for the removal of pollutants discharged from the construction site. Descriptions of these existing permanent control measures will typically be provided by the RE. If there are no existing permanent control measures, the SWPPP shall state as such.

#### **500.2.3.5 Equipment Storage, Cleaning, and Maintenance Areas**

Describe areas that will be used for equipment storage, cleaning, and maintenance. Also, describe the methods that will be used to control pollutants from such areas.

The working details for BMPs CD18(2) - Vehicle and Equipment Cleaning and CD20(2) - Vehicle and Equipment Maintenance describe equipment pollution control practices. The contractor shall review these BMPs and incorporate the appropriate practices.

#### **500.2.3.6 Methods of On-Site Storage and Disposal of Construction Materials**

Describe methods for storing and disposing of construction materials, including materials for construction and construction waste materials.

The working details for BMPs CD10(2) - Material Delivery and Storage, CD13(2) - Solid Waste Management, CD14(2) - Hazardous Waste Management, CD16(2) - Concrete Waste Management, CD17(2) - Sanitary/Septic Waste Management, and CD46(2) - Liquid Waste Management describe storage and disposal practices. The contractor shall review these BMPs and incorporate the appropriate practices.

#### **500.2.3.7 Nature of Fill Material and Existing Data Describing the Soil on the Construction Site**

Describe the conditions of the fill material and the soil at the construction site. A general description can usually be found in the project materials report or geotechnical report. Known information regarding contaminated or hazardous material shall be described in this section and references shall be made to any applicable sections of the plans and Special Provisions covering



existing soils conditions.

#### *500.2.4 Pollutants Likely to Be Present in Storm Water Discharges*

List the potential site pollutants (other than sediment) that are expected from the construction activities. Table 1-1 in Section 1 of this Handbook may help identify potential site pollutants. Also, describe the control measures that will be used to reduce such pollutants.

*Example:*

*Significant quantities of pollutants, other than sediment, are not expected to be present in storm water discharges from this construction site. However, the following is a list of pollutants that are likely to be present in storm water runoff in very small quantities (control practices are in parentheses):*

- # Vehicle fluids, including oil, grease, petroleum, and coolants (CD18(2), CD19(2), CD20(2)).*
- # Asphaltic emulsions associated with asphalt-concrete paving operations (CD8(2)).*
- # Cementitious materials associated with PCC concrete paving operations, drainage structures, median barriers, and bridge construction (CD16(2)).*
- # Joint and curing compounds (CD10(2), CD11(2), CD12(2)).*
- # Paints ( CD9(2), CD10(2), CD11(2), CD12(2)).*
- # Solvents, thinners (CD9(2), CD10(2), CD11(2), CD12(2)).*
- # Wood products (CD10(2)).*
- # Metals and plated products (CD9(2)).*
- # Fertilizers, herbicides, and pesticides (CD10(2), CD11(2), CD12(2)).*

#### *500.2.5 Construction Site Estimates*

Provide the following information in this section:

- # An estimate of the construction site area in hectares (acres),*
- # An estimate of the runoff coefficient of the construction site before and after construction, and*
- # An estimate of the impervious area of the construction site, in percent, both before and after construction.*

The site area, runoff coefficients, and percent impervious area will typically be provided to the contractor by the RE. If the RE does not provide this information, the contractor shall develop it.

The contractor may use the forms provided in Appendix B, Attachment C, to develop the necessary information for runoff coefficients.

#### *500.2.6 Notice of Intent*

The SWPPP shall include a copy of the Notice of Intent (NOI) which will be provided by the RE during the pre-construction meeting. A copy of the Waste Discharge Identification Number (WDID) letter shall also be included when provided by the RE. A sample NOI and WDID letter are included in Appendix B, Attachment D.

#### *500.3 Erosion and Sediment Control*

The SWPPP shall incorporate the applicable minimum BMPs described in the following sections as “Minimum Requirements.” In addition, the contractor shall *consider* for incorporation into the SWPPP all other BMPs that have been identified as “Requiring Consideration.” Using the BMP Consideration Checklist provided as Appendix B, Attachment E, the contractor shall document that all of the appropriate BMPs have been *considered*. For BMPs that will not be incorporated into the SWPPP, include a brief statement on the BMP Consideration Checklist describing the reason for their exclusion. BMPs that will be used shall be shown on the WPCDs and described in the following sections of the SWPPP. The WPCDs and BMP descriptions shall include where the practices will take place and when they will be implemented.

##### *500.3.1 Soil Stabilization Practices*

Soil stabilization BMPs shall be used to preserve existing vegetation where feasible and to revegetate open areas as soon as feasible after grading or construction. Soil stabilization BMPs shall be considered for both active construction areas and nonactive soil-disturbed areas of the project site. The objective of soil stabilization is to prevent erosion of disturbed soils on the construction site.

#### ***Minimum Requirements***

The contractor shall implement in the winter season and as set forth in the Special Provisions, one or more of the minimum required soil stabilization BMPs listed in Part 1A of the BMP Consideration Checklist contained in Appendix B, Attachment E, on all soil-disturbed areas of the project site. Selected BMPs shall be shown on the WPCDs and described in this section of the SWPPP.

#### ***Practices Requiring Consideration***

The contractor shall also consider the soil stabilization BMPs listed in Part 1B of the BMP Consideration Checklist contained in Appendix B, Attachment E. Selected BMPs shall be shown on the WPCDs and described in this section of the SWPPP.

#### ***Example: Top of Embankment Berm***

*During embankment construction where earthwork operations are not in progress and flows are directed toward a slope, an earth berm or swale shall be constructed in order to direct drainage away from the top of*



*the embankment (CD32B). The berms or swales shall direct the flows toward temporary down drains (CD32A) until the permanent down drains are constructed. Locations for these BMPs are shown on the WPCDs.*

#### 500.3.2 Sediment Control Practices

Sediment control BMPs shall be considered on all significant erodible sideslopes and downslope boundaries of both active and nonactive soil-disturbed areas of the project site. The objective of sediment control BMPs is to prevent a net increase in sediment load in storm water discharges from the project site.

##### **Minimum Requirements**

The contractor shall implement in the winter season and as set forth in the Special Provisions, one or more of the minimum required sediment control BMPs listed in Part 2A of the BMP Consideration Checklist contained in Appendix B, Attachment E, on all significant erodible sideslope and downslope boundaries of the project site. Selected BMPs shall be shown on the WPCDs and described in this section of the SWPPP. Significant erodible slopes are defined in Table 500-1.

##### **Practices Requiring Consideration**

The contractor shall also consider the sediment control BMPs listed in Part 2B of the BMP Consideration Checklist contained in Appendix B, Attachment E, for all significant sideslopes and downslope boundaries of the project site. Selected BMPs shall be shown in the WPCDs and described in this section of the SWPPP.

##### **Example: Exterior Slopes**

*As depicted on the WPCP, exterior slopes adjacent to the ESA will have silt fences (CD36), rows of straw bales (CD37) or other similar linear barriers at the toes to prevent sediment from flowing onto the ESA during embankment construction.*

#### 500.3.3 Sediment Tracking Controls

Sediment tracking control BMPs shall be considered for all points of ingress and egress to the project site where vehicles and/or equipment may track sediment from the construction site. The objective of sediment tracking control BMPs is to prevent sediment tracking onto public and private roads.

##### **Minimum Requirements**

The contractor shall implement, year-round and throughout the duration of the project, the minimum required sediment tracking control BMP listed in Part 3A of the BMP Consideration Checklist contained in Appendix B, Attachment E, at all points of ingress and egress to the project site where vehicles or equipment may track sediment onto public or private roads. The minimum required BMP consists of regularly inspecting and sweeping public and private roads at points of ingress and egress to the project site where tracking of sediment off the project site is occurring.



The location of all ingress and egress points to the project site where sediment tracking is likely and measures to prevent sediment tracking shall be shown on the WPCDs and described in this section.

Table 500-1  
Significant Erodible Slopes

Location	Slope 1:20 (V:H) to 1:4 (V:H)		Slope Steeper than 1:4 (V:H)	
	Height greater than 2m (6ft.) and less than 4m (12ft.)	Height greater or equal to 4m (12ft.)	Height greater than 1.2m (4ft.) and less than 2m (6ft.)	Height greater or equal to 2m (6ft.)
Desert Areas				
Winter Season				
Note (1)	Yes	Yes	Yes	Yes
All other areas	No	No	No	No
Nonwinter Season				
Note (1)	No	Yes	No	Yes
All other areas	No	No	No	No
Tahoe Basin (2)				
Winter Season	Yes	Yes	Yes	Yes
Nonwinter Season	No	Yes	No	Yes
Northwest California (3)				
Winter Season	Yes	Yes	Yes	Yes
Nonwinter Season	Yes	Yes	Yes	Yes
Remainder of California				
Winter Season	Yes	Yes	Yes	Yes
Nonwinter Season				
Note (1)	No	Yes	No	Yes
All other areas	No	No	No	No

Notes:

- (1) All areas within 400 m (1/4 mile) of perennial surface water or areas within 400 m (1/4 mile) of a storm drain system which discharge directly into perennial surface waters.
- (2) Northwestern California is defined as all of Caltrans District 1.
- (3) Desert areas are defined as the Colorado River Basin RWQCB jurisdiction and the North and South Lahontan RWQCB jurisdictions (excluding Mono and Antelope Areas, East and West Walker River, East and West Carson River, Truckee and Little Truckee River).
- (4) This is intended to provide general guidance for determining significant erodible slopes for the purpose of determining the need for sediment control BMPs. Determining the erodibility of any slope requires consideration of other factors such as soil characteristics, vegetative cover, climate, and rainfall.
- (5) Slopes that are not considered significant erodible slopes, and therefore not initially protected, must be visually inspected throughout the construction process and protected if erosion is detected.

### ***Practices Requiring Consideration***

The contractor shall also consider the sediment tracking control BMPs listed in Part 3B of the BMP Consideration Checklist contained in Appendix B, Attachment E, for all points of ingress and egress to the project site where sediment tracking is likely. Selected BMPs shall be shown on the WPCDs and described in this section of the SWPPP.

#### ***500.3.4 Wind Erosion Controls***

Wind erosion control BMPs shall be considered on all disturbed soils on the project site that are subject to wind erosion, and when significant wind and dry conditions are anticipated during construction of the project. The objective of wind erosion control is to prevent the transport of soil from soil-disturbed areas of the project site offsite by wind.

### ***Minimum Requirements***

The contractor shall implement, year-round and throughout the duration of the project, the minimum required wind erosion control BMPs listed in Part 4A of the BMP Consideration Checklist contained in Appendix B, Attachment E. Selected BMPs shall be shown on the WPCDs and described in this section of the SWPPP.

### ***Practices Requiring Consideration***

The contractor shall also consider the wind erosion control BMPs listed in Part 4B of the BMP Consideration Checklist contained in Appendix B, Attachment E, if the BMPs are already being implemented as erosion and sediment control BMPs and as long as this will not interfere with construction activities. Selected BMPs shall be shown on the WPCDs and described in this section of the SWPPP.

#### ***500.4 Non-Storm Water Management and Waste Management and Disposal***

Non-storm water management and waste management and disposal BMPs shall be implemented for all applicable activities, material usage, and site conditions on the construction site. The objective of non-storm water management and waste management and disposal BMPs is to reduce the discharge of materials other than storm water to the storm drain system or to receiving waters.

The SWPPP shall incorporate the applicable minimum BMPs described in the following sections as “Minimum Requirements.” Using the BMP Consideration Checklist provided as Appendix B, Attachment E, the contractor shall document that all of the appropriate BMPs have been selected. For BMPs that are not selected and are not to be incorporated into the SWPPP, the contractor shall include a brief statement on the BMP Consideration Checklist describing the reason for their exclusion. Selected BMPs shall be shown on the WPCDs and described in this section of the SWPPP. The WPCDs and BMP descriptions shall include where the practices will take place and when they will be implemented.

### ***Minimum Requirements***

The contractor shall implement, year-round and throughout the duration of the project, the minimum required non-storm water management and waste management and disposal BMPs listed in Part 5 of the BMP Consideration Checklist contained in Appendix B, Attachment E, for all applicable activities, material usage, and site conditions on the project site. Selected BMPs shall be shown on the WPCDs and described in this section of the SWPPP. In addition, the contractor shall prepare and incorporate into the SWPPP a list and estimate of the quantity of significant materials other than storm water that may be discharged to the storm drain system or to receiving waters as a result of construction activities. Appendix B, Attachment F, contains a copy-ready Non-Storm Water Spill log form which shall be used to document any significant non-storm water discharges. The Non-Storm Water Spill Log shall include: the date of the spill (*Example: April 30, 1997*); the identity of spilled material (*Example: potable water*); the estimate quantity of the spill (*Example: 500 l*); and the name of the person who logged the spill.

#### ***500.5 Maintenance, Inspection, and Repair***

The SWPPP shall include a BMP maintenance, inspection, and repair program. Appendix B, Attachment G contains a sample program for the inspection, maintenance, and repair of BMPs identified in the SWPPP.

Inspection frequencies may vary depending upon climate and erosion potential of the particular project. At a minimum, inspection frequencies and record keeping shall comply with the requirements set forth in Section 500.10.1 of the SWPPP.

#### ***500.6 Training***

The contractor shall describe the types of training that the contractor's BMP inspection, maintenance, and repair personnel have received or will receive that is directly related to storm water pollution prevention.

#### ***500.7 List of Contractors/Subcontractors***

The contractor shall notify in writing all subcontractors of the SWPPP requirements. The contractor shall include in the SWPPP a listing of all subcontractors, including the contact name, address, phone number, pager or field phone number, and the date the notification letter was sent for each subcontractor employed on the project. A sample notification letter and copy-ready Subcontractor Notification Log is included in Appendix B, Attachment H. It is recommended that the contractor include provisions in all subcontracts that require compliance with the SWPPP by all subcontractors.

#### ***500.8 Other Plans/Permits***

The contractor shall identify and incorporate into the SWPPP any applicable requirements from permits that other agencies may have issued the project. Copies of permits from outside agencies will be supplied by the RE. The contractor shall keep a copy of such permits on the site.

*Example:*

*This project is subject to the requirements of a streambed alteration permit from the U.S. Army Corps of Engineers, as described in the Special Provisions. A copy of the permit is available at the contractor's field office.*

### **500.9 Post-Construction Storm Water Management**

The SWPPP shall describe post-construction storm water management including control practices, operation and maintenance, funding sources, and the responsible party. The following statement shall be included in the SWPPP subject to site specific modifications by the RE:

*The post-construction control practices are listed in Section 500.2.2.9 of this SWPPP. Upon completion and acceptance of all construction work, Caltrans will be responsible for maintaining post-construction control measures.*

### **500.10 Monitoring Program and Reports**

The contractor shall keep proper records of all inspections, compliance certifications, and non-compliance reporting. Reports must be true and accurate. The Permit provides for significant penalties, including fines and/or imprisonment, for falsifications or misrepresentations.

#### **500.10.1 Site Inspections**

The contractor shall inspect the project site before and after storm events and at 24-hour intervals during extended storms. In addition, the contractor shall inspect the site bi-weekly during the winter season. The results of the inspection and assessment shall be recorded. The inspection report shall include the inspection date, name of inspector, and the observations made. The copy-ready Construction Site Inspection Checklist form included in Appendix B, Attachment I shall be used. A tracking or follow-up procedure shall follow any inspection that identifies deficiencies in BMPs. A copy of the Construction Site Inspection Checklist shall be submitted to the RE upon completion of each inspection. Copies of each completed Construction Site Inspection Checklist shall be maintained on site by the contractor.

In addition, a log of inspections shall be kept on the copy-ready Inspection Log included in Appendix B, Attachment I. The Inspection Log shall be included in this section of the SWPPP.

#### **500.10.2 Compliance Certification**

The contractor shall annually certify to the RE that all construction operations are in compliance with the requirements of the Special Provisions, including provisions to meet the requirements of the Permit to implement the SWPPP for the project site. The deadline for submittal of the certification of compliance to the RE shall be no later than June 15 of each year. A copy-ready Annual Certification of Compliance form is contained in Appendix B, Attachment J. This form must be used for making the annual certification.



*500.10.3 Non-Compliance Reporting*

The contractor shall report any non-compliance to the RE within the time frame set forth in the Special Provisions, which is typically not later than 15 days from the date at which the non-compliance is discovered. The report shall be a written submission containing a description of the non-compliance and its cause; the period on non-compliance, including dates and times; corrective actions, including the expected time for ending the non-compliance; and steps taken or planned to reduce, eliminate, and prevent recurrence of the non-compliance. A sample Notice of Non-Compliance form is included in Appendix B, Attachment K.



## Section 600 Amendments

The contractor shall amend the SWPPP for any of the reasons described in Section 4.5 of this Handbook. All SWPPP amendments shall be in letter format and shall include revised WPCDs, as appropriate. Amendments to the SWPPP become effective upon approval by the RE. Approved amendments shall be attached to the contractor's on-site SWPPP. In addition, all amendments shall be recorded in the SWPPP amendment log which is included in Section 200 of the SWPPP. A sample SWPPP amendment log is contained in Appendix B, Attachment L.

The following items shall be included in the amendment, as appropriate:

- # Discuss who requested the amendment.  
*Example: Requested by the Regional Water Quality Board.*
- # Describe location of proposed change.  
*Example: Relocate concrete washout away from drainage intake at Miller Ave. It is now located on the northeast section of the construction site, see revised map.*
- # Describe reason for change.  
*Example: Water from concrete washout was entering drainage inlet.*
- # Describe the original BMP proposed, if any.
- # Describe the new BMP proposed.
- # Include any revised WPCDs for detail or location changes.
- # The SWPPP amendment shall be certified by the contractor prior to submittal to the RE for review and approval. A copy-ready SWPPP Amendment Certification and Approval form is included in Appendix B, Attachment J.

## Section 700 Additional Caltrans Requirements

### *700.1 Copy of Permit*

The SWPPP shall include, in an appendix, a copy of the applicable Permit. The Special Provisions specify where copies of Permit may be obtained.

### *700.2 BMP Consideration Worksheet*

The SWPPP shall include a completed BMP Consideration Checklist showing that the contractor has considered all BMPs listed thereon. A copy-ready BMP Consideration Checklist form is included in Appendix B, Attachment E.

### *700.3 SWPPP Checklist*

The SWPPP shall include a SWPPP Checklist for Construction Activities, completed by the contractor, to ensure that all required items have been included. A copy-ready SWPPP Checklist for Construction Activities is included in Appendix B, Attachment M.

### *700.4 Schedule of Values*

The SWPPP shall include a schedule of values as required by the Special Provisions. The cost breakdown shall reflect all items of work, quantities, and costs for the water pollution control measures. The sum of the total costs for items included in the SWPPP shall be equal to the contract lump sum bid for water pollution control measures. Units may be altered by the contractor (e.g., temporary berm may be calculated on a LF or a CY basis). Appendix B, Attachment N, provides a sample of a completed cost breakdown for a typical large highway project.



## Section 800 Local Permit Requirements

In addition to the items required under the General Permit, this section of the SWPPP shall address any additional issues required under the provisions of the applicable local permit.



# Section 4

## Specifications for Implementing a WPCP or SWPPP

### 4.1 Implementing Storm Water Controls

Once the WPCP or SWPPP has been prepared and submitted by the contractor, and approved by the RE, the contractor shall implement the plan. Sediment tracking control, wind erosion control, and non-storm water management and waste management and disposal BMPs shall be implemented year-round and throughout the duration of the project. Soil stabilization and sediment control BMPs shall be implemented 20 days prior to, and throughout the duration of the winter season. On projects commencing within 20 days of, or during the winter season, soil stabilization and sediment control BMPs shall be implemented upon start of applicable construction activities.

At a minimum, the contractor shall implement soil stabilization and sediment control BMPs as follows for all construction areas during the winter season:

1. Each active, soil-disturbed area of the project site, including stockpiled materials at storage or staging areas, shall be limited to the area specified in the Special Provisions. The RE may approve, on a case-by-case basis, expansions of the active, soil-disturbed area limit.
2. Active, soil-disturbed areas of the project site shall be fully protected using soil stabilization and sediment control BMPs at the end of each day, unless fair weather is predicted. The determination of fair-weather conditions shall be based on monitoring the weather forecast as required in the Special Provisions.

3. Nonactive, soil-disturbed areas of the project site shall be protected with soil stabilization and sediment control BMPs within 10 days of discontinuance of soil-disturbing activities or prior to the onset of precipitation, whichever is first to occur.

### 4.2 Inspections

A crucial element of storm water pollution prevention is the continued and proper implementation of BMPs once they are initiated and/or installed. It is the contractor's responsibility to inspect the construction site for the proper implementation and maintenance of BMPs. The contractor shall identify corrective actions and time frames to address any failed, damaged, or ineffective BMPs. Caltrans and/or other regulatory inspectors may also inspect the site in order to verify adequate implementation and maintenance of BMPs.

The contractor's site inspections shall be made by trained personnel. The contractor's inspector: shall understand the construction site's potential pollutant sources; shall be knowledgeable in storm water protection and the function of the BMPs being implemented; shall be familiar with the approved WPCP or SWPPP for the project; and shall be familiar with the procedures, practices, and requirements set forth in this Handbook.

The results of each contractor inspection and assessment shall be documented using the Construction Site Inspection Checklist provided in Appendix B, Attachment I. For WPCP projects, inspection records shall be attached to the on-site copy of the WPCP. For SWPPP projects, inspection records shall be retained on



site and shall be made available to the appropriate regulatory agencies upon request. A copy of the completed Construction Site Inspection Checklist shall be submitted to the RE upon completion of each inspection.

#### 4.2.1 *Non-Storm Water Management and Waste Management and Disposal BMPs*

Inspection of non-storm water management and waste management and disposal BMPs consists of visual inspections to verify that the BMPs have been implemented and maintained according to the WPCP or SWPPP. Such inspection shall take place throughout the duration of the project on a minimum, bi-weekly basis and shall include:

- # Looking for evidence of spills and verifying that an adequate supply of spill cleanup material is available;
- # Examining the integrity of secondary containment structures;
- # Verifying adequacy of trash receptacles;
- # Verifying that waste disposal practices (e.g., recycling, septic waste management, and hazardous waste management) are being adequately implemented.

#### 4.2.2 *Inspecting Erosion and Sediment Control BMPs*

Inspection of soil stabilization and sediment control BMPs consists of visual inspections to verify that BMPs have been deployed and are being maintained as needed to meet objectives. Inspections before and after each storm event and at 24-hour intervals during extended storm events are required by the Special Provisions regardless of the season. During the winter season, the contractor shall also inspect the

construction site on a minimum, bi-weekly basis and evaluate the implementation and maintenance of the required BMPs.

#### 4.2.3 *Regulatory Inspections*

Under the terms of the Permit, staff from the RWQCB, SWRCB, and/or EPA have the right to inspect the project site and review the SWPPP. These agencies have the authority to request changes to the SWPPP and to issue significant penalties (see Section 1.2) if pollution control measures and/or the SWPPP document are not in compliance with the applicable Permit. The Special Provisions make the contractor responsible for all fines, penalties or damages imposed by law as a result of the contractor's failure to comply with the requirements set forth in the Special Provisions, this Handbook, and all federal, state, and local regulations.

### 4.3 Maintenance

Maintenance of the soil stabilization, sediment control, and non-storm water management and waste management and disposal BMPs is one of the most critical aspects of storm water pollution prevention. If the contractor determines that a deployed BMP is in need of maintenance or other corrective action, the situation shall be corrected immediately, or by a later date and time if requested by the contractor and approved by the RE, but not later than the onset of subsequent precipitation. If the RE identifies a deficiency in the deployment of an identified BMP, the contractor will be notified in writing requesting that the deficiencies be corrected as described above.

The maintenance and repair of BMPs shall be by trained staff. Appendix B, Attachment G provides a sample BMP maintenance, inspection, and repair program. Additional information on BMP maintenance and

inspection is contained in the working details in Appendix C.

## 4.4 Reporting

For projects requiring a SWPPP, the contractor shall annually certify, based on the site inspections, that the construction operations are in compliance with the requirements of the Permit and the SWPPP. If inspections indicate any non-compliance, the contractor shall notify the RE who will in turn notify the RWQCB. The contractor's notification to the RE shall identify the type(s) of non-compliance, the actions identified to bring the matter into compliance, and a time schedule to achieve compliance. A copy-ready Annual Construction Certification form is included in Appendix B, Attachment J. A sample Notice of Non-Compliance is included in Appendix B, Attachment K.

## 4.5 Amendments

During the course of construction, changes may occur that affect the control practices described in the WPCP or SWPPP. The contractor shall amend the WPCP or SWPPP, graphically and in writing, whenever there is a change in construction or operations that may cause the discharge of significant quantities of pollutants to surface waters, ground waters, municipal storm drain systems, or when deemed necessary by the RE. These changes can include but are not limited to schedule changes, phasing changes, staging area modifications, unanticipated offsite drainage impacts, and failures of pollution controls.

The SWPPP shall also be amended if it is in violation of any condition of the Permit or has not achieved the general objective of reducing pollutants in storm water discharges. Amendments shall be logged in the SWPPP and attached to the on-site document.

All amendments shall be submitted to the RE for review and approval. During the preparation and review of WPCP or SWPPP amendments, construction may continue with temporary modifications to BMPs, subject to approval by the RE.

Sections 2 and 3 of this Handbook specify the process for preparing and logging amendments.



# Section 5

## Guidance for Use of Working Details for Temporary BMPs

### 5.1 Introduction

This section describes the working details for the temporary BMPs considered by Caltrans to be applicable to storm water quality management on transportation projects. The working details are included as Appendix C to this Handbook. For each working detail, the following information is provided:

- # Definition and Purpose
- # Appropriate Applications
- # Limitations
- # Standards and Specifications
- # Maintenance and Inspection

Table 5-1 lists each of the BMPs included in Appendix C. The working detail for each BMP is intended to provide guidance, as opposed to specifications, for BMP use and implementation. Therefore, the contractor has a degree of latitude to select BMPs that best fit their operations, construction methods, and the site, and to adapt the BMP as needed to meet the pollution control objectives. BMPs that are not included in this Handbook may also be used by the contractor to achieve the pollution control objectives, but may not be used to satisfy minimum requirements. The use of alternative BMPs will require that the contractor include additional construction details and/or manufacturer's data sheets in the WPCP or SWPPP. The use of alternative BMPs is subject to approval by the RE.

The guidance provided in the BMP working details assumes the user has a good working knowledge of construction operations and pollution control practices. This knowledge can generally be obtained through any combination of field experience, training, and formal education that enables the user to apply sound judgment and common sense to the selection and implementation of pollution control measures. When there is any doubt about the suitability of a control measure, the contractor should seek the assistance of a registered civil engineer or other knowledgeable person.



Table 5-1 Working Details for Temporary BMPs	
BMP ID	Name
<b>Soil Stabilization Measures</b>	
CD22(2)	Scheduling
CD23(2)	Preservation of Existing Vegetation
CD24B(2)	Temporary Seeding and Planting
CD25(2)	Mulching
CD26A(2)	Soil Stabilizers
CD26B(2)	Geotextiles, Mats/Plastic Covers & Erosion control Blankets
CD28(2)	Temporary Stream Crossing
CD29A(2)	Stabilized Construction Entrance
CD29B(2)	Stabilized Construction Roadway
CD29C(2)	Entrance/Outlet Tire Wash
CD30(2)	Sodding, Grass Plugging, and Vegetative Buffer Strips
CD31(2)	Earth Dikes, Drainage Swales, and Lined Ditches
CD32A(2)	Slope Drains and Subsurface Drains
CD32B(2)	Top and Toe of Slope Diversion Ditches/Berms
CD33A(2)	Outlet Protection/Velocity Dissipation Devices
CD33B(2)	Flared Culvert End Sections
CD34(2)	Check Dams
CD35(2)	Slope Roughening/Terracing/Rounding
CD37(2)	Straw Bale Barrier
CD43(2)	Fiber Rolls
<b>Sediment Controls</b>	
CD34(2)	Check Dams
CD36(2)	Silt Fences
CD37(2)	Straw Bale Barrier
CD38(2)	Sand Bag Barrier
CD39(2)	Brush or Rock Filter
CD40(2)	Storm Drain Inlet Protection
CD41(2)	Sediment Traps
CD42(2)	Sediment Basin
CD43(2)	Fiber Rolls
CD46(2)	Liquid Waste Management

Table 5-1 Working Details for Temporary BMPs	
BMP ID	Name
<b>Sediment Tracking Controls</b>	
CD29A(2)	Stabilized Construction Entrance
CD29B(2)	Stabilized Construction Roadway
CD29C(2)	Entrance/Outlet Tire Wash
<b>Wind Erosion Controls</b>	
CD23(2)	Preservation of Existing Vegetation
CD24B(2)	Temporary Seeding and Planting
CD25(2)	Mulching
CD26A(2)	Soil Stabilizers
CD26B(2)	Geotextiles, Mats/Plastic Covers & Erosion Control Blankets
CD29B(2)	Stabilized Construction Roadway
<b>Non-Storm Water Mater Management &amp; Waste Management &amp; Disposal</b>	
CD4(2)	Water Conservation Practices
CD7(2)	Dewatering
CD8(2)	Paving Operations
CD9(2)	Structure Construction and Painting
CD10(2)	Material Delivery and Storage
CD11(2)	Material Use
CD12(2)	Spill Prevention and Control
CD13(2)	Solid Waste Management
CD14(2)	Hazardous Waste Management
CD15(2)	Contaminated Soil Management
CD16(2)	Concrete Waste Management
CD17(2)	Sanitary/Septic Waste Management
CD18(2)	Vehicle and Equipment Cleaning
CD19(2)	Vehicle and Equipment Fueling
CD20(2)	Vehicle and Equipment Maintenance
CD44(2)	Illicit Discharge/Illegal Dumping Detection and Reporting
CD45(2)	Clear Water Diversion and Encroachment
CD46(2)	Liquid Waste Management

# Appendix A

## Abbreviations, Acronyms, and Definition of Terms

### Abbreviations

ac	acre	NPDES	National Pollutant Discharge Elimination System
cy	cubic yards	PE	Project Engineer
ft	feet	PM	Project Manager
gal	gallon	PR	Project Report
gpm	gallons per minute	PS&E	Plans, Specifications & Estimates
ha	hectares	PSR	Project Study Report
hr	hour	RE	Resident Engineer
in	inches	RWQCB	California Regional Water Quality Control Board
lf	linear feet	SSP	Standard Special Provisions
l	liter	SWPPP	Storm Water Pollution Prevention Plan
m	meter	SWRCB	California State Water Resources Control Board
mm	millimeter	WDID	Waste Discharge Identification Number
s	second	WPCD	Water Pollution Control Drawing
		WPCP	Water Pollution Control Program

### Acronyms

BMP	Best Management Practice	WDID	Waste Discharge Identification Number
CWA	Clean Water Act	WPCD	Water Pollution Control Drawing
EPA	Environmental Protection Agency	WPCP	Water Pollution Control Program
NOI	Notice of Intent		
NONC	Notice of New Construction		
NOT	Notice of Termination		



## Definition of Terms

**Active Construction Area:** The area where the contractor intends to be actively involved in soil disturbing work during the ensuing 20 day period during the winter season. This may include areas where soils have been disturbed as well as areas where soil disturbance has not yet occurred.

**Best Management Practice (BMP):** Any program, technology, process, siting criteria, operating method, measure, or device that controls, prevents, removes, or reduces pollution.

**Clean Water Act (CWA):** The Federal Water Pollution Control Act enacted in 1972 by Public Law 92-500 and amended by the Water Quality Act of 1987. The Clean Water Act prohibits the discharge of pollutants to Waters of the United States unless said discharge is in accordance with an NPDES permit. The 1987 amendments include guidelines for regulating municipal, industrial, and construction storm water discharges under the NPDES program.

**Construction Activity:** Includes clearing, grading, or excavation and contractor activities that result in soil disturbance.

**Construction Site:** The area involved in a construction project as a whole.

**Contamination:** An impairment of the quality of the waters of the state by waste to a degree that creates a hazard to the public health through poisoning or through the spread of disease including any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected.

**Contractor:** Party responsible for carrying out the contract per plans and specifications. The Standard Specifications and Special Provisions contain storm water protection requirements the contractor must address.

**Desert Areas:** Areas within the Colorado River Basin RWQCB and the North and South Lahontan RWQCB jurisdictions (excluding the Mono and Antelope areas, East and West Walker River, East and West Carson River, and the Truckee and Little Truckee River).

**Discharge:** Any release, spill, leak, pump, flow, escape, dumping, or disposal of any liquid, semi-solid or solid substance.

**Disturbed Areas:** Areas that have been purposefully cleared, grubbed, excavated, or graded by the contractor; ground surface that has been disrupted by construction activities, including construction access/roads, producing significant areas of exposed soil and soil piles. Staging and storage sites are considered as part of the total disturbed land area, if they are located on erodible soil within state right-of-way.



**Environmental Protection Agency (EPA):** Agency that issued the regulations to control pollutants in storm water runoff discharges (The Clean Water Act and NPDES permit requirements).

**Erosion:** The wearing away of land surface primarily by wind or water. Erosion occurs naturally as a result of weather or runoff but can be intensified by clearing, grading, or excavation of the land surface.

**Exempt Construction Activities:** Activities exempt from the General Permit, including routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility; and emergency construction activities required to protect public health and safety. Local permits may not exempt these activities.

**Existing vegetation:** Any vegetated area that has not already been cleared and grubbed.

**Fair Weather Prediction:** When there is no precipitation in the forecast between the current calendar day and the next working day. The National Weather Service NOAA Weather Radio forecast shall be used. The contractor may propose an alternative forecast for use if approved by the Engineer.

**Feasible:** Economically achievable or cost-effective measures which reflect a reasonable degree of pollutant reduction achievable through the application of available nonpoint pollution control practices, technologies, processes, site criteria, operating methods, or other alternatives.

**General Permit:** The General Permit for Storm Water Discharges Associated with Construction Activity (NPDES Permit CAS000002) issued by the State Water Resources Control Board.

**Good Housekeeping:** A common practice related to the storage, use, or cleanup of materials, performed in a manner that minimizes the discharge of pollutants.

**Local permit:** An NPDES storm water permit issued to a District by the RWQCB having jurisdiction over the job site. Requirements of the local permit are generally similar to, but supersede the requirements of the General Permit. The District Storm Water Coordinator should be consulted to identify and to incorporate variances between the local permit and General Permit.

**National Pollutant Discharge Elimination System (NPDES) Permit:** A permit issued pursuant to the Clean Water Act that requires the discharge of pollutants to Waters of the United States from storm water be controlled.



**Nonactive Construction Area:** Any area not considered to be an active construction area. Active construction areas become nonactive construction areas whenever construction activities are expected to be discontinued for a period of 20 or more days during the winter season.

**Non-Storm Water Discharge:** Any discharge to a storm drain system or receiving water that is not composed entirely of storm water.

**Notice of Intent (NOI):** A formal notice to the State Water Resources Control Board (SWRCB) that a construction project under the General Permit is about to begin. The NOI is filed by the Project Engineer and a copy is put in the Resident Engineer Pending File. The NOI provides information on the owner, location, and type of project, and certifies that the permittee will comply with conditions of the construction General Permit. The NOI is *not* a permit application and no approval is required. Local permits may require submittal of a Notice of New Construction (NONC) to the RWQCB in lieu of filing a NOI with the SWRCB.

**Notice of Termination (NOT):** A formal notice to the SWRCB for General Permit site terminating coverage under the permit. The NOT is filed by the RE. Local permits may require submittal of the NOT to the RWQCB in lieu of filing with the SWRCB.

**Permit:** The General Permit or local permit, whichever is applicable to the construction project.

**Project Engineer (PE):** Caltrans staff responsible for preparation of Plans, Specifications, and Estimate (PS&E) documents otherwise known as “contract plans” or “bid documents.”

**Project Manager (PM):** Caltrans staff responsible for “shepherding” a project through the project planning and development process, verifying that all requirements, including storm water protection, are met.

**Pollution:** The man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water. An alteration of the quality of the water of the state by waste to a degree which unreasonably affects either the waters for beneficial uses or facilities that serve these beneficial uses.

**Receiving Waters:** All surface water bodies within the permit area.

**Regional Water Quality Control Board (RWQCB):** California agencies that implement and enforce Clean Water Act Section 402(p) NPDES permit requirements, and are issuers and administrators of these permits as delegated by EPA. There are nine regional boards working with the State Water Resources Control Board.



**Resident Engineer (RE):** The Caltrans representative charged with administration of construction contracts. The RE decides questions regarding acceptability of material furnished and work performed. The RE has “contractual authority” to direct the contractor and impose sanctions if the contractor fails to take prompt and appropriate action to correct deficiencies. The following contractual sanctions can be imposed by the RE: (a) withholding payments (or portions of payments), (b) suspending work, (c) bringing in a separate contractor to complete work items (the contractor is billed for such costs), (d) assessing liquidated damages including passing along fines for permit violations, (e) initiating cancellation of the construction contract.

**Sediment:** Organic or inorganic material that is carried by or suspended in water and that settles out to form deposits in the storm drain system or receiving waters.

**State Water Resources Control Board (SWRCB):** California agency that implements and enforces Clean Water Act Section 402(p) NPDES permit requirements, is issuer and administrator of these permits as delegated by EPA. Works with the nine Regional Water Quality Control Boards.

**Storm Drain System:** Streets, gutters, inlets, conduits, natural or artificial drains, channels and watercourses, or other facilities that are owned, operated, maintained and used for the purpose of collecting, storing, transporting, or disposing of storm water.

**Storm Water:** Rainfall runoff, snow melt runoff, and surface runoff and drainage. It excludes infiltration and runoff from agricultural land.

**Storm Water Inspector:** Caltrans staff member who provides support to the Resident Engineer. Coordinates activities and correspondence related to WPCP and SWPPP review and implementation.

**Storm Water Pollution Prevention Plan (SWPPP):** A plan required by the Permit that includes site map(s), an identification of construction/contractor activities that could cause pollutants in the storm water, and a description of measures or practices to control these pollutants. It must be prepared and approved before construction begins. A SWPPP prepared in accordance with the Special Provisions and the Handbooks will satisfy Standard Specifications Section 7-1.01G - Water Pollution, requirement for preparation of a program to control water pollution.

**Temporary Construction Site BMPs:** BMPs that are required only temporarily to address a short-term storm water contamination threat. For example, silt fences are located near the base of newly graded slopes that have a substantial area of exposed soil. Then, during rainfall, the silt fences filter and collect sediment from runoff flowing off the slope.

**Waste Discharge Identification Number (WDID):** The unique project number issued by the SWRCB upon receipt of the notice of intent (NOI).



**Water Pollution Control Program (WPCP):** A program that must be prepared and implemented by the construction contractor under Standard Specifications Section 7-1.01G - Water Pollution.

**Winter Season:** The dates of the winter season shall be as specified in the Special Provision for water pollution control.



# Appendix B

## Attachments to Prepare a SWPPP

The following attachments are used to prepare a Storm Water Pollution Prevention Plan (SWPPP) as discussed in Section 3:

- # Attachment A Example Vicinity Map
- # Attachment B Example Water Pollution Control Drawings
- # Attachment C Computation Sheet for Determining Runoff Coefficients
- # Attachment D Sample Notice of Intent (NOI) and Waste Discharge Identification Number (WDID)
- # Attachment E BMP Consideration Checklist
- # Attachment F Non-Storm Water Spill Log
- # Attachment G Sample Maintenance, Inspection, and Repair Program
- # Attachment H Sample Subcontractor Notification Letter and Subcontractor Notification Log
- # Attachment I Construction Site Inspection Checklist and Inspection Log
- # Attachment J Certification and Approval Forms
- # Attachment K Sample Notice of Non-Compliance
- # Attachment L SWPPP Amendment Log
- # Attachment M SWPPP Checklist



# Attachment A

## Example Vicinity Map

The vicinity map on the following page was obtained from a SWPPP for a construction site located in District 7. This project generally consisted of HOV widening including a section through an environmentally sensitive area.

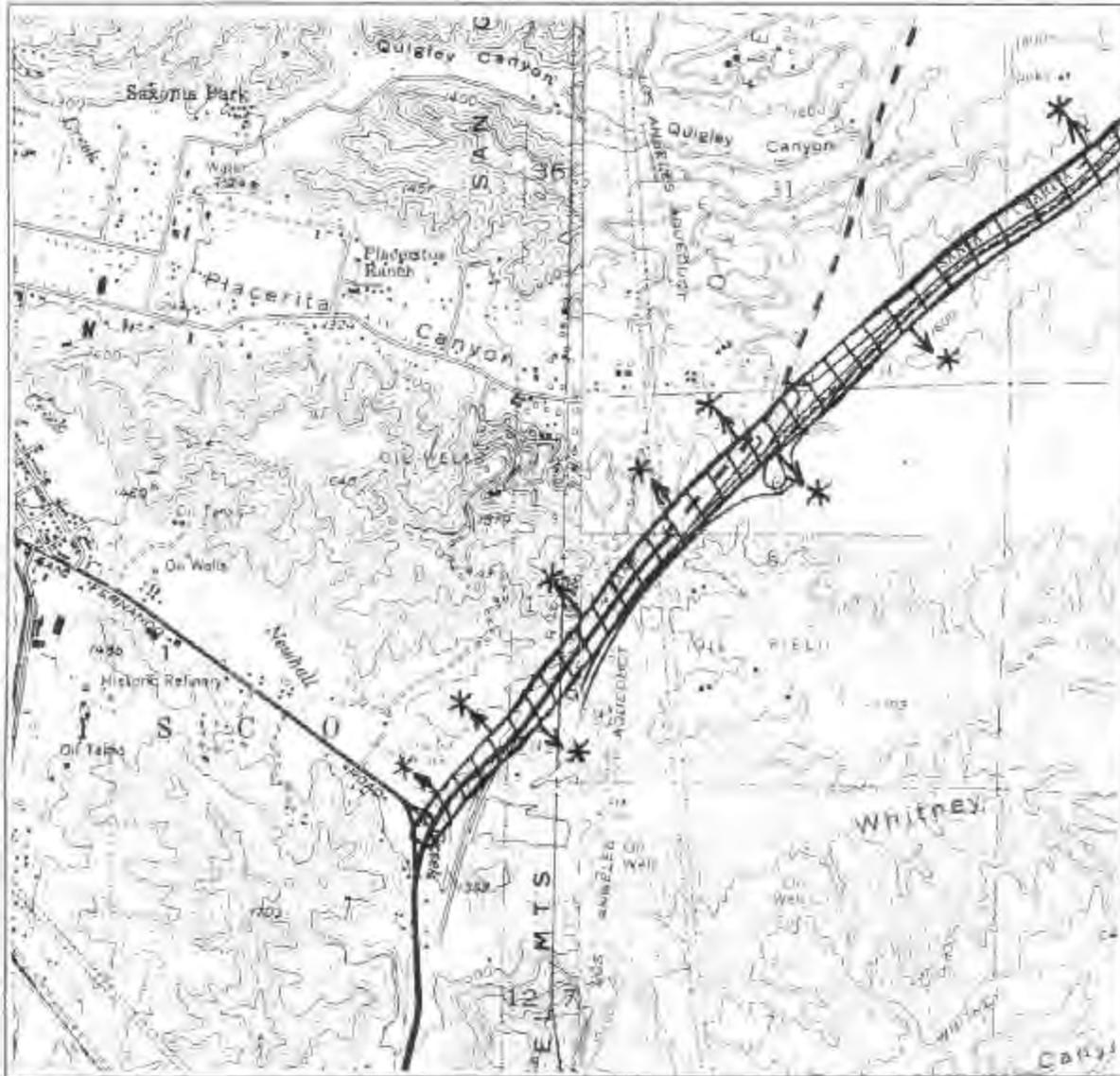
The map is a USGS 7.5 minute topographic quad. This map shows the construction site, the general area topography, the location of existing surface water bodies, and the anticipated discharge locations.

The original document is a colored USGS map and a total of three sheets were required due to the length of the project. The colored map is suggested for use in SWPPPs for clarity and easier identification of topography, water bodies, etc., but is not required.



# STORM WATER POLLUTION PREVENTION PLAN

VICINITY MAP  
FOR  
ROUTE 14  
SANTA CLARITA, CALIFORNIA



## LEGEND

- \* DISCHARGE POINT
- DIRECTION OF FLOW
- ▨ SITE



# Attachment B

## Example Water Pollution Control Drawings

The following are example Water Pollution Control Drawings (WPCDs).

- 1st Page - Cover sheet indicating project information.
- 2nd Page - Detail sheet showing construction details for some of the BMPs.
- 3rd Page - Location sheet showing locations of various BMPs.



**WATER POLLUTION CONTROL DRAWINGS (WPCDs)  
FOR  
ROUTE 690  
IN SANTA CLAUS COUNTY  
CALTRANS CONTRACT NO. 04-123456**

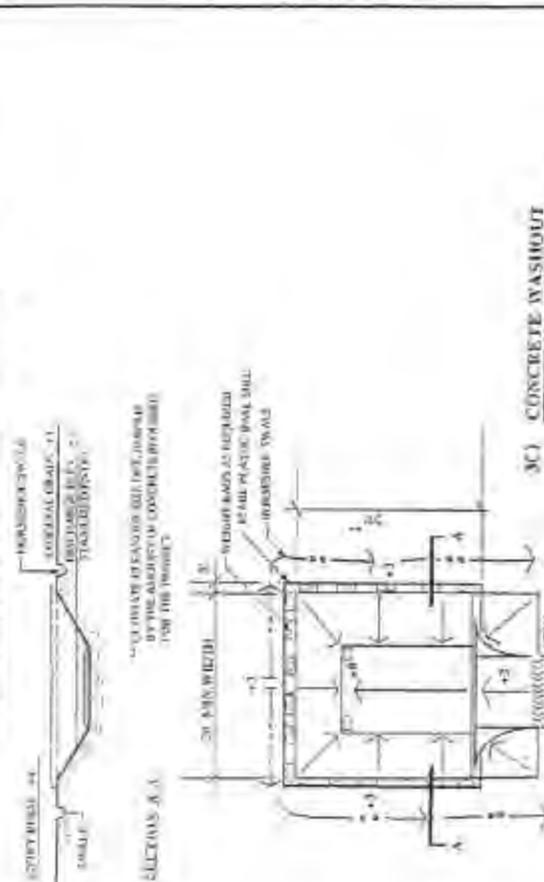
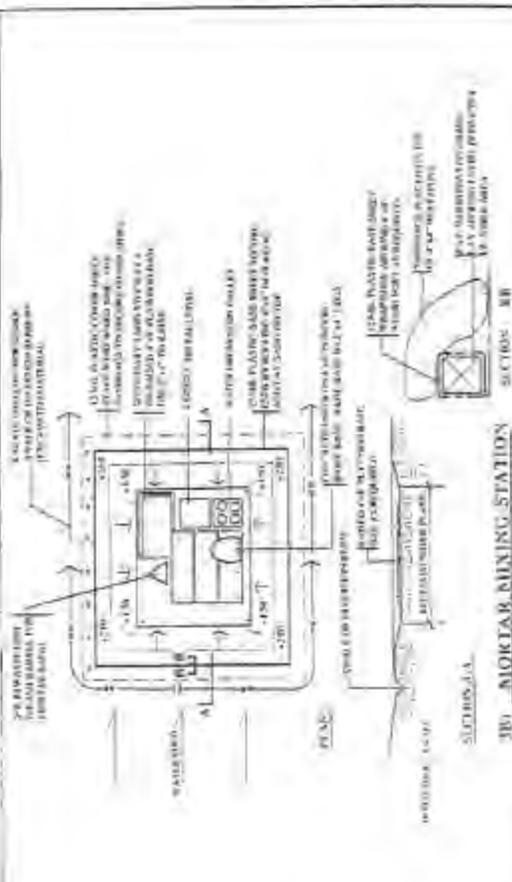
**PREPARED BY  
XYZ ENGINEERING INC.  
FOR  
ABC CONSTRUCTION**

STORM WATER POLLUTION CONTROL GENERAL NOTES

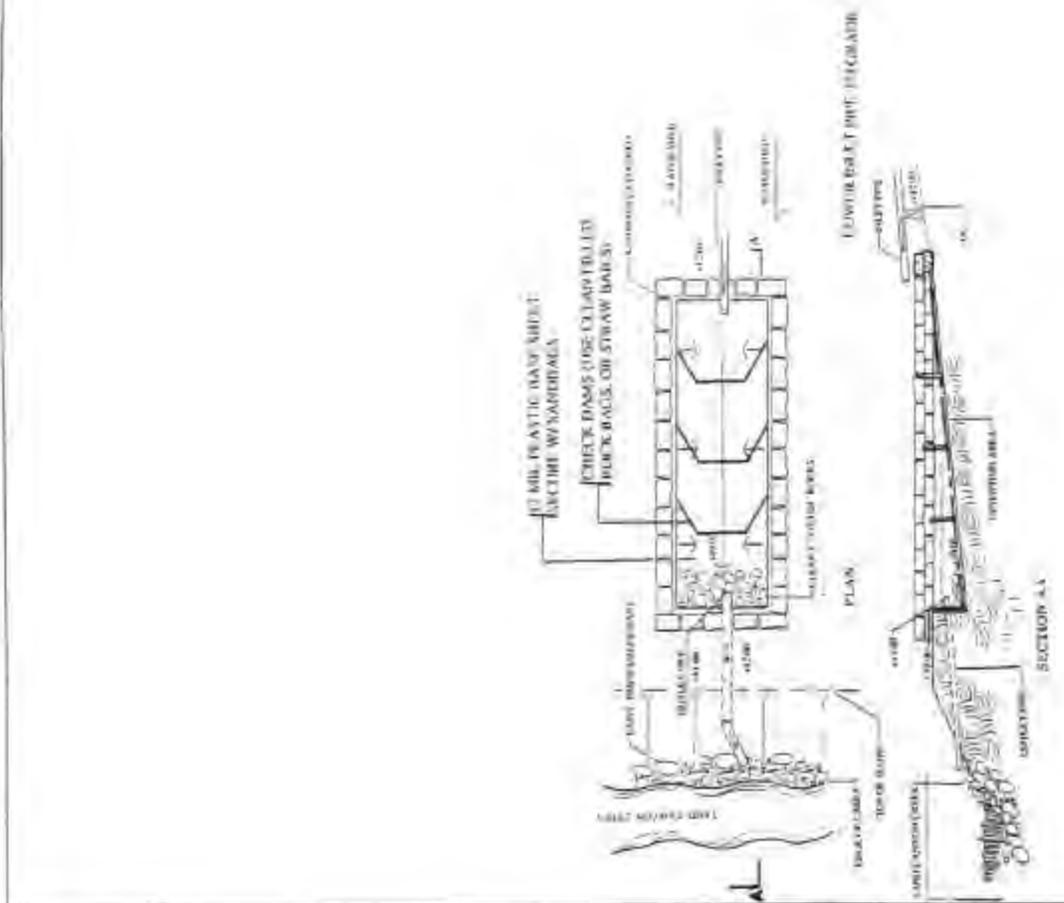
1. THE FOLLOWING PLANS ARE ACCURATE FOR STORM WATER POLLUTION CONTROL PURPOSES ONLY.
2. THE INFORMATION ON THIS PLAN IS INTENDED TO BE USED AS A GUIDELINE FOR THE CONTRACTOR AND SUBCONTRACTORS TO COMPLY WITH THE REQUIREMENTS OF THE STATE WATER RESOURCES CONTROL BOARD. FIELD CONDITIONS MAY NECESSITATE MODIFICATIONS TO THIS PLAN.
3. USE IN CONJUNCTION WITH THE STORM WATER POLLUTION PREVENTION PLAN.
4. SEE LEGEND ON WPCD-3

**WPCD-1**

	DRAWING TITLE: WATER POLLUTION CONTROL DRAWINGS TITLE SHEET		
DRAWN	SIZE A	DWG NO.	REV 0
APPROVED	SCALE NONE	DATE 4/97	SHEET OF



WPCD-2  
MEASURES  
Water Pollution Control Plan  
No. 2000



WPCD-2  
MEASURES  
Water Pollution Control Plan  
No. 2000

**LEGEND**

- Proposed Erosion Control Structures:
  - Erosion Control Basins & Walls (Storm Water Ponds - Retention)
  - Channel Water Management (Channel Widening)
  - Hydroseed Area "Perennial" Seeding (Grass/Forbes) (Hydroseed)
  - Hydroseed Area "Temporary" Seeding (Grass/Forbes) (Hydroseed)
  - Solid Waste Management (Temporary Structure)
  - Subsided Construction Footing
  - Storm Drain Inlet Protection (Type as noted)
  - Access Road Drain
  - Check Dam (Type as noted)
  - Log Deck
  - Log Deck
  - Motor Mixing Station
  - Water Wall
  - Concrete in Drain
  - Drain Pipe (Temporary)
  - Excavation Protection (Concrete and Grout Columns)

- FINISHES OF EXCAVATION:
  - COVER W/ EROSION CONTROL BLANKET (TYPICAL)
  - LOCATE DETENTION BASIN BETWEEN BRIDGE BRIDGES
  - SOLID WASTE MGMT. AREA: PLACE EXCAVATED MATERIAL UNDER BRIDGE & COVER W/ PLASTIC SHEET.



**LEGEND**

- Existing Site Features:
  - Removal of Tree (Indicated)
  - Removal of Tree (Not Indicated)
  - Area to be
  - Vegetation



DATE	REVISION	BY	DATE	DESCRIPTION
08/10/00	001	WPCD	08/10/00	ISSUED FOR PERMITS

PROJECT: SAND CANYON CREEK  
 CLIENT: SAND CANYON CREEK  
 DRAWN BY: WPCD  
 CHECKED BY: WPCD  
 SCALE: AS SHOWN  
 SHEET NO: 10 OF 10

APPLY PERMANENT HYDROSEED EROSION CONTROL SEEDING WHEN WALL IS COMPLETE

MAINTAIN EXISTING VEGETATION BEYOND 20' CLEAR & GRUB ZONE (TYPICAL)

ALIGN SILT FENCE W/ BERM IN STABILIZED ENTRYWAY (TYPICAL)

MORTAR MIXING STATION ON LEVEL GROUND

END FR

CLEAR & GRUB 30' WIDE STRIP ADJACENT TO EDGE OF PAVE

MORTAR MIXING STATION ON LEVEL GROUND

EXISTING 'V' GUTTER

TEMPORARY DRAIN PIPE COVER W/ PLASTIC SHEET & PLACE 3" OF CLEAN ROCK COVER

WPCD-3  
 LAYOUT  
 SCALE 1"=50'  
 L-1

FOR REVISIONS, PLEASE CONTACT THE ENGINEER OR ARCHITECT.

# Attachment C

## Computation Sheet for Determining Runoff Coefficients

Total Site Area	=	_____ (A)
<u>Existing Site Conditions</u>		
Impervious Site Area <sup>1</sup>	=	_____ (B)
Impervious Area Runoff Coefficient <sup>2,4</sup>	=	<u>0.95</u> (C)
Pervious Site Area <sup>3</sup>	=	_____ (D)
Pervious Site Area Runoff Coefficient <sup>4</sup>	=	_____ (E)
Existing Site Area= $\frac{(B)(C) + (D)(E)}{A}$	=	<u>                    </u> (F)
<u>Proposed Site Conditions (After Construction)</u>		
Impervious Site Area <sup>1</sup>	=	_____ (G)
Impervious Site Runoff Coefficient <sup>2,4</sup>	=	<u>0.95</u> (H)
Pervious Site Area <sup>3</sup>	=	_____ (I)
Pervious Site Area Runoff Coefficient <sup>4</sup>	=	_____ (J)
Proposed Site Area= $\frac{(G)(H) + (I)(J)}{A}$	=	<u>                    </u> (K)

- 1 Includes paved areas, areas covered by buildings, and other impervious surfaces.
- 2 Use 0.95 unless lower or higher runoff coefficients can be verified.
- 3 Includes areas of vegetation, most unpaved or uncovered soil surfaces, and other pervious areas.
- 4 See Table C-1 and C-2 for runoff coefficients



<b>Table C-2</b> <b>Runoff Coefficients for Developed Areas</b>	
<b>Type of Drainage Area</b>	<b>Runoff Coefficient</b>
Business: Downtown areas Neighborhood areas	0.70 - 0.95 0.50 - 0.70
Residential: Single-family areas Multi-units, detached Multi-units, attached	0.30 - 0.50 0.40 - 0.60 0.60 - 0.75
Suburban	0.25 - 0.40
Apartment dwelling areas	0.50 - 0.70
Industrial: Light areas Heavy areas	0.50 - 0.80 0.60 - 0.90
Parks, cemeteries:	0.10 - 0.25
Playgrounds:	0.20 - 0.40
Railroad yard areas:	0.20 - 0.40
Unimproved areas:	0.10 - 0.30
Lawns: Sandy soil, flat, 2% Sandy soil, average, 2-7% Sandy soil, steep, 7% Heavy soil, flat, 2% Heavy soil, average, 2-7% Heavy soil, steep, 7%	0.05 - 0.10 0.10 - 0.15 0.15 - 0.20 0.13 - 0.17 0.18 - 0.25 0.25 - 0.35
Streets: Asphaltic Concrete Brick Drives and walks	0.70 - 0.95 0.80 - 0.95 0.70 - 0.85 0.75 - 0.85
Roofs:	0.75 - 0.95

Reference: Caltrans Highway Design Manual, July 1995



# Attachment D Sample Notice of Intent (NOI) and Waste Discharge Identification Number (WDID)

Sample of Notice of Intent (NOI) and Waste Discharge Identification Number (WDID) follow this page.



302387



**NOTICE OF INTENT**  
TO COMPLY WITH THE TERMS OF THE  
GENERAL PERMIT TO DISCHARGE STORM WATER  
ASSOCIATED WITH CONSTRUCTION ACTIVITY (WC Order No. 92-08-DWQ)

MARK ONLY ONE ITEM	1. <input type="checkbox"/> Ongoing Construction	3. <input type="checkbox"/> Change of Information
	2. <input checked="" type="checkbox"/> New Construction	WDD # _____

**I. OWNER**

Name CALTIRANS		Contact Person SYLVIA VEGA	
Local Mailing Address 2501 PULLMAN		Title SENIOR EP	
City SANTANA	State CA	Zip 92705	Phone 714-734-2242

**II. CONSTRUCTION SITE INFORMATION**

A. Developer TRACY E. RYDER		Contact Person JIM TRACY	
Local Mailing Address 22421 GILBERTO SUITE A		Title OWNER	
City RANCHO SANTA MARGARITA	State CA	Zip 92688	Phone 714-858-7002
B. Site Address COSTA MESA FWY. 19TH TO BRISTOL ORANGE			
City COSTA MESA	State CA	Zip -	Phone -
Is the construction site part of a larger common plan of development or sale? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		If yes, name of plan or development	
D. Construction commencement date M M D D Y Y 05/26/93	E. Projected construction completion date M M D D Y Y 1/23/94		

**III. BILLING ADDRESS**

Send to: <input checked="" type="checkbox"/> OWNER <input type="checkbox"/> DEVELOPER <input type="checkbox"/> OTHER (Enter information at right)	Name CALTIRANS
	Mailing Address 2501 PULLMAN STREET
	City SANTANA
	State CA
	Zip 92705

**IV. RECEIVING WATER INFORMATION**

A. Does your construction site's storm water discharge to: (Check one)	
1. <input checked="" type="checkbox"/> Storm drain system - Enter system owners name	CITY OF CALIFORNIA - CALTIRANS
2. <input type="checkbox"/> Directly to waters of U.S. (e.g., river, lake, creek, ocean)	
3. <input type="checkbox"/> Indirectly to waters of U.S.	
B. Name of closest receiving water NEWPORT BAY	

**STATE USE ONLY**

WDD: _____	8 306302387 REGION: 8 ISSUED: 08/20/92	id: _____ Received: _____
NPDES Permit Number: _____	NPDES: CAS000002 ORDER: 92-008 \$250	
CA _____	Or CR#: 729730 - \$250.00	
	DATE: 06/09/93	
	PERMIT ISSUED	

V. TYPE OF CONSTRUCTION ( Check all that apply)

1.  Residential      2.  Commercial      3.  Industrial      4.  Reconstruction      5.  Transportation  
 6.  Utility      99.  Other (Please List)

VI. MATERIAL HANDLING/MANAGEMENT PRACTICES

A. Types of materials that will be handled and/or stored at the site: (Check all that apply)

1.  Solvents      2.  Metal      3.  Petroleum Products      4.  Plated Products  
 5.  Asphalt/Concrete      6.  Hazardous Substances      7.  Paints      8.  Wood Treated Products  
 99.  Other (Please list)  
IRRIGATION PVC PIPING

B. Identify proposed management practices to reduce pollutants in storm water discharges: (Check all that apply)

1.  Oil/Water Separator      2.  Erosion Controls      3.  Sedimentation Controls      4.  Overhead Coverage  
 5.  Detention/Desiltation Pond      99.  Other (Please list)  
POLLUTION PREVENTION PLAN

VII. SITE INFORMATION

A. Total size of construction site: <u>10</u> Acres	B. Percent of site impervious: (Including rooftops) Before construction <u>20</u> %      After construction <u>20</u> %
--	--

VIII. REGULATORY STATUS

Is the site subject to a locally approved erosion/sediment control plan?     Yes     No

If yes, name of local agency \_\_\_\_\_

IX. CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction and 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 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. In addition, I certify that the provisions of the permit, including the development and implementation of a Storm Water Pollution Prevention Plan and a Monitoring Program Plan, will be complied with.

Printed Name: Sylvia Vega  
 Signature: Sylvia Vega      Date: 5/25/93  
 Title: Senior Environmental Planner

**STATE WATER RESOURCES CONTROL BOARD**  
PAUL R. BONDERSON BUILDING  
901 P STREET  
P.O. BOX 100  
SACRAMENTO, CALIFORNIA 95812-0100  
916/657-0941  
FAX: 916/657-1977



April 01, 1997

John Doe, P.E.  
Project Engineer  
CALTRANS, District #  
123 Main Street  
Any Town, CA #####

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**SAMPLE LETTER WITH WDID NUMBER**

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**RECEIPT OF YOUR NOTICE OF INTENT**

The State Water Resources Control Board (State Water Board) has received and processed your NOTICE OF INTENT TO COMPLY WITH THE TERMS OF THE GENERAL PERMIT TO DISCHARGE STORM WATER ASSOCIATED WITH CONSTRUCTION ACTIVITY. Accordingly, you are required to comply with the permit requirements.

Your WDID identification number is **4B19S305098**. Please use this number in any future communications with the Regional Water Quality Control Board regarding this permit.

**SITE DESCRIPTION**

Owner: CALTRANS  
Developer: CALTRANS  
County: SUN SHINE  
City: ANY TOWN  
Site Address: STATE ROUTE 157 AT WALKER ROAD  
Commencement Date: 05/01/97  
Est. Completion Date: 06/01/98

When construction is complete or ownership has been transferred, dischargers are required to notify the State Water Resources Control Board that all State and local requirements have been met in accordance with Special Provision No. 7 of the general permit. If you do not notify the State Water Board that construction activity has been completed you will continue to be invoiced for the annual fee.

If you have any questions regarding permit requirements, please call the Regional Water Quality Control Board at (213) 266-7500.

Sincerely,

Jane Smith

Jane Smith  
Storm Water Permit Unit  
Division of Water Quality

# Attachment E

## BMP Consideration Checklist

The BMP Consideration Checklist follows this page.



**BMP CONSIDERATION CHECK LIST**

The contractor shall consider utilizing all BMPs listed hereon. Those BMPs which are not included in the SWPPP shall be checked as such and shall include a brief statement describing why it is not included

BMP I.D.	BMP DESCRIPTION	MINIMUM REQUIREMENTS	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
<b>PART 1A - SOIL STABILIZATION PRACTICES - MINIMUM REQUIREMENTS</b> The Contractor shall implement one or more of the following BMPS					
CD23	PRESERVATION OF EXISTING VEGETATION	SEE SECTION 500.3.1			
CD24B	TEMPORARY SEEDING AND PLANTING PER PROJECT SPECIFICATIONS	SEE SECTION 500.3.1			
N/A	PERMANENT SEEDING AND PLANTING PER PROJECT SPECIFICATIONS	SEE SECTION 500.3.1			
CD25	MULCHING	SEE SECTION			
CD26A	SOIL STABILIZERS	SEE SECTION			
CD26B	GEOTEXTILES, MATS/PLASTIC COVERS & EROSION CONTROL BLANKETS	SEE SECTION 500.3.1			
CD30	SODDING, GRASS PLUGGING, & VEGETATIVE BUFFER STRIPS	SEE SECTION 500.3.1			
<b>PART 1B - SOIL STABILIZATION PRACTICES - BMPS REQUIRING CONSIDERATION</b>					
CD22	SCHEDULING				
CD28	TEMPORARY STREAM CROSSING				
CD29A	STABILIZED CONSTRUCTION ENTRANCE				
CD29B	STABILIZED CONSTRUCTION ROADWAY				
CD29C	ENTRANCE/OUTLET TIRE WASH				
CD31	EARTH DIKES/DRAINAGE SWALES & LINED DITCHES				
CD32A	SLOPE DRAINS/SUBSURFACE DRAINS				
CD32B	TOP & TOE OF SLOPE DIVERSION DITCHES/BERMS				
CD33A	OUTLET PROTECTION/VELOCITY DISSIPATION DEVICES				
CD33B	FLARED CULVERT END SECTIONS				
CD34	CHECK DAMS				
CD35	SLOPE ROUGHENING/TERRACING/ROUNDING				
CD37	STRAW BALE BARRIER				
CD43	FIBER ROLL				



**BMP CONSIDERATION CHECK LIST**

The contractor shall consider utilizing all BMPs listed hereon. Those BMPs which are not included in the SWPPP shall be checked as such and shall include a brief statement describing why it is not included

<b>BMP I.D.</b>	<b>BMP DESCRIPTION</b>	<b>MINIMUM REQUIREMENTS</b>	<b>CHECK IF USED</b>	<b>CHECK IF NOT USED</b>	<b>IF NOT USED, STATE REASON</b>
<b>PART 2A - SEDIMENT CONTROL PRACTICES - MINIMUM REQUIREMENTS</b> The contractor shall implement one or more of the following BMPs					
CD36	SILT FENCES	SEE SECTION 500.3.2			
CD37	STRAW BALE BARRIER	SEE SECTION 500.3.2			
CD38	SANDBAG BARRIER	SEE SECTION 500.3.2			
<b>PART 2B - SEDIMENT CONTROL PRACTICES - BMPs REQUIRING CONSIDERATION</b>					
CD34	CHECK DAMS				
CD39	BRUSH OR ROCK FILTER				
CD40	STORM DRAIN INLET PROTECTION				
CD41	SEDIMENT TRAPS				
CD42	SEDIMENT BASINS				
CD43	FIBER ROLLS				
<b>PART 3A - SEDIMENT TRACKING CONTROL PRACTICES - MINIMUM REQUIREMENTS</b> The contractor shall implement the following requirement					
N/A	INSPECTION AND CLEANING	SEE SECTION 500.3.3			
<b>PART 3B - SEDIMENT TRACKING CONTROL PRACTICES - BMPs REQUIRING CONSIDERATION</b>					
CD29A	STABILIZED CONSTRUCTION ENTRANCE				
CD29B	STABILIZED CONSTRUCTION ROADWAY				
CD29C	ENTRANCE/OUTLET TIRE WASH				



**BMP CONSIDERATION CHECK LIST**

The contractor shall consider utilizing all BMPs listed hereon. Those BMPs which are not included in the SWPPP shall be checked as such and shall include a brief statement describing why it is not included

BMP I.D.	BMP DESCRIPTION	MINIMUM REQUIREMENTS	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
<b>PART4A - WIND EROSION CONTROLS - MINIMUM REQUIREMENTS</b> The contractor shall implement one or more the following BMPs when applicable					
CD23	PRESERVATION OF EXISTING VEGETATION	SEE SECTION 500.3.4			
NA	DUST CONTROL PER STANDARD SPECIFICATIONS SECTION 10	SEE SECTION 500.3.4			
<b>PART 4B - WIND EROSION CONTROLS - BMPs REQUIRING CONSIDERATION</b>					
CD24B	TEMPORARY SEEDING AND PLANTING				
CD25	MULCHING				
CD26A	SOIL STABILIZERS				
CD26B	GEOTEXTILES, MATS/PLASTIC COVERS AND EROSION CONTROL BLANKETS				
CD29B	STABILIZED CONSTRUCTION ROAD				



**BMP CONSIDERATION CHECK LIST**

The contractor shall consider utilizing all BMPs listed hereon. Those BMPs which are not included in the SWPPP shall be checked as such and shall include a brief statement describing why it is not included

BMP I.D.	BMP DESCRIPTION	MINIMUM REQUIREMENTS	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
<b>PART 5 - NON-STORM WATER MANAGEMENT &amp; WASTE MANAGEMENT &amp; DISPOSAL - MINIMUM REQUIREMENTS</b> <b>The contractor shall implement the following BMPs as applicable</b>					
CD4	WATER CONSERVATION PRACTICES	SEE SECTION 500.4			
CD7	DEWATERING	SEE SECTION 500.4			
CD8	PAVING OPERATIONS	SEE SECTION 500.4			
CD9	STRUCTURE CONSTRUCTION AND PAINTING	SEE SECTION 500.4			
CD10	MATERIAL DELIVERY AND STORAGE	SEE SECTION 500.4			
CD11	MATERIAL USE	SEE SECTION 500.4			
CD12	SPILL PREVENTION	SEE SECTION 500.4			
CD13	SOLID WASTE MANAGEMENT	SEE SECTION 500.4			
CD14	HAZARDOUS WASTE MANAGEMENT	SEE SECTION 500.4			
CD15	CONTAMINATED SOIL MANAGEMENT	SEE SECTION 500.4			
CD16	CONCRETE WASTE MANAGEMENT	SEE SECTION 500.4			
CD17	SANITARY/SEPTIC WASTE MANAGEMENT	SEE SECTION 500.4			
CD18	VEHICLE & EQUIPMENT CLEANING	SEE SECTION 500.4			
CD19	VEHICLE & EQUIPMENT FUELING	SEE SECTION 500.4			
CD20	VEHICLE & EQUIPMENT MAINTENANCE	SEE SECTION 500.4			
CD44	ILLICIT DISCHARGE/ILLEGAL DUMPING DETECTION AND REPORTING	SEE SECTION 500.4			
CD45	CLEAR WATER DIVERSION AND ENCROACHMENT	SEE SECTION 500.4			
CD46	LIQUID WASTE MANAGEMENT	SEE SECTION 500.4			



# Attachment F Non-Storm Water Spill Log

A copy-ready Non-Storm Water Spill Log follows this page



## NON-STORM WATER SPILL LOG

Project Name: \_\_\_\_\_ Caltrans Contract Number: \_\_\_\_\_

DATE	NON-STORM WATER MATERIAL	ESTIMATED QUANTITY	OBSERVED BY

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



# Attachment G

## Sample Maintenance, Inspection, and Repair Program

The contractor shall use the following guidelines for maintenance, inspection, and repair of erosion and sediment control BMPs.		
CONTROLS	INSPECTION FREQUENCY	MAINTENANCE/REPAIR MEASURES
Stabilization of Graded Areas	C Bi-weekly	Regrade and reapply seed, straw and tack. Cover with plastic if necessary.
Silt Fences	C Prior to a forecast storm	Replace torn sections, remove piled up debris, re-key bottom of fences
Straw Bales	C After precipitation that causes runoff	Replace straw bales as necessary.
Diversion Berms	C At 24 hour intervals during extended precipitation events	Regrade any eroded areas, re-install berms/sandbags, remove accumulated debris.
Inlet Protections		Remove accumulated debris and repair bales/gravel bags as required.
Construction Entrances		Remove excessive soil accumulation on top gravel entrances.
Outlet Structures		Remove sediment in pipes. Reinstall sandbags as Structures necessary.
The contractor shall use the following guidelines for maintenance, inspection, and repair of non-storm water management and waste management and disposal BMPs.		
Covered Areas	C Bi-weekly	Cover up any exposed areas.
Concrete Wash-Outs	C Prior to a forecast storm	Remove accumulated debris. Replace straw bales and replace lining as necessary.
Waste Containers	C After precipitation that causes runoff	Refuse contractor to pickup. Remove unacceptable materials. Segregate waste. Repair leaks. Replace as necessary.
Vehicle Storage Areas	C At 24 hour intervals during extended precipitation events	Remove leaked material. Replace drip pans. Restock spill materials.



# Attachment H

## Sample Subcontractor Notification Letter and Subcontractor Notification Log

### SWPPP NOTIFICATION TO SUBCONTRACTOR

[DATE]

[Subcontractor's Name]  
[Company]  
[Address]  
[City, State]

Dear [Subcontractor's Name]

Please be advised that the California State Water Resources Control Board has begun formal implementation of the National Pollutant Discharge Elimination System (NPDES).

In short, the purpose of this system is to eliminate pollutants from entering into the storm drain systems and eventually into our lakes, streams and ocean. Pollutants include, but are not limited to oil, grease, trash, sediment, asphaltic emulsions, and cement wastes.

[Contractor] has developed a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the State requirements.

You, as a subcontractor, are required to comply with the SWPPP and the General Permit for any work done on this site.

Any person or group who violates any condition of the General Permit may be subject to substantial penalties in accordance with the law. You are encouraged to advise each of your employees working on this project of the SWPPP.

A copy of the General Permit and the SWPPP developed for this site are available for your review at the construction office.

Please call if you have any questions.

Sincerely,

---

General Contractor



Caltrans Storm Water Quality Handbooks  
Construction Contractor's Guide and Specifications  
April 1997

### SUBCONTRACTOR NOTIFICATON LOG

Project Name: \_\_\_\_\_ Caltrans Contract Number: \_\_\_\_\_

SUBCONTRACTOR NAME	CONTACT NAME	ADDRESS	PHONE NUMBER	PAGER/FIELD PHONE NUMBER	DATE NOTIFICATION LETTER SENT

*USE ADDITIONAL PAGES AS NECESSARY*



# Attachment I

## Construction Site Inspection Checklist and Inspection Log

A copy-ready Construction Site Inspection Checklist and Inspection Log follows this page.

The Construction Site Inspection Checklist shall be used to document site inspections required by the Special Provisions and the WPCP or SWPPP for the project. The contractor shall provide a copy of the completed checklist to the RE following each inspection. The contractor shall also keep a copy of completed Construction Site Inspection Checklists on site with the WPCP or SWPPP.

All construction site inspections shall be logged on the Inspection Log. The Inspection Log shall be included in the WPCP or SWPPP.



### Construction Site Inspection Checklist

Inspected By: \_\_\_\_\_

Project: \_\_\_\_\_

Contractor: \_\_\_\_\_

Date: \_\_\_\_\_

Contractor's Inspector: \_\_\_\_\_

Check "Yes" or "No" or "N/A" if not applicable

YES	NO	N/A	
_____	_____	_____	1. Has there been an absence of rain since the last inspection?
_____	_____	_____	2. Are all sandbags, straw bales, and silt fences in-place in accordance with the WPCP or SWPPP and are they functioning properly?
_____	_____	_____	3. If present, are all significant erodible slopes protected from erosion through the implementation of acceptable soil stabilization practices?
_____	_____	_____	4. If present, are all sediment traps/basins functioning properly?
_____	_____	_____	5. Are all material handling and storage areas reasonably clean and free of spills, leaks, or other deleterious materials?
_____	_____	_____	6. Are all equipment storage and maintenance areas reasonably clean and free of spills, leaks, or any other deleterious materials?
_____	_____	_____	7. Are all materials and equipment properly covered?
_____	_____	_____	8. Are all discharge points reasonably free of any noticeable pollutant discharges?
_____	_____	_____	9. Are all discharge points reasonably free of any significant erosion or sediment transport?
_____	_____	_____	10. Are all BMPs identified on the WPCP or SWPPP installed in the proper location and according to the specifications for the plan?
_____	_____	_____	11. Are all BMPs in good repair and maintained in functional order?



YES	NO	N/A	
_____	_____	_____	12. Are all on-site traffic routes, parking, and storage of equipment and supplies restricted to areas designated in the WPCP or SWPPP for those uses?
_____	_____	_____	13. Are all locations of temporary soil stockpiles or construction materials in approved areas?
_____	_____	_____	14. Are all seeded or landscaped areas properly maintained?
_____	_____	_____	15. Are sediment controls in place at discharge points from the site?
_____	_____	_____	16. Are slopes free of significant erosion?
_____	_____	_____	17. Is sediment, debris, or mud being cleaned from public roads at intersections with site access roads?
_____	_____	_____	18. Does the WPCP or SWPPP reflect current site conditions?

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If you answered "no" to any of the above questions, describe any corrective action which must be taken to remedy the problem and when the corrective action is to be completed.

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# Attachment J

## Certification and Approval Forms

The following copy-ready forms follow this page.

- # SWPPP Certification and Approval
- # Annual Construction Activity Certification
- # SWPPP Amendment Certification and Approval



**SWPPP CERTIFICATION AND APPROVAL**

Project Name: \_\_\_\_\_ Caltrans Contract Number \_\_\_\_\_

\_\_\_\_\_  
To Be Completed by Contractor

*"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate 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."*

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name and Title

(        ) \_\_\_\_\_  
Phone Number

\_\_\_\_\_  
For Caltrans Use Only

**RESIDENT ENGINEER'S APPROVAL  
AND  
CALTRANS CERTIFICATION  
OF THE  
STORM WATER POLLUTION PREVENTION PLAN**

*"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate 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."*

\_\_\_\_\_  
RE's Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Print RE's Name

(        ) \_\_\_\_\_  
RE's Phone Number

**STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM  
 ANNUAL CONSTRUCTION ACTIVITY CERTIFICATION**

**PART 1 - TO BE COMPLETED BY CONTRACTOR**

CALTRANS CONTRACT NUMBER AND PROJECT NAME		WASTE DISCHARGE IDENTIFICATION NUMBER
CONTRACTOR'S NAME	CONTRACTOR'S ADDRESS OF RECORD	CONTRACTOR'S TELEPHONE NUMBER
CONSTRUCTION STARTING DATE	CONSTRUCTION COMPLETION DATE	COUNTY, ROUTE, POST MILES

DESCRIPTION OF WORK

WORK CONDUCTED DURING LAST 12 MONTHS:

WORK NOW IN PROGRESS:

WORK PLANNED FOR NEXT 12 MONTHS:

**CERTIFICATION BY CONTRACTOR**

Based upon inspections of the project site over the last 12 months, or since commencement of construction on the project if less than 12 months ago, the undersigned hereby certifies that the pollutant controls identified in the SWPPP approved for the project site and the work described above are adequate and properly implemented in accordance with the terms of the Contract Special Provisions. *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 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.*

CONTRACTOR'S SIGNATURE	DATE
------------------------	------

**PART 2 - TO BE COMPLETED BY RESIDENT ENGINEER**

RESIDENT ENGINEER'S FINDINGS

I, and/or personnel acting under my direction and supervision, have inspected the project site and the work described above and find as follows:

- |    |       |      |   |
|----|-------|------|---|
| 1. | G YES | G NO | Storm water pollution control measures are being implemented in accordance with the SWPPP approved for the project.                                 |
| 2. | G YES | G NO | The project site and activities thereon are in compliance with NPDES General Permit No. CAS000002 or local NPDES permits, which ever is applicable. |

WHEN BOTH 1 AND 2 ABOVE ARE CHECKED "YES", THE RESIDENT ENGINEER MUST COMPLETE THE ANNUAL CERTIFICATION BELOW. IF EITHER 1 OR 2 ABOVE ARE CHECKED "NO", THE RESIDENT ENGINEER MUST: FILE A NOTICE OF NONCOMPLIANCE WITHIN 30 DAYS OF IDENTIFICATION OF THE NONCOMPLIANCE; DOCUMENT FOLLOW UP ACTIONS BELOW; NOTIFY THE CONTRACTOR; AND INITIATE CORRECTIVE ACTIONS IN ACCORDANCE WITH THE CONTRACT SPECIAL PROVISIONS AND THE STANDARD SPECIFICATIONS. INSTRUCTIONS FOR COMPLETING THE ANNUAL CERTIFICATION OR NOTICE OF NONCOMPLIANCE, FOR NOTIFYING THE CONTRACTOR, AND INITIATING CORRECTIVE ACTIONS ARE CONTAINED IN THE CALTRANS STORM WATER QUALITY HANDBOOKS - CONSTRUCTION STAFF GUIDE.

RESIDENT ENGINEER'S FOLLOW UP ACTIONS

**CERTIFICATION BY CALTRANS**

*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 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.*

RESIDENT ENGINEER'S SIGNATURE	DATE
-------------------------------	------

**SWPPP AMENDMENT CERTIFICATION AND APPROVAL**

Project Name: \_\_\_\_\_ Caltrans Contract Number \_\_\_\_\_

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To Be Completed by Contractor

*"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate 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."*

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name and Title

(       ) \_\_\_\_\_  
Phone Number

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For Caltrans Use Only

**RESIDENT ENGINEER'S APPROVAL  
AND  
CALTRANS CERTIFICATION  
OF THE  
STORM WATER POLLUTION PREVENTION PLAN**

*"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate 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."*

\_\_\_\_\_  
RE's Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Print RE's Name

(       ) \_\_\_\_\_  
RE.s Phone Number

# Attachment K Sample Notice of Non-Compliance

## NOTICE OF NON-COMPLIANCE (SAMPLE)

[Date]

To: Caltrans - Resident Engineer

In accordance with the State Water Resources Control Board, National Pollutant Discharge Elimination System General Permit for Discharges of Storm Water Runoff Associated with Construction Activity, notice is hereby given that the following event(s) of non-compliance with the General Permit or the SWPPP for the subject site located at [insert general description of site location] occurred within \_\_\_\_\_ days prior to the date of the notice:

[describe event(s) of non-compliance]

The following actions are necessary to achieve compliance and shall be implemented by the dates stated below.

Actions to be Taken  
[list]

Commencement Date

Completion Date

Please notify the undersigned should you need any further information concerning this notice or desire to modify the above schedule.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name, Title

(       ) \_\_\_\_\_  
Phone Number



# Attachment L SWPPP Amendment Log

A copy-ready SWPPP Amendment Log follows this page.





# Attachment M

## SWPPP Checklist

The copy-ready SWPPP Checklist form follows this page.



**STORM WATER POLLUTION PREVENTION PLAN (SWPPP) CHECKLIST  
FOR CONSTRUCTION ACTIVITIES**

CONTRACTOR: _____		CONTRACT NO.: _____	
<b>GENERAL PERMIT SECTION A: STORM WATER POLLUTION PREVENTION PLAN</b>			
CHECK IF ADDRESSED N/A IF NOT APPLICABLE	ITEM	GENERAL PERMIT REF	COMMENTS
	<b>Map Extending 1/4 Mile Showing:</b> construction site surface water bodies (lakes, ponds, spring, and wetlands) wells outline of offsite drainage areas discharging into site general topography discharge location from site	A.5.a	
	<b>Site Map Showing or Describing:</b> location of control practices areas used to store soils and waste areas of cut and fill drainage patterns and slopes after construction areas of soil disturbances surface water locations areas of potential erosion slated for control practices existing and proposed paved areas and buildings location of post-construction control practices outline of drainage area for each discharge point vehicle storage and service area areas of existing vegetation	A.5.b (i) (ii) (iii) (iv) (v) (vi) (vii) (viii) (ix) (x) (xi) (xii)	To be provided by Caltrans
	<b>Narrative Description of the Following:</b> toxic materials stored, disposed, spilled or leaked practices to minimize contact with storm water construction material loading, unloading, and access areas preconstruction control practices equipment storage, cleaning, and maintenance areas methods of onsite storage and disposal of materials nature of fill material and description of existing soil onsite	A.5.c (i) (ii) (iii) (iv) (v) (vi) (vii)	To be provided by Caltrans
	<b>List of Pollutants Likely to be Present in Storm Water Discharges</b>	A.5.d	
	<b>Size of Construction Site</b> runoff coefficient before and after construction percentage of impervious surfaces before and after construction	A.5.e	To be provided by Caltrans To be provided by Caltrans
	<b>Copy of NOI/WDID</b>	A.5.f	To be provided by Caltrans
	<b>Erosion and Sediment Control</b> description of soil stabilization practices description/illustration of control practices to prevent sediment runoff control practices to reduce tracking of sediment onto streets control practices to reduce wind erosion	A.6 a b c d	
	<b>Non-Storm Water Management</b> provisions to eliminate/reduce non-storm water discharges	A.7	
	<b>Post-Construction Storm Water Management</b> description of post-construction storm water management control practices site-specific conditions seasonal conditions operation and maintenance of control practices after completed construction short-term funding long-term funding responsible party	A.8	To be provided by Caltrans



**STORM WATER POLLUTION PREVENTION PLAN (SWPPP) CHECKLIST  
FOR CONSTRUCTION ACTIVITIES**

CHECK IF ADDRESSED	ITEM	GENERAL PERMIT REFERENCE	COMMENTS
	<b>Waste Management and Disposal</b> waste disposal onsite in compliance with federal, state, and local laws	A.9	
	<b>Maintenance, Inspection, and Repair Procedures</b> procedures to insure that control measures are effective and maintained	A.10	
	<b>Training</b> procedures to insure all inspections are done by trained personnel	A.11	
	<b>List of Contractors and Subcontractors Responsible for SWPPP Implementation</b>	A.12	
	<b>Reference to Other Plans</b> reference, where needed, to other plans required by local, state, or federal agencies	A.13	
	<b>Preparer</b> signature/title, person responsible, date of preparation	A.15	

**GENERAL PERMIT SECTION B: MONITORING PROGRAM AND REPORTING REQUIREMENTS**

CHECK IF ADDRESSED	ITEM	GENERAL PERMIT REFERENCE	COMMENTS
	<b>Amendment Log</b>	B.2	
	<b>Monitoring Program Implementation Discussion</b>	B.3 a,b	
	<b>Site Inspection Plan</b>	B.4	
	<b>Compliance Certification Form</b>	B.5	
	<b>Noncompliance Reporting Form</b>	B.6	
	<b>Monitoring Records Retained for at Least Three Years</b> all inspections, compliance certifications, and non-compliance reports	B.7	

**CALTRANS REQUIREMENTS**

CHECK IF ADDRESSED	ITEM	STEP-BY-STEP REFERENCE	COMMENTS
	<b>Title Page and Contents</b>	100	
	<b>Certification Page and Amendment Log</b>	200	
	<b>Introduction/Project Description</b>	300	
	<b>Reference Page</b>	400	
	<b>Statement of SWPPP Objective</b>	500.1	
	<b>Amendment Log</b>	600.1	
	<b>Copy of General (Local) Permit</b>	700.1	
	<b>Completed BMP Consideration Worksheet</b>	700.2	
	<b>Completed SWPPP Checklist</b>	700.3	
	<b>Completed Schedule of Values</b>	700.4	

**LOCAL PERMIT REQUIREMENTS - INSERT AS APPROPRIATE**

CHECK IF ADDRESSED	ITEM	STEP-BY-STEP REFERENCE	COMMENTS
		800	



# Attachment N

## Cost Breakdown for Water Pollution Control

SAMPLE <sup>(1)</sup>

Cost Breakdown for Water Pollution Control				
Contract No. _____				
Unit Description	Unit	Approximate Quantity	Unit Cost	Total Cost
Temporary Sediment Basin	EA	1	800.00	800.00
Temporary Silt Fence	M	1000	10.00	10,000.00
Temporary Straw Bale	EA	800	14.00	11,200.00
Temporary Sand Bags	EA	400	3.00	1,200.00
Temporary Berm	M	300	3.00	900.00
Temporary Filter Inlet	EA	0	0	0
Temporary Flexible Downdrain	M	20	30.00	600.00
Energy Dissipator	EA	2	400.00	800.00
Lined Channel	M	0	0	0
Temporary Downdrain	M	0	0	0
Temporary Check Dams	EA	8	200.00	1,600.00
Temporary Gravel Construction Entrance	EA	3	1,500.00	4,500.00
Temporary Mulching	HA	4	3,750.00	15,000.00
Construction Waste Management	LS	1	5,000.00	5,000.00

**Total    51,600.00 <sup>(2)</sup>**

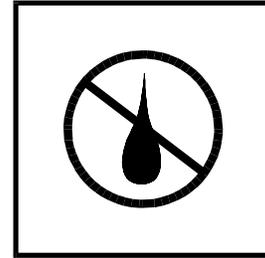
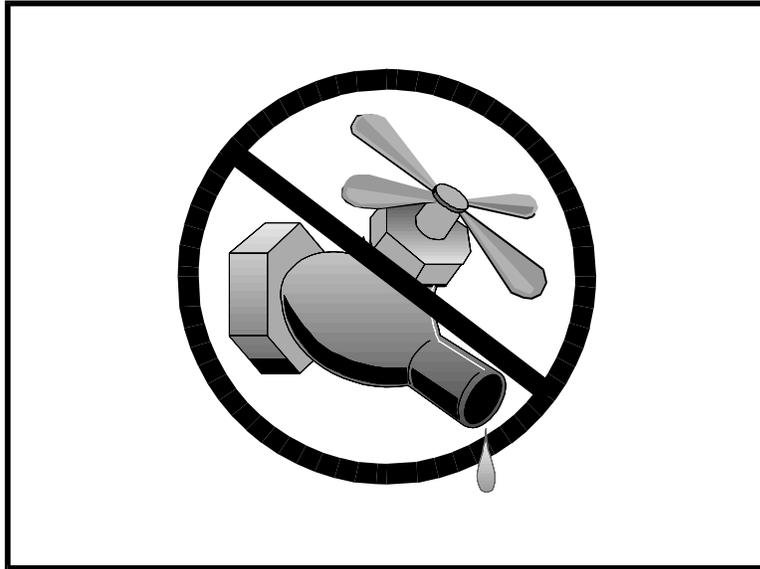
Note: <sup>1</sup>This schedule of values is an example only. The unit costs shown may not reflect unit costs for water pollution control.  
<sup>2</sup>The total of all extended unit costs must equal the lump sum bid for water pollution control.



# CD4(2)

## Water Conservation Practices

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<b>BMP Objectives</b>
F Soil Stabilization
F Sediment Control
F Tracking Control
F Wind Erosion Control
M Non-Storm Water

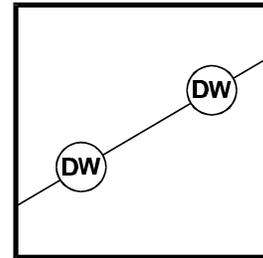
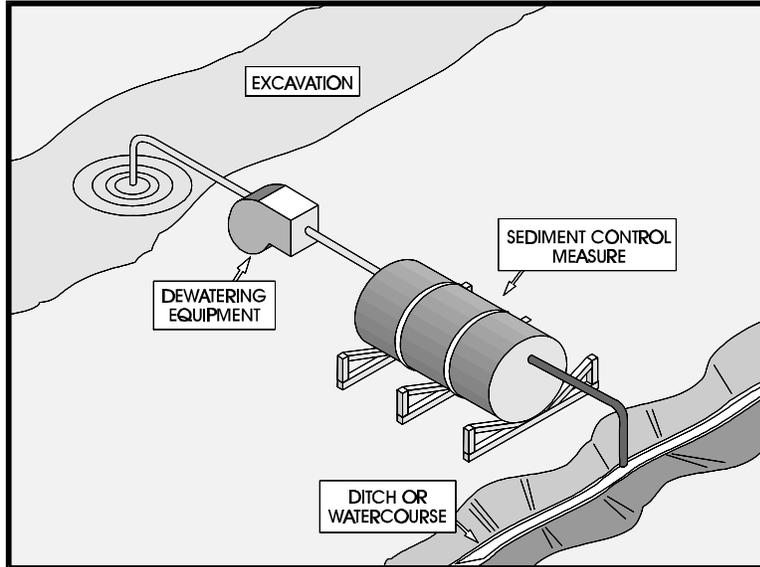
**Definition and Purpose**      Procedures and practices which reduce the discharge of pollutants to the storm drain system or to watercourses resulting from the use of construction waters by using construction water in a manner that does not cause erosion or wash materials off the site.

**Appropriate Applications**      All construction sites where water is used.

**Limitations**      None identified.

- Standards and Specifications**
- # Keep water equipment in good working condition.
  - # Repair water leaks promptly.
  - # Discourage washing of equipment on the construction site.
  - # Avoid using water to clean construction areas. Sweep paved areas where practical.
  - # Direct construction water runoff to areas where it can soak into the ground.
  - # Apply water for dust control in accordance with CD26A(2).

**Maintenance and Inspection**      # Inspect water equipment at least weekly.



BMP Objectives	
F	Soil Stabilization
F	Sediment Control
F	Tracking Control
F	Wind Erosion Control
M	Non-Storm Water

<b>Definition and Purpose</b>	Procedures and practices which reduce the discharge of pollutants to the storm drain system or to watercourses from dewatering operations by using sediment controls and by testing the groundwater for pollution.
<b>Appropriate Applications</b>	<p>Where two general classes of pollutants may be encountered from dewatering operations:</p> <ul style="list-style-type: none"> <li># Sediments - A high sediment content in the dewatering discharge is common because of the nature of the operation.</li> <li># Toxic and petroleum products - These pollutants are not commonly found in dewatering discharges unless the site has been used for light or heavy industrial activities, or the area has a history of groundwater contamination.</li> </ul>
<b>Limitations</b>	<ul style="list-style-type: none"> <li># Site conditions will dictate design and use.</li> <li># 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 Standard Specifications Section 5-1.116 - Differing Site Conditions.</li> </ul>

- # 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.

## Standards and Specifications

Use the following sediment controls to remove sediments from water generated by the dewatering discharge:

- # Sediment Traps, see CD41(2)

- # Sediment Basin, see CD42(2)

- # Portable Sediment Tank:

- Construct with steel drums, sturdy wood or other material suitable for handling the pressure exerted by the water and sediment.
- Use the following formula to determine the minimum storage volume of the tank:

Pump discharge (l/s) x 7.3 = m<sup>3</sup> of storage required.

Note: 1 l/s = 0.001 m<sup>3</sup>/s = 15.85 gpm.

- Design tank to allow for emergency flow over top of tank.
- Sediment tank minimum depth is 600 mm (24 in).
- Locate tank to minimize interference with construction activities.
- Position tank for easy cleanout and disposal of trapped sediment.
- Once the water level nears top of tank, shut off pump while the tank drains and additional capacity is made available.
- Clean-out of the tank is required once one-third of the original capacity is depleted due to sediment accumulation. Clearly mark tank to show the clean-out point.

- # Filter Box:

- The box selected should be made of steel, sturdy wood or other materials suitable to handle the pressure requirements imposed by the water and sediment. 208 l (55 gal) drums welded top to

bottom are normally readily available and, in many cases, will suffice.

- Use the following formula to determine the minimum storage volume of the filter box:

Pump discharge (l/s) x 7.3 = m<sup>3</sup> of storage required.

Note: 1 l/s = 0.001 m<sup>3</sup>/s = 15.85 gpm.

- Design box to allow for emergency flow over top of box.
- Make bottom of the box porous by drilling holes or by other methods.
- Place Class 3 Caltrans aggregate base or similar material acceptable to the Engineer over holes to a minimum depth of 300 mm (12 in) (metal "hardware" cloth may need to be placed between aggregate and the holes if holes are drilled larger than the majority of the stone).
- Direct effluent over a well vegetated strip of at least 15 m (50 ft) after leaving base of filter box.
- Once the water level nears top of box, shut off pump while the box drains and additional capacity is made available.
- If the stone filter does becomes clogged with sediment, the stones must be cleared from the inlet, cleaned and replaced.
- Clean-out of box is required once one-third of the original capacity is depleted due to sediment accumulation. Clearly mark box to show the clean-out point.

#### # Straw Bale/Silt Fence Pit:

- Use straw bales, silt fence, a stone outlet and a wet storage pit.
- Use the following formula to determine the minimum storage volume of the pit:

Pump discharge (l/s) x 7.3 = m<sup>3</sup> of storage required.

Note: 1 l/s = 0.001 m<sup>3</sup>/s = 15.85 gpm.

- The excavated area should be a minimum of 1 m (3 ft) below the base of the straw bales and silt fence.

# CD7(2) Dewatering

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- Installation guidelines can be found under CD36(2) - Silt Fences and CD37(2) - Straw Bale Barrier.
- Once the water level nears crest of stone weir (emergency overflow), shut off pump while the structure drains down to the top of the wet storage pit.
- The wet storage pit may be dewatered only after a minimum of 6 hours of sediment settling time. Pump effluent across a well vegetated area or through a silt fence prior to discharge.
- Once the wet storage area becomes filled to one-half of the excavated depth, accumulated sediment shall be removed and properly disposed.

## # Sump Pit and Perforated Standpipe Wrapped in Filter Fabric:

- Use filter fabric as required for silt fence fabric, described in CD36(2) - Silt Fences, or similar material approved by the Engineer.
- Design pit and size of standpipe according to dewatering discharge requirement.
- Perforated pipe shall conform to requirements in Standard Specifications Section 68 - Subsurface Drain or similar material approved by the Engineer.
- The standpipe wrapped in filter fabric shall be surrounded by stones which filter the water as it collects in the pit before being pumped out.

## Maintenance and Inspection

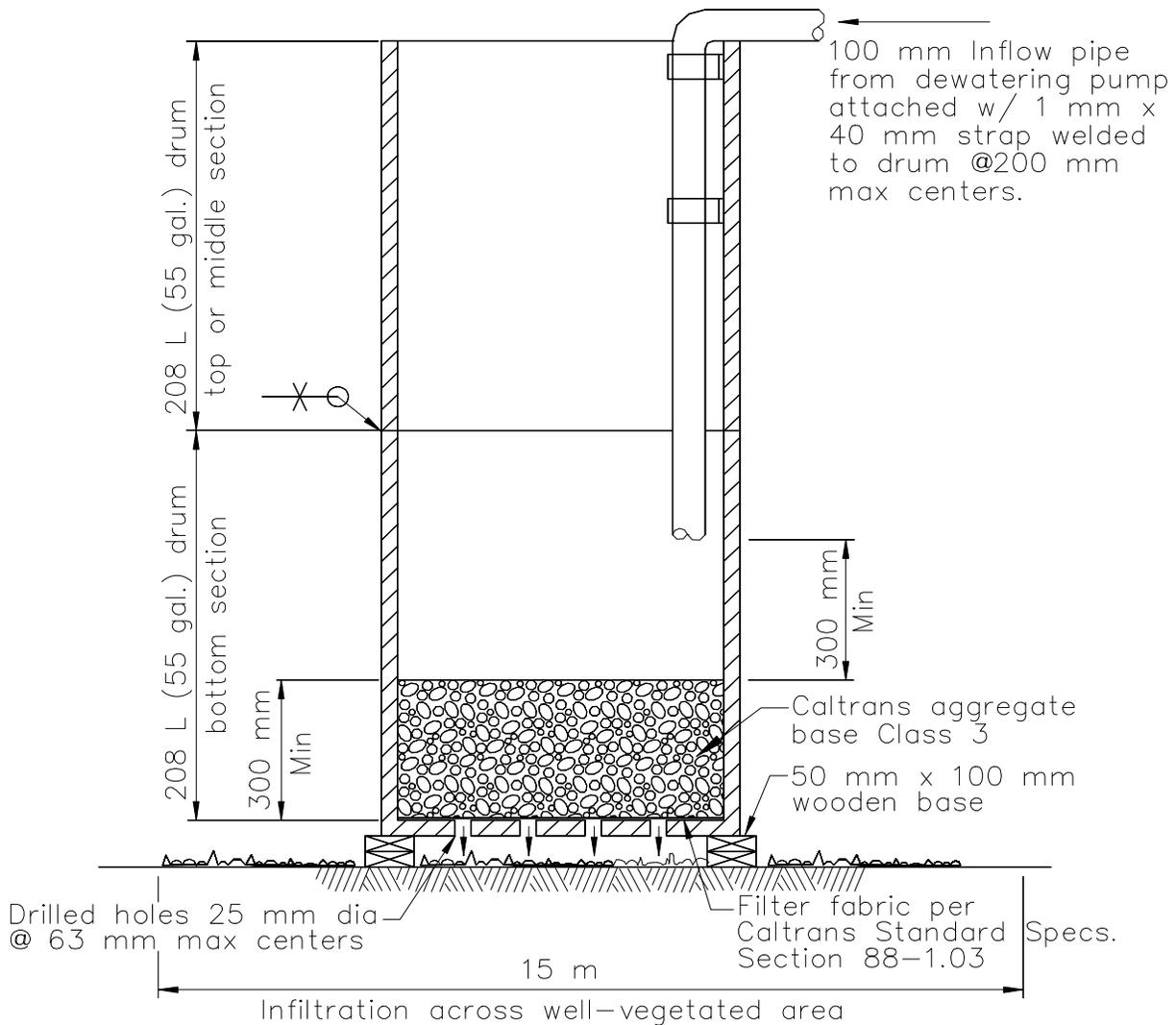
- # Inspect filtering device frequently and repair or replace once the sediment build-up prevents the structure from functioning as designed.
- # Accumulated sediment removed from a dewatering device must be spread on site and stabilized or disposed of at a disposal site as approved by the Engineer.



# CD7(2) Dewatering

## NOTES:

1. Weld shall be designed for the capacity of the tank.
2. For bottom drum, remove top cover only. Remove top & bottom covers for top & middle drums.

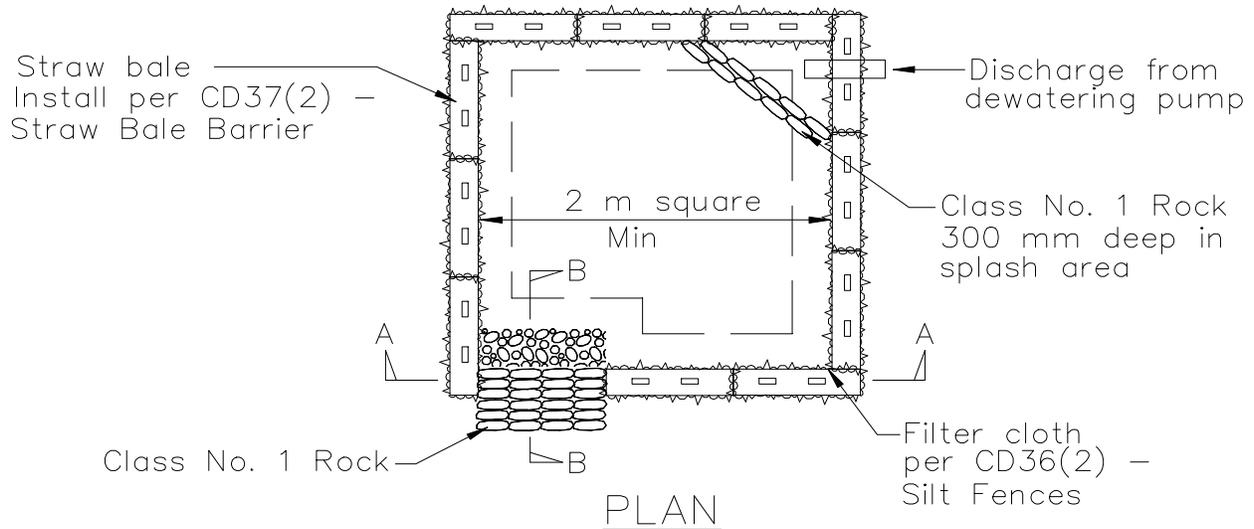
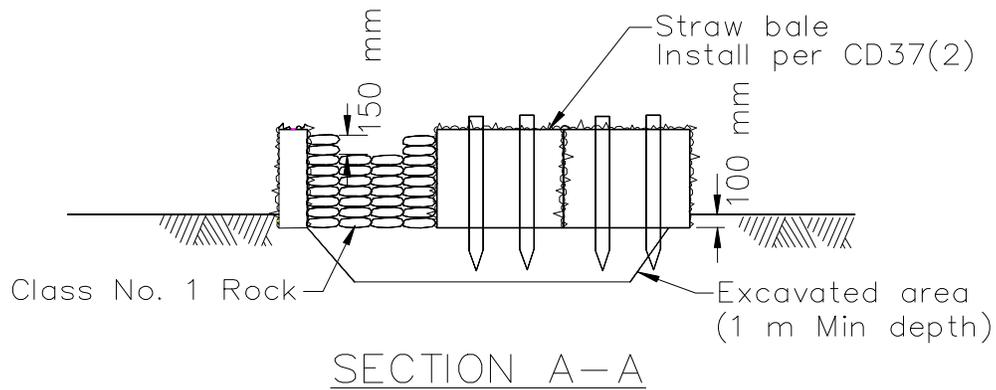
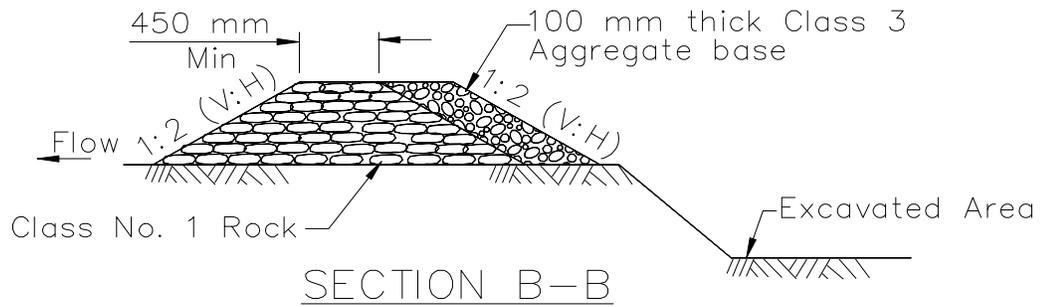


TYPICAL FILTER BOX  
NOT TO SCALE

Sheet 1



# CD7(2) Dewatering

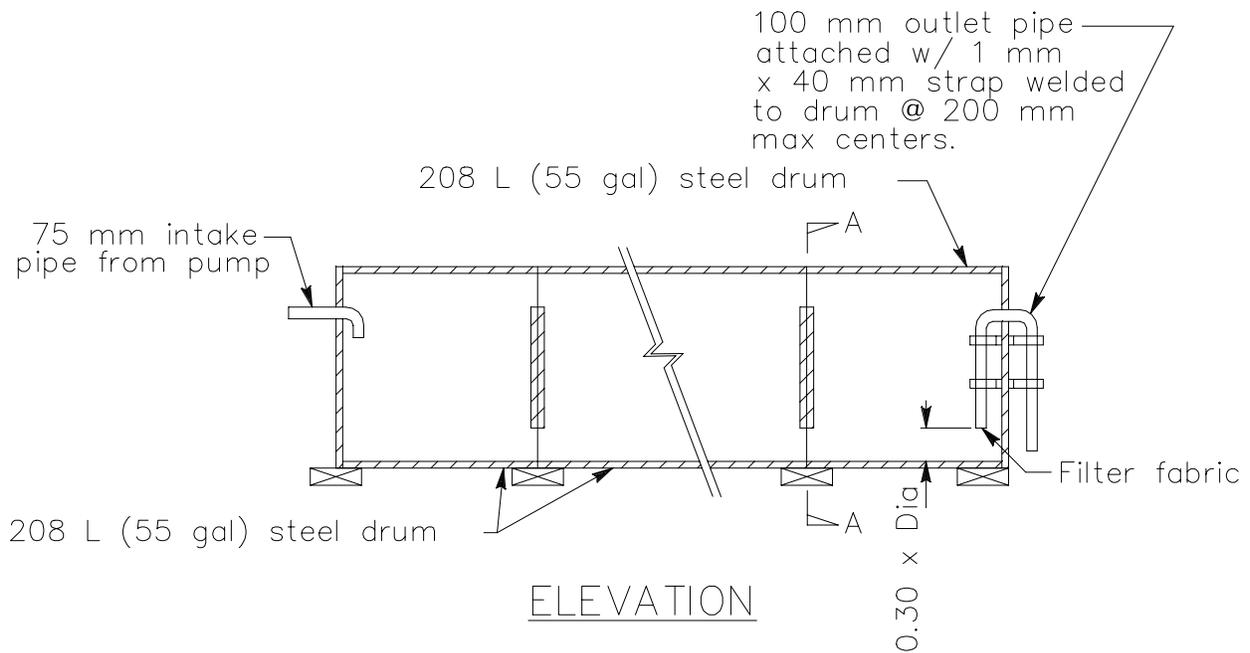
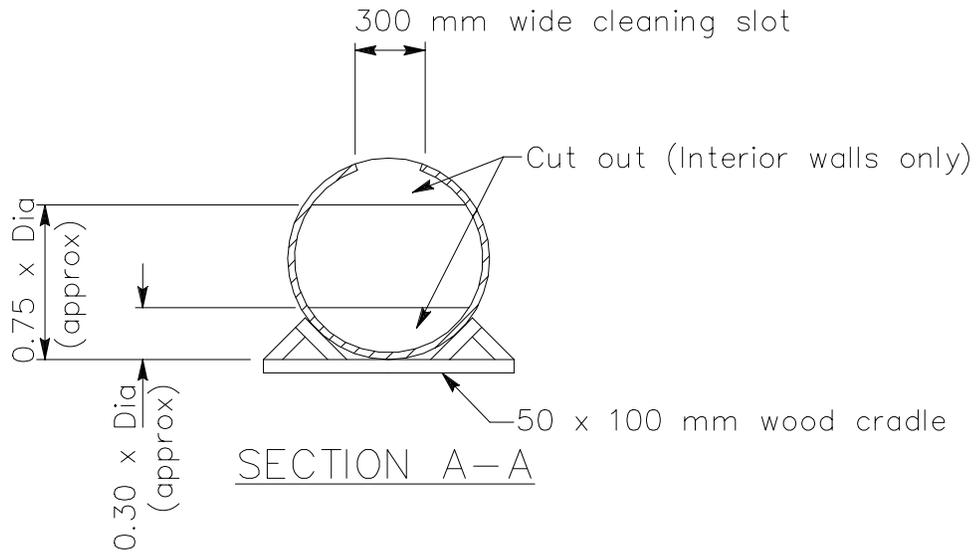


TYPICAL STRAW BALE PIT  
NOT TO SCALE

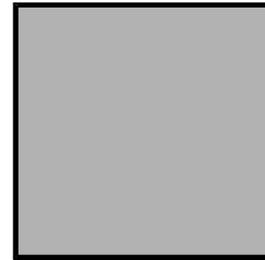
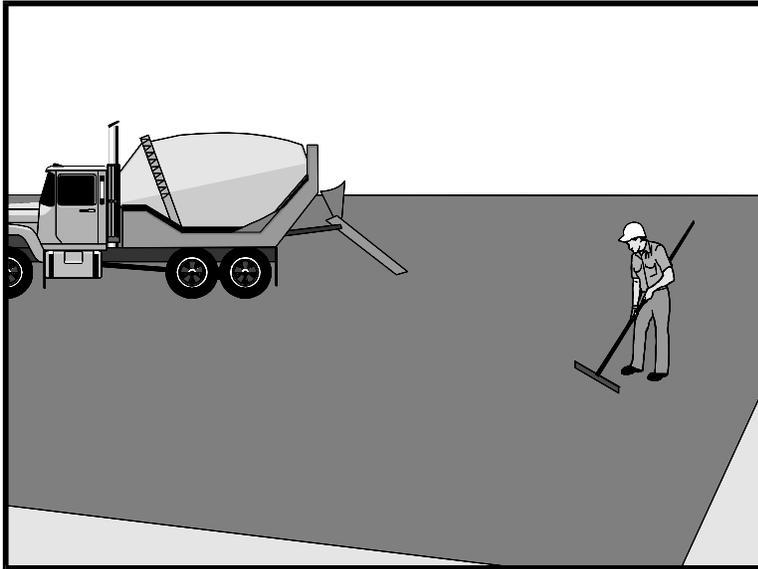
Sheet 2



# CD7(2) Dewatering



TYPICAL PORTABLE SEDIMENT TANK  
NOT TO SCALE



<b>BMP Objectives</b>
F Soil Stabilization
F Sediment Control
F Tracking Control
F Wind Erosion Control

	<b>Definition and</b>
<b>Purpose</b>	Procedures and practices which reduce the discharge of pollutants to the storm drain system or to watercourses as a result of paving operations by properly disposing of wastes and by implementing measures to control runoff and prevent runoff from areas being paved.
<b>Appropriate Applications</b>	<ul style="list-style-type: none"> <li># Paving</li> <li># Surfacing and resurfacing</li> <li># Sawcutting</li> <li># Asphalt removing</li> </ul>
<b>Limitations</b>	<ul style="list-style-type: none"> <li># Finer solids are not effectively removed by filtration systems.</li> <li># Paving opportunities may be limited during wet weather.</li> </ul>
<b>Standards and Specifications</b>	<ul style="list-style-type: none"> <li># Place drip pans or absorbent materials under paving equipment while not in use, to catch and/or contain drips and leaks.</li> <li># Apply CD40(2) - Storm Drain Inlet Protection when needed to prevent discharge of sediment, sand, aggregate, or similar material to the storm drain system.</li> <li># When on-site mixing takes place, follow General Industrial Activities General Storm Water Permit requirements.</li> </ul>

# CD8(2) Paving Operations

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- # When paving involves asphaltic concrete, the following steps shall be implemented:
  - 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.
  - Asphalt concrete grindings, pieces, or chunks used in embankments or shoulder backing must not be allowed to enter any storm drains or watercourses. Apply temporary perimeter controls until structure is stabilized or permanent controls are in place. Examples of temporary perimeter controls include CD32B(2) - Top and Toe of Slope Diversion Ditches/Berms, CD36(2) - Silt Fences, or CD43(2) - Fiber Rolls.
  - Collect and remove all broken asphalt and recycle when practical; otherwise, dispose in accordance with Standard Specification 7-1.13.
  - Any asphalt concrete chunks and pieces used in embankments must be placed above the water table and covered by at least 0.3 m (1 ft) of material.
  - Use only non-toxic substances to coat asphalt transport trucks and asphalt spreading equipment.
- # Cover drainage inlet structures and manholes with filter fabric during application of seal coat, tack coat, slurry seal, and fog seal.
- # Do not apply seal coat, tack coat, slurry seal, or fog seal if rain showers or thunder storms are expected during the application and curing period.
- # Clean asphalt coated equipment off-site whenever possible. When cleaning off dry, hardened asphalt from equipment, manage hardened asphalt debris as described in CD13(2) - Solid Waste Management.
- # Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect and return to aggregate base stockpile, or dispose of properly.
- # Allow aggregate rinse to settle. Then, either allow rinse water to



# CD8(2) Paving Operations

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dry in a temporary pit, as described in CD16(2) - Concrete Waste Management, or pump the water to the sanitary sewer if allowed by the local wastewater authority.

# Do not allow saw-cut slurry to enter storm drains or watercourses. See also CD16(2) - Concrete Waste Management.

## Maintenance and Inspection

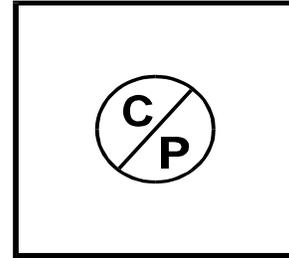
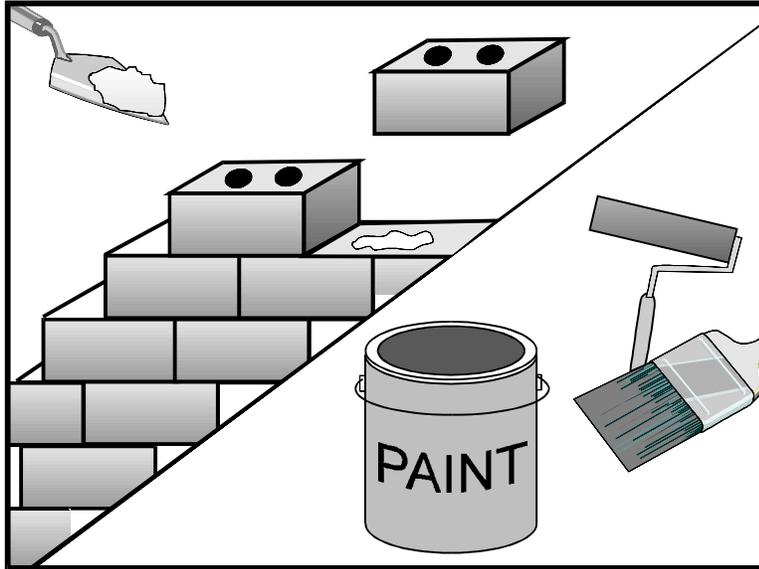
# Inspect and maintain machinery regularly to minimize leaks and drips.

# Ensure that employees and subcontractors are implementing appropriate measures during paving operations.



# CD9(2)

## Structure Construction and Painting



<b>BMP Objectives</b>
<input type="checkbox"/> Soil Stabilization
<input type="checkbox"/> Sediment Control
<input type="checkbox"/> Tracking Control
<input type="checkbox"/> Wind Erosion Control

**Definition and Purpose**

Procedures and practices which reduce the discharge of paints and related products to the storm drain system or to watercourses by reducing the opportunities for these materials to come into contact with storm water.

**Appropriate Applications**

# Structure construction and painting activities, during active construction/painting periods only.

**Limitations**

- # Safer alternative building and construction products may not be available or suitable in every instance.
- # Hazardous wastes that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.

**Standards and Specifications**

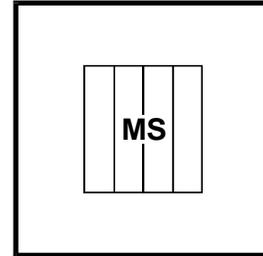
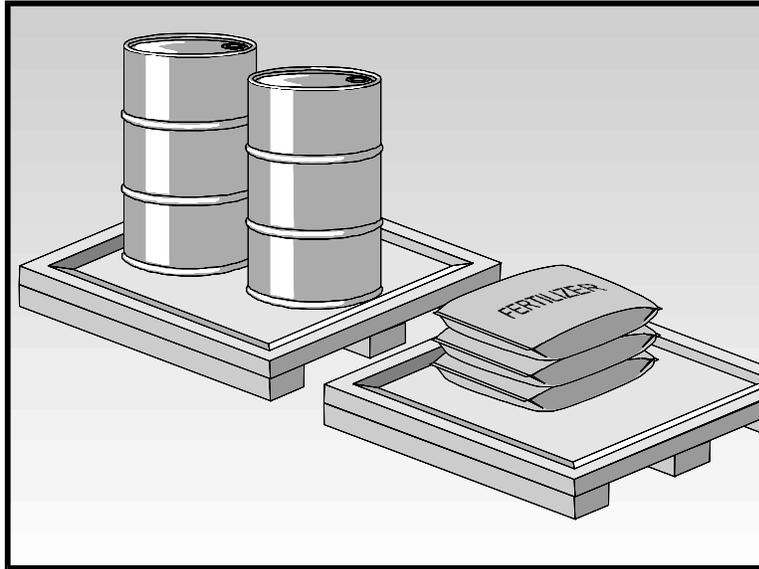
- # Remove debris in a timely fashion to keep the work site clean and orderly.
- # Collect and properly dispose of roofing debris prior to rainfall and upon completion of work to prevent entry of debris and materials into gutter downspouts.
- # Refer to Section 91 Caltrans Standard Specifications for paint.
- # Refer to Section 59 Caltrans Standard Specifications for painting.
- # Inform employees and subcontractors of acceptable practices and include appropriate provisions in subcontracts to make certain proper housekeeping and disposal practices are implemented.

# Structure Construction and Painting

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- # Do not remove the original product label, it contains important safety and disposal information.
  - # Mix paint indoors, or in a containment area.
  - # Use all the product before disposing of the container.
  - # For water-based paints, paint out 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, paint out brushes to the extent practical, and filter and reuse thinners and solvents.
  - # Never clean paint brushes or rinse paint containers into a street, gutter, storm drain or watercourse.
  - # Dispose of any paint, thinners, residue, and sludges that cannot be recycled as hazardous waste.
  - # 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.
  - # Use recycled and less hazardous products when practical.
  - # Recycle residual paints, solvents, lumber, and other materials.
- Maintenance and Inspection
- # Spot check employees and subcontractors at least monthly throughout the job to ensure appropriate practices are being employed.

# CD10(2) Material Delivery and Storage



## BMP Objectives

- F Soil Stabilization
- F Sediment Control
- F Tracking Control
- F Wind Erosion Control
- M Non-Storm Water

### Definition and Purpose

Procedures and practices that reduce the discharge of pollutants to the storm drain system or to watercourses as a result of material delivery and storage by preventing spills during delivery and by minimizing the contact of materials with runoff.

### Appropriate Applications

Construction sites with delivery and storage of the following materials:

- # Soil
- # Pesticides and herbicides
- # Fertilizers
- # Detergents
- # Plaster or other products
- # Petroleum products such as fuel, oil, and grease
- # Asphalt and concrete components
- # 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

# CD10(2) Material Delivery and Storage

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- Limitations
- # Space limitation may preclude indoor storage.
  - # Storage sheds must meet building & fire code requirements.
- Standards and Specifications
- General*
- # Train employees and subcontractors on the proper material delivery and storage practices.
- Material Storage Areas and Practices*
- # Designate storage areas at the project site.
  - # Locate the storage area away from the storm drain system and watercourses.
  - # Prevent spills or leakage of liquid materials from contaminating soil or soaking into the ground by placing storage areas on impervious surfaces.
  - # Provide curbs or dikes around the perimeter of material storage areas to prevent runoff from adjacent areas as well as runoff of storm water from the material storage areas.
  - # Minimize the material inventory stored on site (e.g., only a few days supply).
  - # Stockpile soil in a central location and protect the stockpile from runoff. Apply suitable controls to remove sediment from runoff from the stockpile. See CD36(2) - Silt Fences, CD37(2) - Straw Bale Barriers, and CD38(2) - Sand Bag Barrier. If the stockpile will be inactive for an extended period, plant temporary vegetation in accordance with CD24B(2) - Temporary Seeding and Planting, or install long-term perimeter controls. Smaller stockpiles may be protected with tarps.
  - # Store materials indoors within existing structures or sheds when available.
  - # Have proper storage instructions posted at all times in an open and conspicuous location.
  - # Minimize hazardous material storage on site.
  - # Do not store hazardous chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and when possible, under cover in secondary containment.

# CD10(2) Material Delivery and Storage

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- # Keep hazardous chemicals in their original containers and keep them well labeled.
- # Keep ample supply of appropriate spill clean up material near storage areas.

## *Material Delivery Practices*

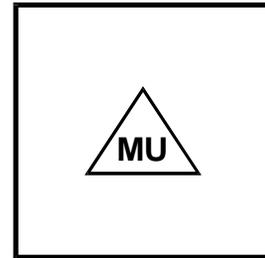
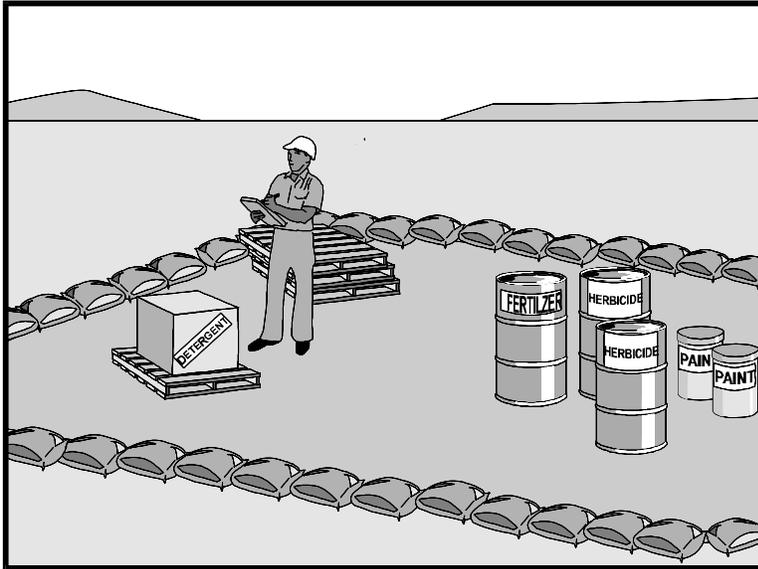
- # Keep an accurate, up-to-date inventory of material delivered and stored on site.
- # Employees trained in emergency spill clean-up procedures should be present when dangerous materials or liquid chemicals are unloaded.

## *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 materials or contaminated soil.

## Maintenance and Inspection

- # Inspect storage areas before and after rainfall events, and at least weekly during other times.
- # Inspect to ensure that designated storage areas are kept clean and well organized.
- # Repair and/or replace perimeter controls, containment structures, and covers as needed to keep them properly functioning.



### BMP Objectives

- F Soil Stabilization
- F Sediment Control
- F Tracking Control
- F Wind Erosion Control
- M Non-Storm Water

### Definition and Purpose

Procedures and practices that reduce the discharge of pollutants to the storm drain system or to watercourses as a result of material use by properly storing and utilizing materials.

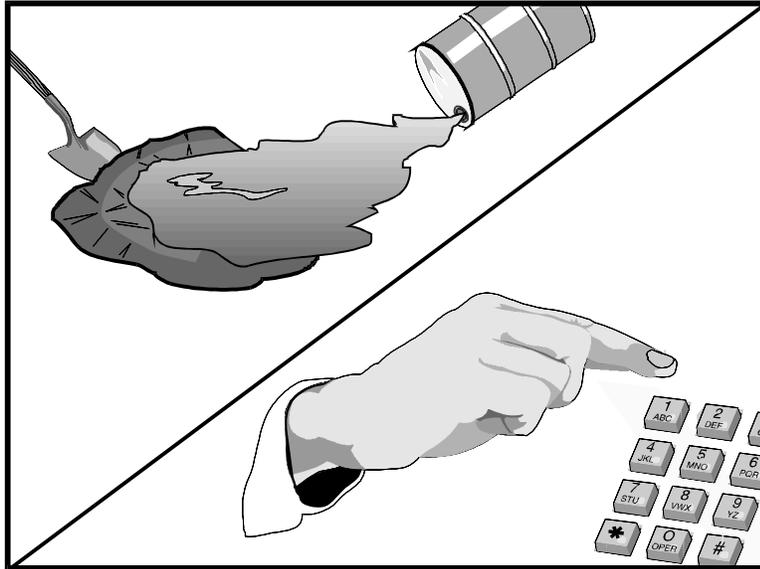
### Appropriate Applications

Construction sites where the following materials are used or prepared on site:

- # Pesticides and herbicides
- # Fertilizers
- # Detergents
- # Plaster or other products
- # Petroleum products such as fuel, oil, and grease
- # Asphalt and other concrete components
- # 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	# Safer alternative building and construction products may not be available or suitable in every instance.
Standards and Specifications	# Use materials only where and when needed to complete the construction activity.
	# Follow manufacturer's instructions regarding the preparation, use, and disposal of materials.
	# Use safer alternative materials as much as possible.
	# Reduce or eliminate use of hazardous materials on site when practical.
	# Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow strictly the recommended usage instructions. Over-application is expensive and environmentally harmful. Apply surface dressings in smaller applications, as opposed to one large application, to allow time for it to work in and to avoid excess materials being carried off-site by runoff. Do not apply these chemicals just before it rains.
	# Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.
# Keep an ample supply of spill clean up material near material use areas. Train employees in spill clean up procedures.	
Maintenance and Inspection	# Spot check employees and subcontractors monthly throughout the job to ensure appropriate practices are being employed.

# CD12(2) Spill Prevention and Control



## BMP Objectives

- F Soil Stabilization
- F Sediment Control
- F Tracking Control
- F Wind Erosion Control
- M Non-Storm Water

### Definition and Purpose

Procedures and practices that reduce the discharge of pollutants to the storm drain system or to watercourses as a result of spills by preventing, containing, and cleaning up spilled material.

### Appropriate Applications

Spill prevention and control is applicable anytime chemicals and/or hazardous substances are stored or utilized. Sites located near natural watercourses, canals, and reservoirs are at highest risk of an uncontained spill contaminating surface waters.

Spill prevention and control applies to chemicals and hazardous substances including, but not limited to:

- # Soil stabilizers
- # Palliatives
- # Herbicides
- # Growth inhibitors
- # Fertilizers
- # Deicing/anti-icing chemicals
- # Fuels
- # Lubricants

# CD12(2) Spill Prevention and Control

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- # Other petroleum distillates
- Limitations # This BMP only applies to spills caused by the contractor.
- # Use only a reputable, licensed spill clean up company to clean up large spills.
- # Procedures and practices presented in this BMP are general. Contractor shall identify appropriate practices for the specific materials used or stored on site.
- Standards and Specifications *Education*
- # Educate employees and subcontractors on what a “significant spill” is for each material they use, and what is the appropriate response for “significant” and “insignificant” spills.
- # Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- # Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- # Establish a continuing education program to indoctrinate new employees.
- # Designate a foreman or supervisor to oversee and enforce proper spill prevention and control measures.
- Clean up and Storage Procedures*
- # Minor Spills
- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
  - Use absorbent materials on small spills rather than hosing down or burying the spill.
  - Remove the absorbent materials promptly and dispose of properly.
  - The practice commonly followed for a minor spill is:
    1. Contain the spread of the spill.

# CD12(2)

## Spill Prevention and Control

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2. Recover spilled materials.
3. Clean the contaminated area and/or properly dispose of contaminated materials.

### # Semi-Significant Spills

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.
- Clean up spills immediately:
  1. Notify the project foreman immediately. The foreman shall notify the Engineer.
  2. Contain spread of the spill.
  3. If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
  4. If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
  5. If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

### # Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps shall be taken:
  1. Notify the Engineer immediately and follow up with a written report.
  2. Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.



# CD12(2)

## Spill Prevention and Control

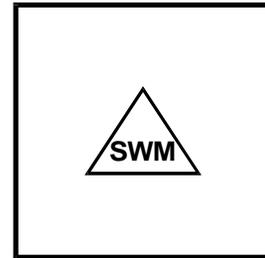
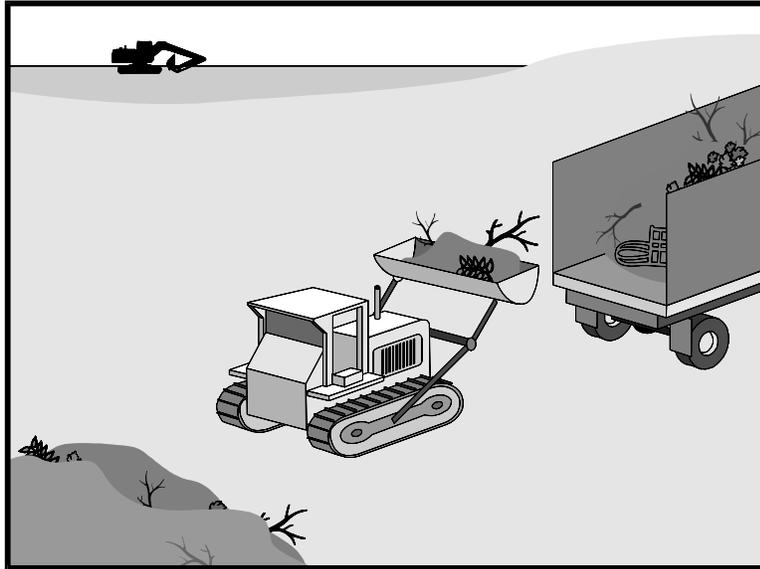
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3. Notify the Governor's Office of Emergency Services Warning Center, (805) 852-7550.
4. For spills of federal reportable quantities, the contractor shall notify the National Response Center at (800) 424-8802.
5. Notification should first be made by telephone and followed up with a written report.
6. The services of a spills contractor or a Haz-Mat team shall be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staff has arrived at the job site.
7. Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

### Maintenance and Inspection

- # Verify weekly that spill control clean up materials are located near material storage, unloading, and use areas.
- # Update spill prevention and control plans and stock appropriate clean-up materials whenever changes occur in the types of chemicals on site.





- BMP Objectives**
- F Soil Stabilization
  - F Sediment Control
  - F Tracking Control
  - F Wind Erosion Control
  - M Non-Storm Water

**Definition and Purpose** Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of the creation, stockpiling, and removal of litter and other construction wastes.

**Appropriate Applications** Solid waste management is applicable to construction projects that generate any of the following byproducts, residuals, or wastes:

- # Concrete, brick, and mortar
- # Steel and metal scraps (rebar, nails, guardrail, rust residue)
- # Tree and shrub wastes from clearing and grubbing
- # Pipe and electrical cuttings
- # Pavement planing or grinding and removal
- # Wood framing or falsework
- # Domestic wastes including food containers, beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- # Other waste products not specifically identified

**Limitations** # Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-winter season or in desert areas with low rainfall.

Standards and  
Specifications

*Education*

- # Designate a foreman or supervisor to oversee and enforce proper solid waste procedures and practices.
- # Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- # Educate employees and subcontractors on solid waste storage and disposal procedures.
- # Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- # Require that employees and subcontractors follow solid waste handling and storage procedures.
- # Prohibit littering by employees, subcontractors, and visitors.
- # Wherever possible, minimize production of solid waste materials.

*Collection*

- # Collect site trash regularly, daily during rainy and windy conditions.
- # Arrange for regular (not less than weekly) container service by local trash hauler. If local trash haulers are not utilized, contractor shall provide for regular (not less than weekly) removal of trash in containers.

*Storage*

- # Notify trash hauling contractors that only watertight dumpsters are acceptable for use on site.
- # Plan for additional containers during the demolition phase of construction.
- # Designate on-site waste storage areas and obtain approval of the Engineer.
- # Designate waste storage areas that are away from storm drain inlets, drainage facilities, or watercourses.

# CD13(2)

## Solid Waste Management

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- # Provide containers in areas where employees congregate for breaks and lunch.
- # Use containment berms for waste storage areas when needed to prevent runoff.
- # Segregate potentially hazardous waste from nonhazardous construction site waste.
- # Keep solid waste materials shielded by either a covered dumpster or other enclosed trash container that limits contact with rain, runoff, and scattering due to blowing winds.
- # Divert runoff which comes into contact with unprotected waste into appropriate control measures in order to remove waste and debris.
- # Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- # Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor, to be conducted at said haulers approved place of business.

### *Disposal*

- # Plan for more frequent pickup during the demolition phase of construction.
- # Dispose of nonhazardous waste in accordance with Standard Specification 7-1.13, Disposal of Material Outside the Highway Right-of-Way.
- # For disposal of hazardous waste, see BMP CD14(2)-Hazardous Waste Management. Haul hazardous waste to an appropriate disposal and/or recycling facility.
- # Salvage or recycle useful vegetation debris, packaging and/or surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.
- # Litter stored in collection areas and containers shall be handled and disposed of by trash hauling contractors.

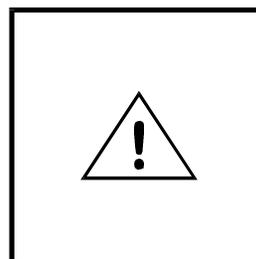
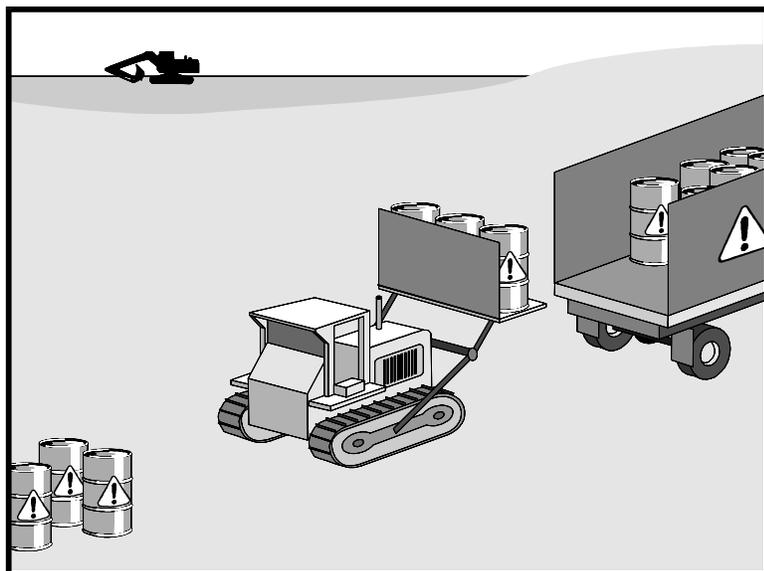
# CD13(2) Solid Waste Management

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- Maintenance and Inspection
- # Foreman and/or construction supervisor shall monitor on-site solid waste storage and disposal procedures.
  - # Police site for litter and debris.



# CD14(2) Hazardous Waste Management



## BMP Objectives

- F Soil Stabilization
- F Sediment Control
- F Tracking Control
- F Wind Erosion Control
- M Non-Storm Water

### Definition and Purpose

Procedures and practices to reduce the discharge of pollutants from construction site hazardous waste to the storm drain system or to watercourses by educating staff and proper storage and disposal of wastes.

### Appropriate Applications

Hazardous waste management is applicable to construction projects that generate any of the following hazardous wastes:

- # Petroleum products such as oils, fuels, and grease
- # Asphalt products
- # Concrete curing compounds
- # Herbicides and pesticides
- # Chemical additives used for soil stabilization (e.g., palliative such as calcium chloride)
- # Acids for cleaning masonry
- # Septic wastes
- # Paints and solvents
- # Wood preservatives
- # Stains

# CD14(2) Hazardous Waste Management

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# Roofing tar

# Any material considered by the State of California to be a hazardous waste

In addition, sites with existing structures may contain wastes which must be disposed of in accordance with federal, state, and local regulations. These wastes include:

# Sandblasting grit mixed with lead-, cadmium-, or chromium-based paints

# Asbestos

# PCBs (particularly in older transformers)

## Limitations

# This practice is not intended to address site-assessments and pre-existing contamination.

# Major contamination, large spills, and other serious hazardous waste incidents require immediate response from specialists.

# Demolition activities and potential pre-existing materials, such as asbestos, are not addressed by this program.

## Standards and Specifications

### *Education*

# Educate employees and subcontractors on hazardous waste storage and disposal procedures.

# Educate employees and subcontractors of potential dangers to humans and the environment from hazardous wastes.

# Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.

# Instruct employees and subcontractors in identification of hazardous and solid waste.

# Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

# Designate a foreman or supervisor to oversee and enforce proper solid waste management procedures and practices.

# Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.



# CD14(2) Hazardous Waste Management

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## *Storage Procedures*

- # Ensure that adequate hazardous waste storage volume is available.
- # Ensure that hazardous waste collection containers are conveniently located.
- # Designate hazardous waste storage areas on site, away from storm drains or watercourses.
- # Minimize production or generation of hazardous materials and hazardous waste on the jobsite.
- # Use containment berms in fueling and maintenance areas and where the potential for spills is high.
- # Segregate potentially hazardous waste from nonhazardous construction site debris.
- # Store hazardous materials and wastes in covered containers and protected from vandalism.
- # Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.
- # Clearly mark on all hazardous waste containers which materials are acceptable for the container.
- # Place hazardous waste containers in secondary containment.
- # Do not allow potentially hazardous waste materials to accumulate on the ground.
- # Do not mix wastes, as this can cause chemical reactions, make recycling impossible, and complicate disposal.

## *Disposal Procedures*

- # Regularly schedule hazardous waste removal to minimize on-site storage.
- # Arrange for regular waste collection before containers overflow.
- # Use only reputable, licensed hazardous waste haulers.



# CD14(2) Hazardous Waste Management

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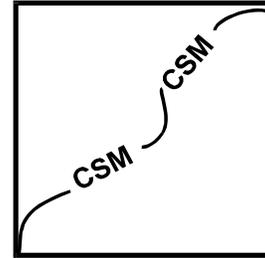
- # Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- # Recycle any useful material such as used oil or water-based paint when practical.
- Maintenance and Inspection # Foreman and/or construction supervisor shall monitor on-site hazardous waste storage and disposal procedures.



# CD15(2)

## Contaminated Soil Management

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- BMP Objectives**
- F Soil Stabilization
  - F Sediment Control
  - F Tracking Control
  - F Wind Erosion Control
  - M Non-Storm Water

<b>Definition and Purpose</b>	Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity in or near contaminated soils by identifying and protecting contaminated areas, and conducting appropriate cleanup activities.
<b>Appropriate Applications</b>	<p># Applicable to many construction projects, especially those in highly urbanized or industrial areas, where soil contamination may have occurred due to spills, illicit discharges, and underground storage tanks.</p> <p># Applicable to highway widening projects in older areas where median and shoulder soils may have been contaminated by aerially deposited lead.</p>
<b>Limitations</b>	# 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.
<b>Standards and Specifications</b>	<p><i>Identifying Contaminated Areas</i></p> <p># Contaminated soils are often identified in the project materials report with known locations identified in the plans and specifications. The contractor shall review applicable reports and investigate appropriate callouts in the plans and specifications.</p>

# CD15(2) Contaminated Soil Management

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- # The contractor may further identify contaminated soils by investigating:
  - Past site uses and activities.
  - Detected or undetected spills and leaks.
  - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements.
- # Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.

## *Education*

- # Prior to performing any excavation work at the locations containing material classified as hazardous, employees and subcontractors shall complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified.
- # Educate employees and subcontractors on contaminated soil handling and disposal procedures.
- # Instruct employees and subcontractors in identification of contaminated soil.
- # Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

## *Handling Procedures for Material with Aerially Deposited Lead*

- # Materials from areas designated as containing aerially deposited lead 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.

# CD15(2) Contaminated Soil Management

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## *Handling Procedures for Contaminated Soils or Hazardous Materials*

- # Test suspected soils at a Caltrans approved, certified laboratory.
- # If the soil is contaminated, work with the local regulatory agencies to develop options for treatment and/or disposal.
- # Avoid temporary stockpiling of contaminated soils or hazardous material.
- # If temporary stockpiling is necessary:
  1. Cover the stockpile with plastic sheeting or tarps.
  2. Install a berm around the stockpile to prevent runoff from leaving the area.
  3. Do not stockpile in or near storm drains or watercourses.
  4. Implement stockpile controls as presented in CD10(2) - Material Delivery and Storage.
- # 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 dispose of at an 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.



# CD15(2) Contaminated Soil Management

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- # 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 shall supersede the procedures outlined in this BMP):
  - United States Department of Transportation (USDOT);
  - United States Environmental Protection Agency (USEPA);
  - California Environmental Protection Agency (CAL-EPA);
  - California Division of Occupation Safety and Health Administration (CAL-OSHA); 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 material.
- # Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).
- # The underground storage tank, any liquid and/or sludge found within the tank, and all contaminated material and hazardous material removed during the tank removal shall be transported to disposal facilities permitted to accept such material.

## *Water Control*

- # Take all necessary precautions and preventive measures to prevent the flow of water, including ground water, from entering hazardous material 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.



# CD15(2) Contaminated Soil Management

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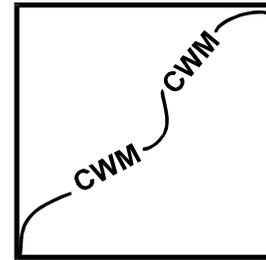
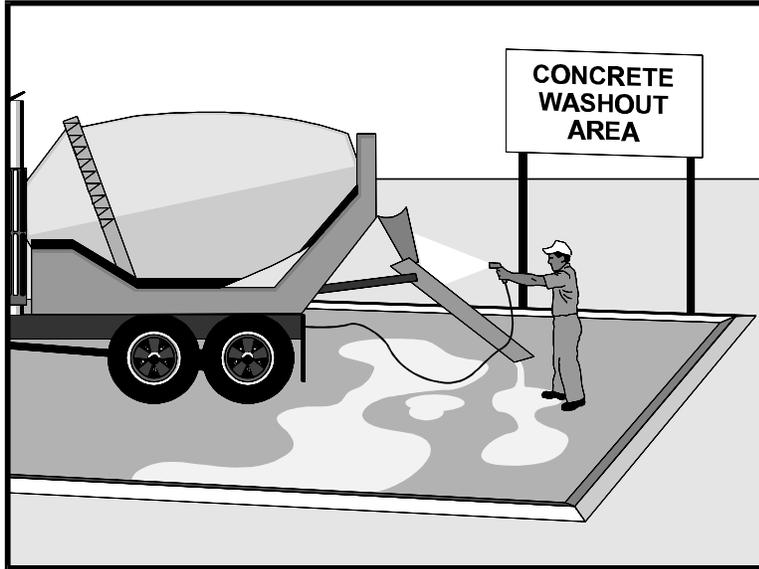
- # If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, shall be discharged to clean, closed top, watertight, transportable holding tanks, and disposed of in accordance with federal, state, and local laws.
- Maintenance and Inspection
- # Inspect excavated areas daily for signs of contaminated soil.
  - # Monitor air quality continuously during excavation operations at all locations containing hazardous material.
  - # Coordinate contaminated soils and hazardous material management with the appropriate federal, state, and local agencies.
  - # Inspect hazardous waste receptacles and areas regularly.



# CD16(2)

## Concrete Waste Management

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### BMP Objectives

- F Soil Stabilization
- F Sediment Control
- F Tracking Control
- F Wind Erosion Control
- M Non-Storm Water

### Definition and Purpose

Procedures and practices to prevent discharge of portland cement concrete slurries, asphalt concrete slurries, or wet portland cement concrete waste materials to the storm drain system or to watercourses by implementing appropriate washout procedures, slurry containment, housekeeping and disposal practices.

### Appropriate Applications

- # Where slurries containing portland cement concrete (PCC) or asphalt concrete (AC) are generated, such as from sawcutting, coring, grinding, and grooving.
- # Where concrete trucks and other concrete coated equipment are washed on site.

### Limitations

None identified.

### Standards and Specifications

#### *Education*

- # Educate employees, subcontractors, and suppliers on the concrete waste management techniques described in this CD.
- # Designate a foreman or supervisor to oversee and enforce concrete waste management procedures.

#### *Concrete Slurry Wastes*

- # Do not allow slurry residue from wet coring or saw-cutting AC or PCC to enter storm drains or receiving waters by:

# CD16(2) Concrete Waste Management

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- Placing temporary berms (CD32B(2)) or sandbags (CD38(2)) around coring or saw-cutting locations to capture and contain slurry runoff.
  - Protect inlets in accordance with CD40(2) Storm Drain Inlet Protection during coring or cutting operations.
  - Placing straw bales, sand bags, or gravel dams around inlets to prevent slurry from entering storm drains.
- # Shovel or vacuum slurry residue and dispose in a temporary pit (as described in *On Site Concrete Transit Truck Washout Procedures*, below) and allow slurry to dry. Dispose of dry slurry residue in accordance with CD13(2) - Solid Waste Management; or, for on site disposal, in accordance with Standard Specification 15-3.02-Removal Methods.
- # Collect residue from grooving and grinding operations in accordance with Standard Specifications Section 42-1.02 and 42-2.02-Construction.

## *On Site Concrete Transit Truck Washout Procedures*

- # Designate areas to be used for washout of transit mix trucks and other vehicles used to transport or move concrete.
- # Locate on site washout areas at least 15 m (50 ft) from storm drain inlets, drainage facilities, or watercourses, and away from concrete truck access areas so that construction traffic will not drive through and track wash waters.
- # Washout areas shall have a temporary pit or bermed area of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- # Washout locations may be flagged with lath and surveyors tape or designated and signed as necessary to inform truck drivers to utilize proper areas.
- # Perform washout of concrete trucks in designated areas only.



# CD16(2) Concrete Waste Management

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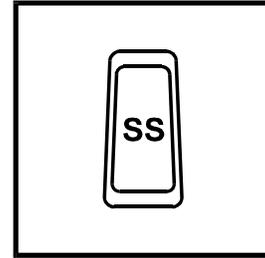
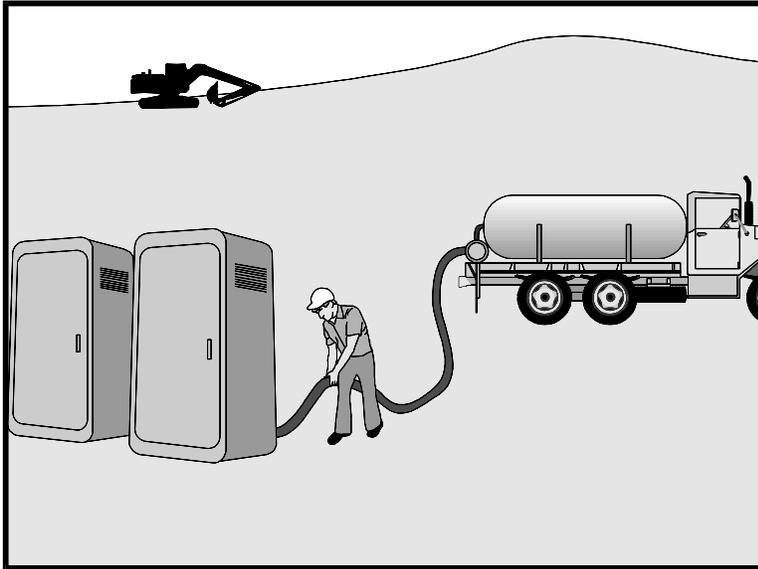
- # Once concrete wastes are washed into the designated area and allowed to harden, the concrete can be broken up and disposed of per CD13(2) - Solid Waste Management; or per Standard Specification 15-3.02-Removal Methods, for on site disposal. Dispose of hardened concrete on a regular basis.
- Maintenance and Inspection
- # Foreman and/or construction supervisor shall monitor on site concrete waste storage and disposal procedures at least weekly.
  - # Foreman and/or construction supervisor shall monitor concrete working tasks, such as saw cutting, coring, grinding and grooving at least weekly to ensure proper methods are employed.



# CD17(2)

## Sanitary/Septic Waste Management

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<b>BMP Objectives</b>
<input type="checkbox"/> Soil Stabilization
<input type="checkbox"/> Sediment Control
<input type="checkbox"/> Tracking Control
<input type="checkbox"/> Wind Erosion Control
<input checked="" type="checkbox"/> Non-Storm Water

<b>Definition and Purpose</b>	Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction site sanitary/septic waste management by properly storing and disposing of these wastes.
<b>Appropriate Applications</b>	Applicable to all construction sites that use temporary or portable sanitary/septic waste systems.
<b>Limitations</b>	Not applicable.
<b>Standards and Specifications</b>	<p><i>Education</i></p> <ul style="list-style-type: none"> <li># Educate employees, subcontractors, and suppliers on sanitary/septic waste storage and disposal procedures.</li> <li># Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary/septic wastes.</li> <li># Instruct employees, subcontractors, and suppliers in identification of sanitary/septic waste.</li> <li># Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).</li> <li># Establish a continuing education program to indoctrinate new employees.</li> </ul>

# Sanitary/Septic Waste Management

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## *Storage Procedures*

- # If using an on site disposal system, such as a septic system, comply with local health agency requirements.
- # If discharging to the sanitary sewer, contact the local wastewater agency for their requirements.
- # Locate sanitary facilities in a convenient location, but away from storm drain inlets, drainage facilities, and watercourses.
- # Properly connect temporary sanitary facilities that discharge to the sanitary sewer system to avoid illicit discharges.
- # Anchor portable sanitary facilities, when needed, to prevent them from blowing over or being turned over by vandals.
- # Never discharge or bury untreated raw wastewater on site.

## *Disposal Procedures*

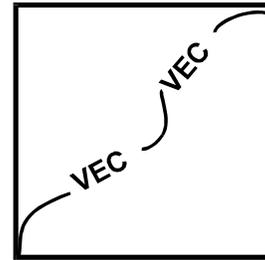
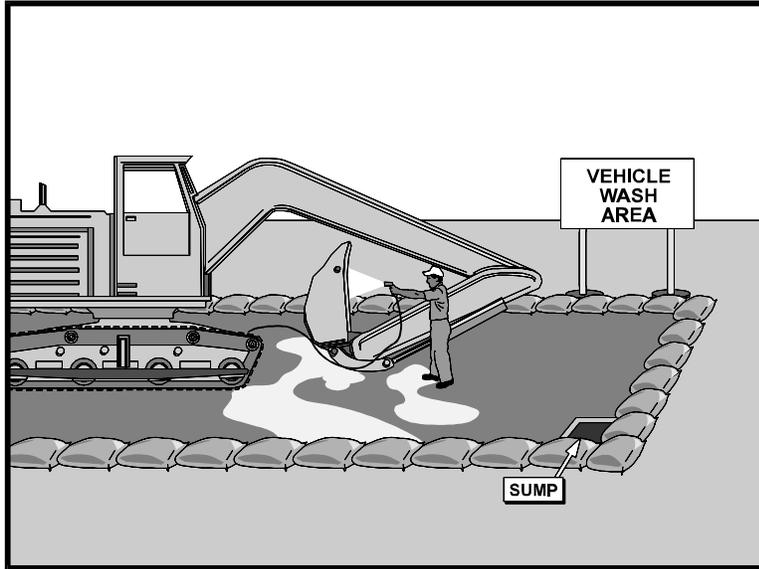
- # Ensure that sanitary/septic facilities are maintained in good working order by a licensed service.
- # Use only reputable, licensed sanitary/septic waste haulers.

## Maintenance and Inspection

- # Foreman and/or construction supervisor shall monitor on site sanitary/septic waste storage and disposal procedures at least weekly.

# CD18(2)

## Vehicle and Equipment Cleaning



<b>BMP Objectives</b>	
<b>F</b>	Soil Stabilization
<b>F</b>	Sediment Control
<b>F</b>	Tracking Control
<b>F</b>	Wind Erosion Control
<b>M</b>	Non-Storm Water

<b>Definition and Purpose</b>	Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of vehicle and equipment cleaning by conducting these activities off site when practical or by conducting these operations in designated and protected areas when conducted on site.
<b>Appropriate Applications</b>	Applicable to all construction sites where vehicles and equipment cleaning is performed.
<b>Limitations</b>	# Some municipalities may require pretreatment and monitoring of wash water discharges to the sanitary sewer.
<b>Standards and Specifications</b>	<p># Clean off site all vehicles/equipment that regularly enter and leave the construction site.</p> <p># When vehicle/equipment washing/cleaning must occur on site, and the operation cannot be located within a structure or building equipped with sanitary sewer facilities, the outside cleaning area shall have the following characteristics:</p> <ul style="list-style-type: none"> <li>- Located away from storm drain inlets, drainage facilities, or watercourses</li> <li>- Paved with concrete or asphalt, or stabilized with an aggregate base</li> <li>- Bermed to contain wash waters and to prevent runoff and runoff</li> </ul>

# Vehicle and Equipment Cleaning

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- Configured wash area with a sump to allow collection and disposal of wash water
- Discharges wash water to a sanitary or process waste sewer (where permitted), or to a dead end sump. Wash waters shall not be discharged to storm drains or watercourses
- Used only when necessary

# When cleaning vehicles/equipment with water:

- Use as little water as possible. High pressure sprayers may use less water than a hose, and should be considered.
- Use positive shutoff valve to minimize water usage.

# Do not use solvents to clean vehicles/equipment on site.

# Do not permit steam cleaning on site.

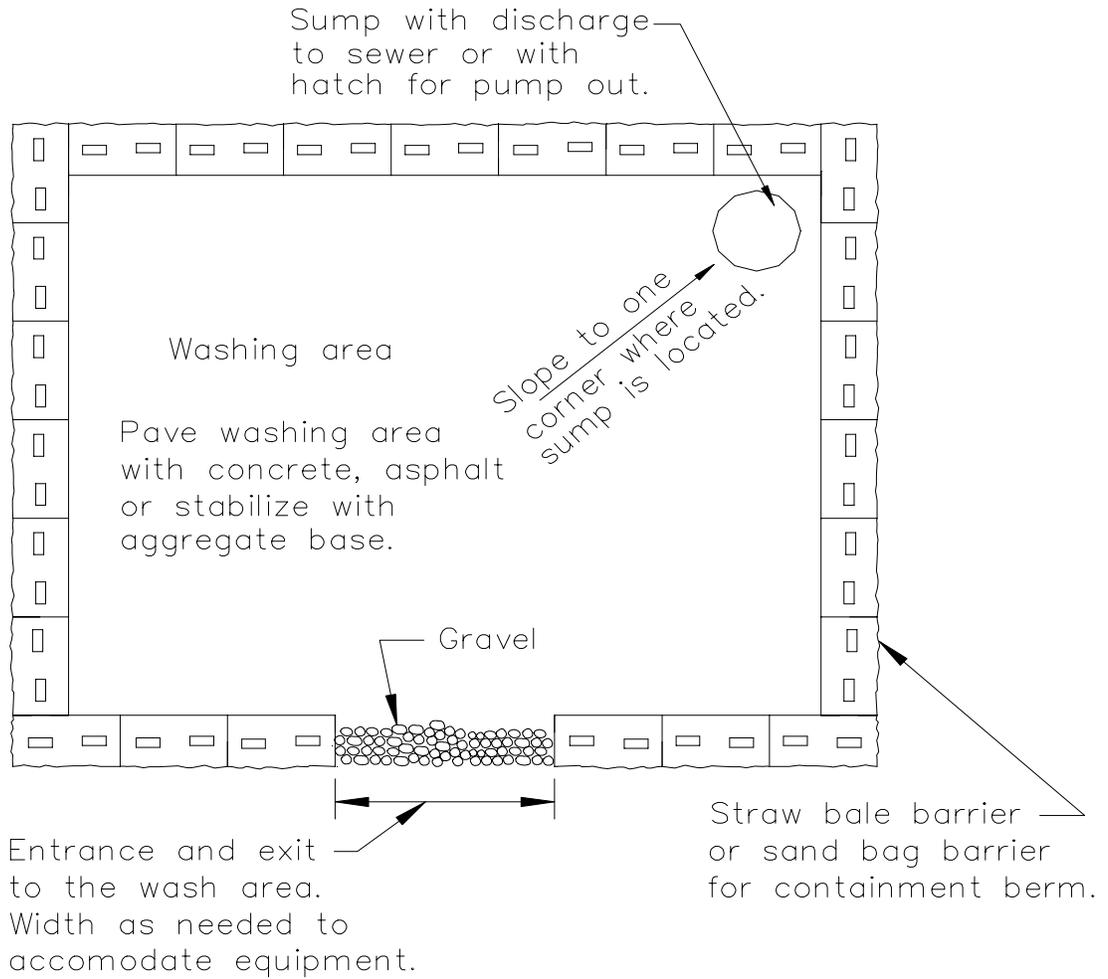
Maintenance and  
Inspection

# The control measure should be inspected at a minimum of once a week.

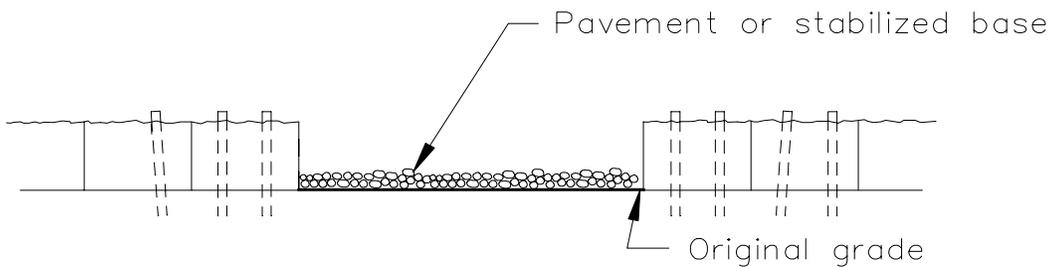
# Service sump regularly.

# CD18(2)

## Vehicle and Equipment Cleaning



PLAN



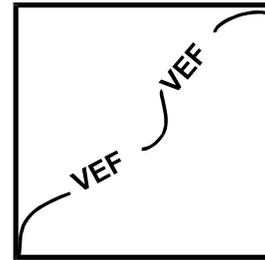
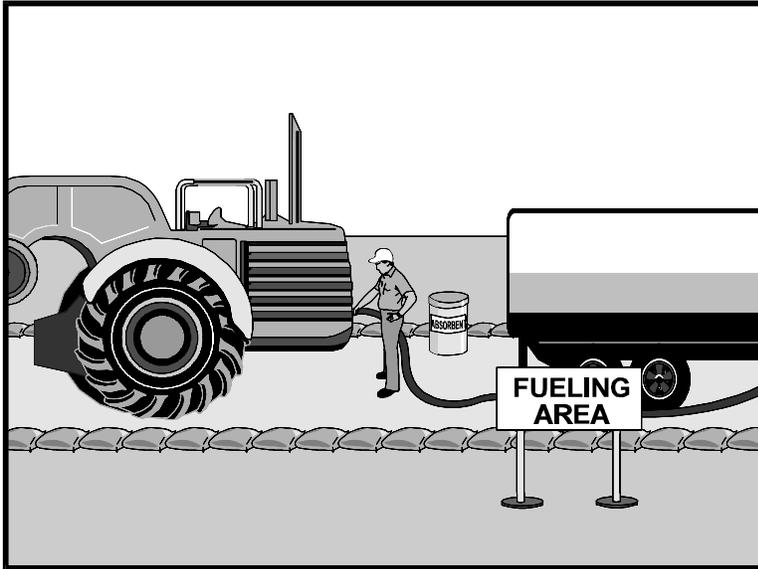
FRONT ELEVATION

TYPICAL VEHICLE & EQUIPMENT CLEANING AREA  
NOT TO SCALE

# CD19(2)

## Vehicle and Equipment Fueling

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<b>BMP Objectives</b>	
<b>F</b>	Soil Stabilization
<b>F</b>	Sediment Control
<b>F</b>	Tracking Control
<b>F</b>	Wind Erosion Control
<b>M</b>	Non-Storm Water

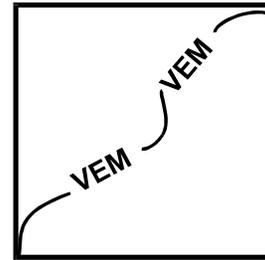
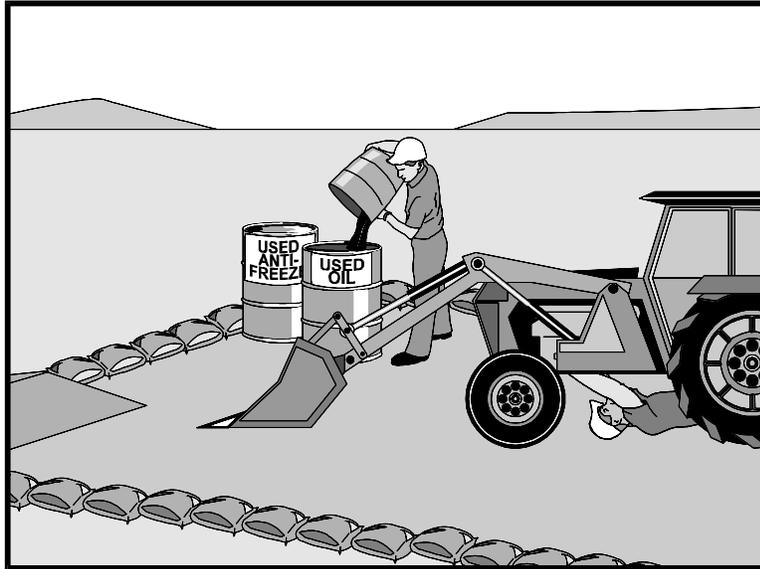
<b>Definition and Purpose</b>	Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of vehicle and equipment fueling by preventing leaks and spillage and by cleaning up spilt materials when needed.
<b>Appropriate Applications</b>	Applicable to all construction sites where vehicle and equipment fueling takes place.
<b>Limitations</b>	# On-site vehicle and equipment fueling should only be used where it's impractical to send vehicles and equipment offsite for fueling.
<b>Standards and Specifications</b>	<p># When fueling must occur on site, the contractor shall select and designate an area to be used, subject to approval of the Engineer.</p> <p># Locate designated fueling areas away from storm drain inlets, drainage facilities, or watercourses.</p> <p># Locate fueling areas on a paved surface where practical.</p> <p># Protect fueling areas with berms and/or dikes to prevent runoff, runoff, and to contain spills.</p> <p># Secondary containment techniques such as drain pans or drop cloths shall be used when fueling to catch spills or leaks.</p>

## Vehicle and Equipment Fueling

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- # Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts.
  - # Use nozzles equipped with automatic shutoff features to prevent overtopping fuel tank.
  - # Fuel tanks shall not be “topped-off.”
  - # A stockpile of spill clean up materials shall be readily accessible at designated fueling areas.
  - # Absorbent materials shall be used on small spills instead of hosing down or burying techniques. The spent absorbent material shall be removed promptly and disposed of properly.
  - # Federal, state, and local requirements shall be observed for any stationary above ground storage tanks.
  - # Mobile fueling of construction equipment throughout the site should be minimized. Whenever practical, equipment shall be transported to the designated fueling area.
- Maintenance and Inspection
- # Fueling areas and storage tanks shall be inspected on a regular basis.
  - # Keep an ample supply of spill cleanup material on the site.
  - # Immediately cleanup spills and properly dispose contaminated soil and cleanup materials.

# Vehicle and Equipment Maintenance



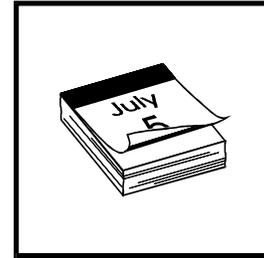
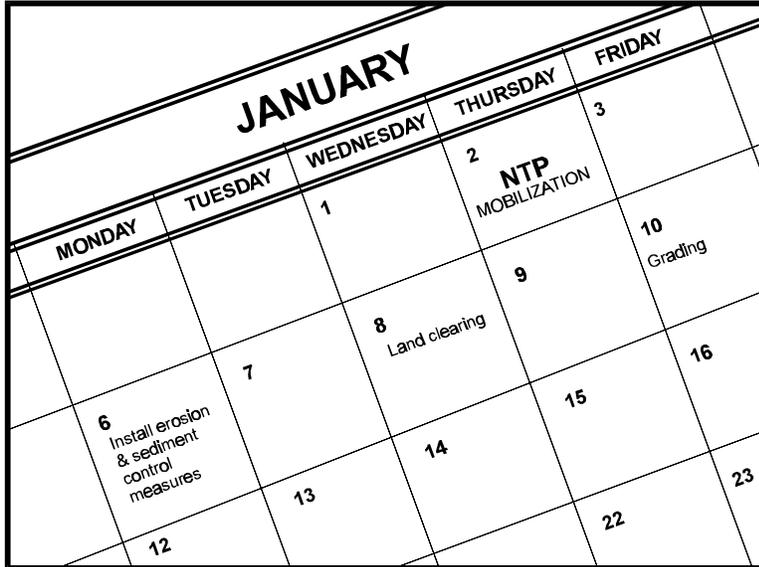
BMP Objectives	
F	Soil Stabilization
F	Sediment Control
F	Tracking Control
F	Wind Erosion Control
M	Non-Storm Water

Definition and Purpose	Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of vehicle and equipment maintenance by conducting these activities off site or in a designated area designed to contain spills and prevent runoff or runoff.
Appropriate Applications	Applicable to all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.
Limitations	None identified.
Standards and Specifications	<ul style="list-style-type: none"> <li># Use off-site maintenance facilities whenever practical.</li> <li># Designate on-site vehicle and equipment maintenance areas, away from storm drain inlets and watercourses.</li> <li># Locate on paved surfaces where practical.</li> <li># Use berms to protect maintenance areas from runoff.</li> <li># For long-term projects, consider using portable tents or covers over maintenance areas.</li> <li># Properly dispose of used oils, fluids, and lubricants.</li> <li># Do not dump fuels and lubricants onto the ground.</li> </ul>

# Vehicle and Equipment Maintenance

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- # Do not place used oil in a dumpster or pour into a storm drain or watercourse.
  - # Properly dispose of or recycle used batteries.
  - # Do not bury used tires.
  - # Repair leaks of fluids and oil immediately.
  - # Provide spill containment dikes or secondary containment around stored oil and chemical drums.
  - # Maintain an adequate supply of spill cleanup materials in designated areas.
- Maintenance and Inspection
- # Maintain waste fluid containers in leak proof condition.
  - # Vehicle and equipment maintenance areas shall be inspected regularly.
  - # Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.



BMP Objectives	
M	Soil Stabilization
F	Sediment Control
F	Tracking Control
F	Wind Erosion Control
F	Non-Storm Water

**Definition and Purpose**

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activities by scheduling construction activities in a manner that minimize the exposure of disturbed soils to wind, rain, runoff and runoff.

**Appropriate Applications**

All projects involving land-disturbing activities.

**Limitations**

None Identified.

**Standards and Specifications**

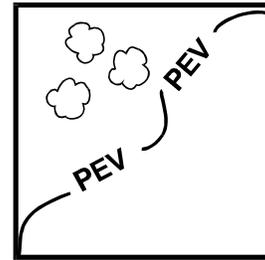
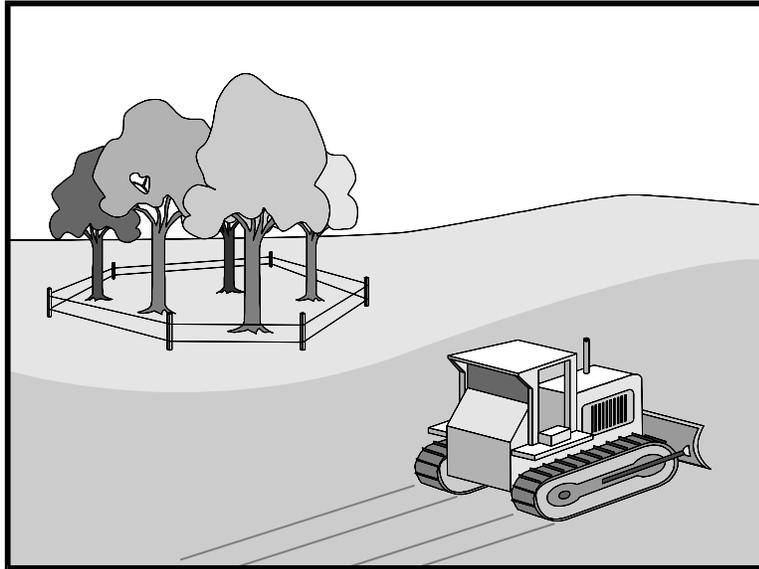
- # Plan project to incorporate the use of a schedule or flow chart to layout the construction plan.
- # Work out the sequencing and timetable for the start and completion of each item such as site clearing, grading, excavation, pouring foundations, installing utilities, etc.
- # Schedule work to minimize the active construction area during the rainy season.
- # Incorporate soil stabilization items in the construction schedule.
- # Stabilize nonactive areas as soon as practical.
- # Minimize land disturbing activities during the winter season.

- # Schedule major grading operations for the non-winter season when practical.
  - # Monitor the weather forecast for rainfall.
  - # When rainfall is predicted, adjust the construction schedule to allow the implementation of erosion and sediment controls and sediment treatment controls on all disturbed areas prior to the onset of rain.
  - # Be prepared year-round to deploy erosion and sediment control and sediment treatment control practices. Erosion may be caused during dry seasons by unseasonal rainfall, wind and vehicle tracking. Keep the site stabilized year-round, and retain and maintain rainy season sediment trapping devices in operational condition.
  - # Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
  - # Sequence trenching activities so that most open portions are closed before new trenching begins.
- Maintenance and Inspection
- # Routinely verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
  - # When changes are warranted, amend the sequence scheduling in advance to maintain control.

# CD23(2)

## Preservation of Existing Vegetation

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### BMP Objectives

- M** Soil Stabilization
- F** Sediment Control
- F** Tracking Control
- M** Wind Erosion Control
- F** Non-Storm Water

### Definition and Purpose

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activities by protecting existing vegetation which protects the site from soil erosion.

### Appropriate Applications

This technique is applicable to all types of construction sites. Areas where preserving vegetation can be particularly beneficial are floodplain, wetlands, streambanks, steep slopes, and other areas where erosion control would be difficult to establish, install, and maintain, or areas where there are critical resources downstream.

Preservation of existing vegetation should be practiced in the following locations:

- # Areas on a site where no construction activity is planned or will occur at a later date.
- # Sensitive areas where natural vegetation exists and should be preserved, such as on steep slopes, watercourses, and building sites in wooded areas.
- # Areas where federal, state, or local government regulations require preservation, such as delineated wetlands, vernal pools, marshes, etc.

### Limitations

Protection of existing vegetation requires planning, and may constrict the area available for construction activities.

# Preservation of Existing Vegetation

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## Standards and Specifications

### *Timing*

Preservation of existing vegetation shall be done before any site disturbance begins.

### *Tree and Vegetation Marking*

Clearing limits shall be outside of the drip line of any retained tree, and at a minimum of 1.5 m (5 ft) from the trunk regardless of the size of the tree. A protective device, to guard against damage to roots, trunk, and tops of trees, shall be placed at these limits.

Individual trees, stands of trees, and areas of vegetation to be retained shall be marked before construction at a height visible to equipment operators. Orange-colored plastic construction fencing or other suitable material shall be used. Within 12 m (40 ft) of a proposed building or excavation, however, retained trees shall be protected by fencing. The following are alternatives for tree and vegetation protection:

- # A standard snow fence on steel posts set 1.8 m (6 ft) apart and at a height of 1.0 m (40 in), placed at clearing limits.
- # Board fencing on 100 mm (4 in) square posts set securely and 1.8 m (6 ft) apart, and protruding at least 1.2 m (4 ft) above the ground, placed at clearing limits.
- # A cord fence with 2 rows of cord at least 6 mm (¼ in) in thickness running between posts. Each post shall be at least 50 mm (2 in) thick set securely and 1.8 m (6 ft) apart, protruding at least 1.2 m (4 ft) above the ground, placed at clearing limits. Strips of colored surveyor's flagging shall be tied securely to the cord at intervals of no more than 900 mm (3 ft).
- # Plastic fencing of 1.0 m (40 in) high orange polyethylene webbing, secured to metal "T" or "U" posts driven to a depth of at least 450 mm (18 in), on 1.8 m (6 ft) minimum centers, placed at the clearing limits. Minimum physical qualities (ASTM D638) of this fencing shall be:
  - an average tensile yield of 7,300 N/m (2,000 lbs/4 ft) width,
  - an average ultimate tensile yield of 10,600 N/m (2,900 lbs/4 ft) width,

# CD23(2) Preservation of Existing Vegetation

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- elongation at break greater than 1,000%, and
  - chemically inert to most chemicals and acids.
- # An earth berm constructed according to specifications, but only if its presence does not conflict with drainage patterns. The base of the berm on the tree or vegetation side shall be located at the clearing limits.
- # Leaving a buffer zone of existing trees between the trunks of retained trees and the clearing limits. Trees in this buffer zone shall be a maximum of 1.8 m (6 ft) apart so that equipment and material cannot pass. These trees shall be re-examined before construction is completed to check for and ensure survival or be removed.
- # As a last resort, a tree trunk may be armored with burlap wrapping and 50 mm (2 in) studs wired vertically, no more than 50 mm (2 in) apart encircling the trunk to a height of 1.5 m (5 ft). No nailing shall ever be done to a retained tree. The root zone, however, will still require protection.

Employees and subcontractors shall be instructed to honor protective devices. No heavy equipment, vehicular traffic, or storage piles of any construction materials shall be permitted within the drip line of any tree to be retained. Removed trees shall not be felled, pushed, or pulled into any retained trees. Fires shall not be permitted within 30 m (100 ft) of the drip line of any retained trees. Any fires shall be of limited size, and shall be kept under continual surveillance. No toxic or construction materials – including paint, acid, nails, gypsum board, chemicals, fuels, and lubricants – shall be stored within 15 m (50 ft) of the drip line of any retained trees, nor disposed of in any way which would injure vegetation.

### *Grade Protection*

Tree wells can be used to protect the root zone of retained trees, when approved by the Engineer. Unless specified otherwise, use the following procedure:

- # Remove vegetation and organic matter from beneath the retained tree(s) to at least 1 m (3 ft) beyond the drip line, loosening the soil to at least 75 mm (3 in) in depth without damaging roots.
- # Apply fertilizer to the loosened soil at rates not to exceed those recommended by the fertilizer manufacturer.



# CD23(2)

## Preservation of Existing Vegetation

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- # Construct a dry well to allow for trunk growth. Provide 300 mm (12 in) between the trunk and the wall for older, slow-growing trees, and at least 600 mm (24 in) for younger trees.
- # The well shall be just above the level of the proposed fill, and the wall should taper away from the trunk by 80 mm/m (1 in/ft) of wall height.
- # The well wall shall be constructed of large stone, brick, building tile, concrete blocks, or cinder blocks, with openings left in the wall for the flow of air and water. Mortar shall be used only near the top of the well and above the porous fill.
- # Drain lines beginning at the lowest point inside the well shall be built extending outward from the trunk in a radial pattern with the trunk as the hub. They shall be made of 100 mm (4 in) drain tiles, sloping away from the well at a rate of 10 mm/m (0.125 in/ft). A circumferential line of tiles shall be located beneath the drip line; vertical tiles or pipes should be placed over the intersections of the two tile systems for fills greater than 600 mm (24 in) in depth, held in place with stone fill. All tile joints should be tight. Drainage may be improved by extending a few radial tiles beyond each intersection and slope sharply downward. Coarse gravel may be substituted for tile in areas where water drainage is not a problem. Stones, crushed rock, and gravel may be added instead of vertical tiles or pipes, so the upper level of these porous materials slopes toward the surface near the drip line.
- # Tar paper or an approved equivalent shall be placed over the tile or pipe joint to prevent clogging, and a large stone placed around and over drain tiles or pipes for protection.
- # Layer 50 mm (2 in) to 150 mm (6 in) of stone over the entire area under the tree from the well outward at least to the drip line. For fills up to 600 mm (24 in) deep, a layer 200 mm (8 in) to 300 mm (12 in) shall be adequate. Deeper fills require thicker layers of stone to be built to a maximum of 760 mm (30 in).
- # A layer of 19 mm (0.75 in) to 25 mm (1 in) stone covered by straw, fiberglass mat, or filter fabric shall be used to prevent soil clogging between stones. Do not use cinders as fill material.
- # Complete filling with porous soil (to sustain vegetation) until the desired grade is reached.

## Preservation of Existing Vegetation

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- # Crushed stone shall be placed inside the dry well over the openings of the radial tiles to prevent clogging of the drain lines. Vertical tiles shall also be filled with crushed rock and covered with a screen.
- # The area between the trunk and the well wall shall be covered by an iron grate or filled with a 1:1 mixture of crushed charcoal and sand to prevent anyone from falling into the well or to prevent leaves, debris, rodents, or mosquitoes from accumulating.

One-half of these systems may be constructed if the grade is being raised on only one side of the tree(s).

### *Trenching and Tunneling*

- # Trenching should be as far away from tree trunks as possible, usually outside of the tree crown. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them. When trenching and/or tunneling trees to be retained, tunnels shall be at least 450 mm (18 in) below the ground surface, and not below the tree center to minimize impact on the roots.
- # Tree roots shall not be left exposed to air; they shall be covered with soil as soon as possible, protected, and kept moistened with wet burlap or peat moss until the tunnel and/or trench can be completed.
- # The ends of damaged or cut roots shall be cut off smoothly and protected by painting them with a tree-wound dressing.
- # Trenches and tunnels shall be filled as soon as possible. Careful filling and tamping will eliminate air spaces in the soil which can damage roots.
- # To induce and develop root growth, peat moss shall be added to the fill material.
- # The tree shall be mulched to conserve moisture and fertilized to stimulate new root growth.
- # Remove any trees intended for retention if those trees are damaged seriously enough to affect their survival. If replacement is desired or required, the new tree shall be of similar species, and of at least 50 mm (2 in) caliper balled and burlapped nursery stock, unless otherwise required by the contract documents.

# Preservation of Existing Vegetation

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- # Because protected trees may be destroyed by carelessness during the final cleanup and landscaping, fences and barriers shall be removed last, after all other work is complete.

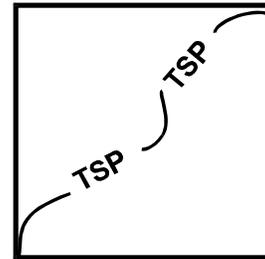
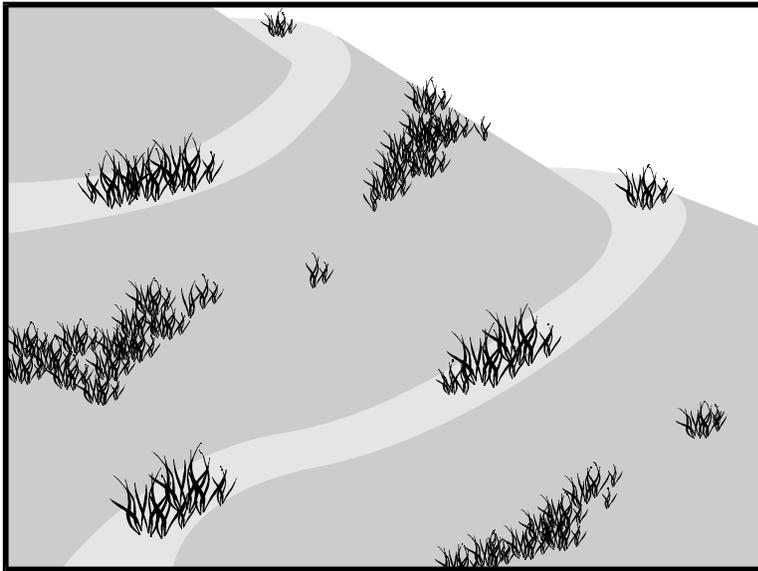
## Maintenance and Inspection

During construction, the limits of disturbance shall remain clearly marked at all times. Irrigation or maintenance of existing vegetation shall conform to the requirements in the landscaping plan.

If damage to protected trees still occurs, maintenance guidelines described below shall be followed:

- # Soil which has been compacted over a tree's root zone shall be aerated by punching holes 300 mm (12 in) deep with an iron bar, and moving the bar back and forth until the soil is loosened. Holes shall be placed 450 mm (18 in) apart throughout the area of compacted soil under the tree crown.
- # Any damage to the crown, trunk, or root system of a retained tree shall be repaired immediately.
  - Damaged roots shall be immediately cut cleanly inside the exposed area and surfaces painted with approved tree paint, and moist soil or soil amendments shall be spread over this area.
  - If bark damage occurs, all loosened bark shall be cut back into the undamaged area, with the cut tapered at the top and bottom, and drainage provided at the base of the wood. Cutting of the undamaged area shall be as limited as is possible.
  - Serious tree injuries shall be attended to by an arborist, forester or tree specialist.
  - Stressed or damaged broadleaf trees shall be fertilized to aid recovery.
  - Trees shall be fertilized in the late fall or early spring.
  - Fertilizer shall be applied to the soil over the feeder roots and in accordance with label instructions, but never closer than 1 m (3 ft) to the trunk. The fertilized area shall be increased by one-fourth of the crown area for conifers, that have extended root systems.

# CD24B(2) Temporary Seeding and Planting



BMP Objectives	
M	Soil Stabilization
F	Sediment Control
F	Tracking Control
M	Wind Erosion Control
F	Non-Storm Water

## Definition and Purpose

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by establishing a temporary vegetative cover to protect exposed soils from erosion by water and wind.

## Appropriate Applications

The purpose of temporary seeding and planting is to reduce erosion by stabilizing disturbed areas. Appropriate applications include:

- # Disturbed areas requiring temporary protection until permanent protective measures are established.
- # Disturbed areas that will be redisturbed following an extended period of inactivity.
- # Exposed soils that need protection from erosion.

## Limitations

If the site is susceptible to erosion, additional control measures may be necessary during the establishment of vegetation. Grasses require regular maintenance and uncut dry grass may present a fire hazard. Steep slopes are difficult to protect with temporary seeding. Temporary seeding may not be appropriate in dry periods without supplemental irrigation.

## Standards and Specifications

- An evaluation of site conditions shall be performed with respect to:
- # Soil conditions

# CD24B(2) Temporary Seeding and Planting

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- # Site topography
- # Season and climate
- # Vegetation types
- # Maintenance requirements
- # Sensitive adjacent areas
- # Water availability
- # Plans for permanent vegetation

The following steps shall be followed for implementation:

- # When temporary seeding and planting will be used to protect permanent plantings, strip and stockpile topsoil during construction. Use stockpiled materials in the surface preparation prior to seeding operations.
- # Apply fertilizer or other soil amendments as indicated by a soil test and in accordance with the manufacturers label instructions.
- # Roughen the slope or area to be seeded by plowing, disking, or raking to a depth of 150 mm (6 in), with the furrows trending along the contours See CD35(2) - Slope Roughening/Terracing/Rounding.
- # Plant seeds using broadcast seeding, drill seeding, or hydraulic seeding, as appropriate.
- # Apply a protective mulch to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow.
- # Irrigate seeded areas as needed based on rainfall and weather conditions.

All seeds shall be in conformance with the California State Seed Law of the Department of Agriculture. Each seed bag shall be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test. The container shall be labeled to clearly reflect the amount of Pure Live Seed (PLS)



# CD24B(2) Temporary Seeding and Planting

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contained. All legume seed shall be pellet-inoculated. Inoculant sources shall be species specific and shall be applied at a rate of 2 kg of inoculant per 100 kg of seed (2 lb inoculant per 100 lb seed).

Commercial fertilizer shall conform to the requirements of the California Food and Agricultural Code. Fertilizer shall be pelleted or granular form.

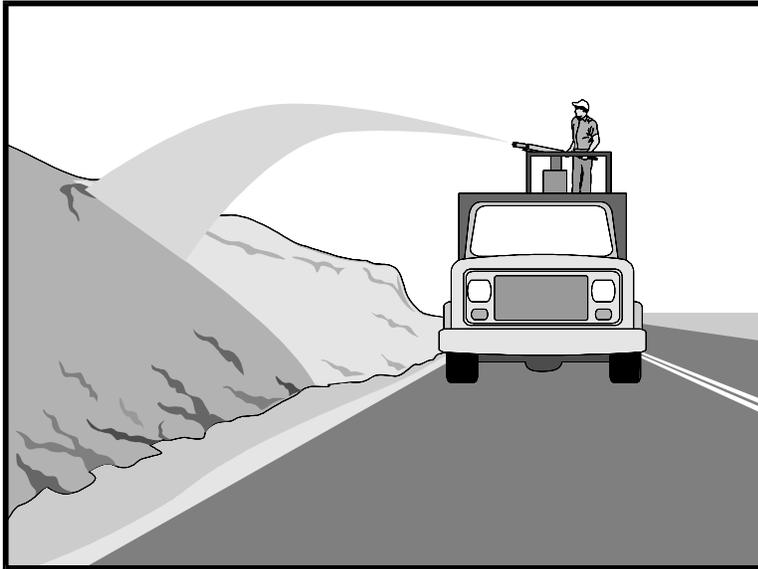
Follow-up applications shall be made as needed to cover weak spots, and to maintain adequate soil protection.

## Maintenance and Inspection

If soil moisture is deficient, new vegetation shall be supplied with supplemental irrigation until plants are firmly established. Cutting or mowing grasses will encourage the establishment and spread of the grass.

All seeded areas shall be inspected for failures and reseeded, fertilized, and mulched within the planting season, using not less than half the original application rates. Any temporary revegetation efforts that do not provide adequate cover within 30 days of planting must be revegetated within 40 days of the initial installation.





### BMP Objectives

- M Soil Stabilization
- F Sediment Control
- F Tracking Control
- M Wind Erosion Control
- F Non-Storm Water

<b>Definition and Purpose</b>	Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by covering exposed soil with mulch to protect it from erosion by raindrop impact or wind.
<b>Appropriate Applications</b>	<ul style="list-style-type: none"> <li># As a stand-alone temporary surface cover on disturbed areas until soils can be prepared for revegetation.</li> <li># Used in combination with temporary and/or permanent seeding strategies.</li> <li># On poor or marginal soils to add organic matter and fertility as strategy to speed the establishment and increase the survival of temporary and/or permanent vegetative cover.</li> <li># As short term, non-vegetative ground cover on steepened slopes to reduce rainfall impact, decrease the velocity of sheet flow, and settle out sediment.</li> <li># As long term, non-vegetative ground cover around established plants, such as trees or shrubs, and on flat to minor slopes not otherwise protected.</li> </ul>
<b>Limitations</b>	<i>Vegetable Fibers (Hay or Straw)</i> - A machine and labor intensive practice that requires either proper crimping or use of tackifiers. Hay stays flexible longer than straw, but is more likely to contain weed and other unwanted seed.

*Recycled Paper Hydraulic Mulches* - Can be applied rapidly on any large ground surface area. Short fiber length limits erosion control effectiveness unless applied with tackifier and in heavy layers.

*Wood Fiber Based Hydraulic Mulches* - Can be applied rapidly on any large ground surface area. Has longer fiber length than recycled paper based product, but also has limits on erosion control effectiveness unless applied with tackifier and in heavy layers.

*Hydraulic Matrices* - Behave like erosion control blankets, but can be applied much more rapidly. Need 24 hours to dry before rainfall occurs to be effective.

## Standards and Specifications

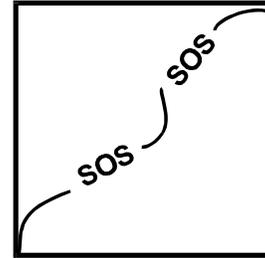
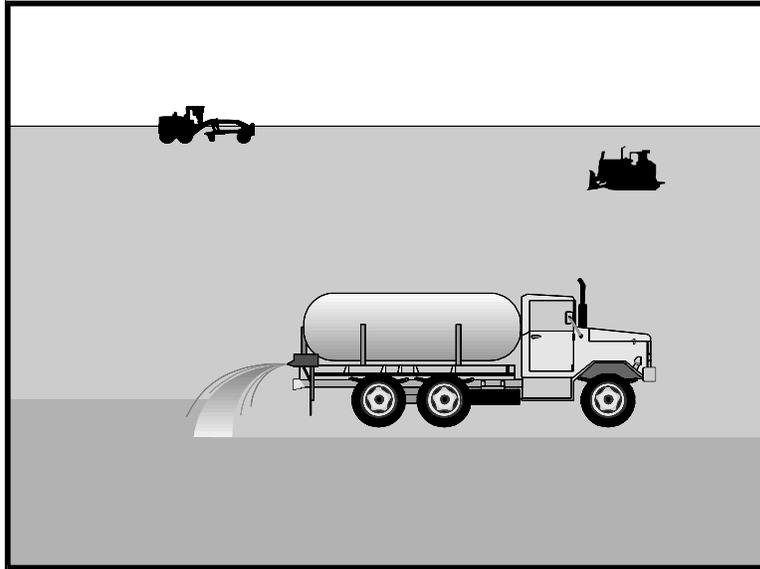
*Vegetable Fibers (Hay or Straw)* - Apply at a rate of 4,250 kg/ha (2 tons/ac) by machine or hand distribution to achieve complete coverage of the target area. Applied straw or hay shall have fiber lengths in excess of 150 mm (6 in). Anchor in place by crimping with approved crimping equipment, by anchoring netting over the straw, or by tackifier.

*All Hydraulic Mulches* - Apply as a liquid slurry using a hydraulic application machine (i.e., hydroseeder) at rates of mulch and tackifier recommended by the manufacturer to achieve complete coverage of the target area. Materials shall conform to Standard Specifications Sections 20-2.07 and 20-2.08.

*Hydraulic Matrices* - Apply either as wood fiber, paper fiber, or combination of both mixed with acrylic polymers as binders. Apply as a liquid slurry using a hydraulic application machine (i.e., hydroseeder) at the following minimum rates to achieve complete coverage of the target area: 570 kg/ha (500 lbs/ac) wood fiber mulch, 1,140 kg/ha (1,000 lbs/ac) recycled paper mulch and 520 liters/ha (55 gal/ac) of acrylic copolymer with a minimum of 55 percent solid content. Alternatively, apply bonded fiber matrix (available mixed in a single bag) at a rate of 3,400 to 4,500 kg/ha (3,000 to 4,000 lbs/ac) based on manufacturers recommendation to achieve complete coverage of the target area. Do not apply immediately before, during, or after a rainfall, in order to allow the matrix to dry.

## Maintenance and Inspections

Maintain an unbroken, temporary mulched ground cover throughout the period of construction the soils are not being reworked. Inspect before expected rain storms and repair any damaged ground cover and remulch exposed areas of bare soil.



### BMP Objectives

- M Soil Stabilization
- F Sediment Control
- F Tracking Control
- M Wind Erosion Control
- F Non-Storm Water

### Definition and Purpose

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by applying soil stabilizers to disturbed areas to prevent wind erosion.

Dust control is considered primarily as a temporary measure—an intermediate treatment between disturbance and either construction, paving, or revegetation.

### Appropriate Applications

# Dust control should be practiced at all construction sites by performing phased clearing and grading operations, using temporary stabilization methods, and/or placing undisturbed vegetative buffers of at least 15 m (50 ft) length between areas being graded and those areas to remain undeveloped.

# Dust control is particularly important in windy or wind-prone areas.

### Limitations

Dust control agents are temporary in nature, need reapplication, and have environmental impacts.

### Standards and Specifications

Temporary dust control measures can be classified into the three main categories described below.

### *Chemical Methods*

Chemical methods are dust suppressant or binding agents that are used on the soil surface to bind finer particles together. Chemical dust control agents must be environmentally benign, easily applied, easily maintained, economical and not significantly detrimental to traffic ability.

Approximately three-quarters of chemical dust control agents are inorganic compounds which are compatible with soil and biota. After application, the compounds dampen and penetrate into the soil; a hygroscopic reaction pulls moisture from the atmosphere into the surface and adheres fines to aggregate surface particles. The compounds may not penetrate soil surfaces made up primarily of silt and clay, so soil tests are required.

Performance of chemical agents depends on temperature, humidity, and traffic. To be effective, a suppressant must effectively limit visible dust emissions. Examples of chemical control agents are provided in Table 26A-1.

### *Structural and Mechanical Methods*

Vegetative methods can often be as useful in dust control as chemical means. Surface materials can be used such that dust control is accounted for in the design process rather than as a reaction to site conditions. Some alternatives are shown in Table 26A-1.

### *Administrative Methods*

Examples of administrative dust control methods are shown in Table 26A-1. Implementing and enforcing a speed limit and limiting traffic reduces the pulverization of road materials. It is recommended that vehicle speeds be limited to 24 kph (15 mph) on unpaved roads, although this may not be possible in all areas. Restrictions on vehicle weight or number of wheels can be useful practices in dust-prone areas. Traffic can also be reduced by restricting access and increasing ride-sharing practices.

### *Selection of Methods*

Selection of dust control agents should be based primarily on cost-effectiveness and environmental hazards. Key factors in determining the method include the following:

- # Soil types and surface materials - both fines and moisture content are key properties of surface materials.

- # Properties of the agents - the five most important properties are penetration, evaporation, resistance to leaching, abrasion, and aging.
- # Traffic volumes - the effectiveness and life span of dust control agents decreases as traffic increases. For high traffic areas, agents need to have strong penetrating and stabilizing capabilities.
- # Climate - some hygroscopic agents lose their moisture-absorbing abilities with lower relative humidity, and some may lose resilience. Under rainy conditions, some agents may become slippery or even leach out of the soil.
- # Environmental requirements - the primary environmental concern is the presence and concentration of heavy metals in the agent that may leach into the immediate ecosystem, depending on the soil properties.
- # Frequencies of application - rates and frequencies of application are based on the type of agent selected, the degree of dust control required, subgrade conditions, surface type, traffic volumes, types of vehicles and their speeds, climate, and maintenance schedule.

### *Application of Methods*

For dust control agents, once all factors have been considered, the untreated soil surface must first contain sufficient moisture to assist the agent in achieving uniform distribution (except when using a highly resinous adhesive agent). The following steps should be followed in general:

- # Ideally, application should begin in the spring, after seasonal rains - not during or just before heavy rainfall- so that subgrade and surface materials will not have dried.
- # If the surface has minimal natural moisture, the area to be protected must be pre-wetted so that the chemicals can uniformly penetrate the surface.
- # In general, cooler and/or more humid periods result in decreased evaporation, increased surface moisture, and thus significant increase in control efficiency. However, chemical and organic agents should not be applied under frozen conditions, rainy conditions, or when the temperature is below 4° C (40° F). Tar and bitumen agents should not be applied in fog or in rain or below 13° (55° F).

# More than one treatment with salts or organic compounds per year is often necessary, although the second treatment should probably be diluted.

## Maintenance and Inspection

The primary maintenance requirement is the reapplication of the selected dust control agent at intervals appropriate to the agent type. High traffic areas shall be inspected on a daily basis, and lower traffic areas shall be inspected on a weekly basis.

# CD26A(2)

## Soil Stabilizers

<b>Table 26A-1 Soil Stabilizers</b>			
<b>Method</b>	<b>Selection</b>	<b>Preparation</b>	<b>Application Rate</b>
<b>Chemicals - Inorganic</b>			
Water	<ul style="list-style-type: none"> <li>- Most commonly used practice</li> <li>- Evaporates quickly</li> <li>- Lasts less than 1 day</li> </ul>	For all liquid agents: <ul style="list-style-type: none"> <li>- Blade a smooth surface.</li> <li>- Crown or slope surface to avoid ponding.</li> <li>- Compact soils if needed.</li> <li>- Uniformly pre-wet at 0.14 - 1.4 l/m<sup>3</sup> (0.03-0.3 gal/yd<sup>2</sup>).</li> <li>- Apply solution under pressure. Overlap solution 100 - 300 mm (6 - 12 in).</li> <li>- Allow treated area to cure 0 - 4 hours.</li> <li>- Compact area after curing.</li> <li>- Apply second treatment before first treatment becomes ineffective, using 50% application Rate.</li> <li>- In low humidities, reactivate chemicals by rewetting at 0.5 - 0.9 l/m<sup>2</sup> (0.1 - 0.2 gal/yd<sup>2</sup>)</li> </ul>	0.6 l/m <sup>2</sup> (0.125 gal/yd <sup>2</sup> ) every 20 to 30 minutes.
Salts - Calcium Chloride (CaCl)	<ul style="list-style-type: none"> <li>- Restricts evaporation</li> <li>- Lasts 6-12 months</li> <li>- Can be corrosive</li> <li>- Less effective in low humidity</li> <li>- Can build up in soils and leach by rain</li> </ul>		Apply 38% solution at 1.21 l/m <sup>2</sup> (0.27 gal/yd <sup>2</sup> ) or as loose, dry granules per manufacturer.
- Magnesium Chloride (MgCl)	<ul style="list-style-type: none"> <li>- Restrict evaporation</li> <li>- Works at higher temperatures and lower humidity than CaCl</li> <li>- May be more costly than CaCl</li> </ul>		Apply 26 - 32% solution at 2.3 l/m <sup>2</sup> (0.5 gal/yd <sup>2</sup> ).
- Sodium Chloride (NaCl)	<ul style="list-style-type: none"> <li>- Effective over smaller range of conditions</li> <li>- Less expensive</li> </ul>		Per manufacturer.
- Salt Mixes	Reduces cost		Per manufacturer.
Silicates	<ul style="list-style-type: none"> <li>- Generally expensive</li> <li>- Available in small quantities</li> <li>- Require second application</li> </ul>		
Surfactants	<ul style="list-style-type: none"> <li>- High evaporation rates</li> <li>- Effective for short time periods</li> <li>- Must apply frequently</li> </ul>		

# CD26A(2)

## Soil Stabilizers

<b>Table 26A-1 Soil Stabilizers</b>			
<b>Method</b>	<b>Selection</b>	<b>Preparation</b>	<b>Application Rate</b>
<b>Chemicals - Organic</b>			
- Copolymers	<ul style="list-style-type: none"> <li>- Form semi-permeable transparent crust.</li> <li>- Resists ultraviolet radiation and moisture induced breakdown.</li> <li>- Lasts 1 to 2 years.</li> </ul>	Same as above.	750 - 940 l/ha (80 - 100 gal/ac).
- Petroleum Products	<ul style="list-style-type: none"> <li>- Bind soil particles</li> <li>- May hinder foliage growth</li> <li>- Environmental and aesthetic concerns</li> <li>- Higher cost</li> </ul>		use 57 - 63% resins as base. Apply at 750 - 940 l/ha (80 - 100 gal/ac).
- Lignin Sulfonate	<ul style="list-style-type: none"> <li>- Paper industry waste product</li> <li>- Acts as dispersing agent</li> <li>- Best in dry climates</li> <li>- Can be slippery</li> </ul>		Loosen surface 25 - 50 mm (1 - 2 in). Need 4 - 8% fines.
- Vegetable Oils	<ul style="list-style-type: none"> <li>- Coat grains of soil, so limited binding ability</li> <li>- May become brittle</li> <li>- Limited availability</li> </ul>		Per manufacturer.
- Spray-on Adhesives	<ul style="list-style-type: none"> <li>- Available as organic or synthetic</li> <li>- Effective on dry, hard soils</li> <li>- Form a crust</li> <li>- Can last 3 to 4 years</li> </ul>		Per manufacturer.

# CD26A(2)

## Soil Stabilizers

<b>Table 26A-1 Soil Stabilizers</b>			
<b>Method</b>	<b>Selection</b>	<b>Preparation</b>	<b>Application Rate</b>
<b>Structural/Mechanical</b>			
- Vegetative	Effective where no construction traffic	- Seed incrementally during project. - Seed at appropriate time of year.	See Temporary Seeding and Planting
- Mulch	- Not appropriate for heavily-trafficked areas. - Fast and effective.	See Mulching (CD25)	See Mulching (CD25)
- Tillage	Roughens soil to reduce wind erosion	- Begin on windward side - Use spring-toothed harrows or chisel-type plows spaced 300 mm (12 in) apart	N/A
- Stone	- Can stabilize roads or other disturbed areas. - Low-cost, stable, effective for highly used roads.	- Blade a smooth surface - Crown or slope to avoid ponding - Compact soils, if needed	Apply 25 - 75 mm (1 - 3 in) stone in uniform layer
- Road Fabrics	- Separate subgrade and base courses. - Flexible, durable, permeable.	(same as above)	Install per manufacturer
- Barriers	- Can be used to interrupt air flow. - Can use board fence, wind fence, silt fence, burlap fence, straw bale, or similar.	- Place barrier perpendicular to prevailing air currents - Place at intervals of 15 times the barrier height	Install per manufacturer.

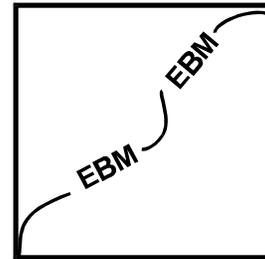
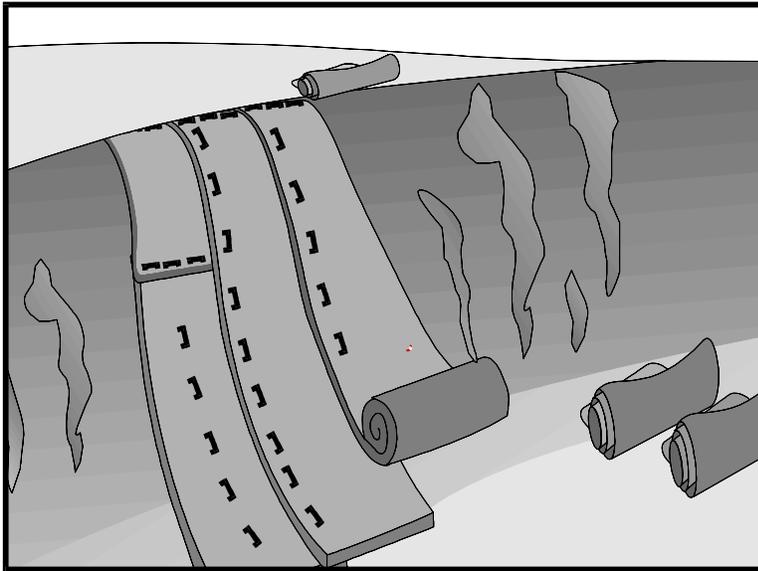
# CD26A(2)

## Soil Stabilizers

<b>Table 26A-1 Soil Stabilizers</b>			
<b>Method</b>	<b>Selection</b>	<b>Preparation</b>	<b>Application Rate</b>
<b>Administrative</b>			
Speed Limits	Reduces dust generation and pulverization of road materials	Limit speeds to 24 kph (15 mph)	
Weight/Wheel Restrictions	Reduces dust generation and pulverization of road materials	Use signage and barriers in dust-prone areas	
Carpooling	Reduces number of vehicles at site	Require or encourage employees to ride share	
Restrict Access	Reduces number of vehicles in dust-prone areas	Use signage and barriers	

# CD26B(2)

## Geotextiles, Mats/Plastic Covers and Erosion Control Blankets



<b>BMP Objectives</b>
M Soil Stabilization
F Sediment Control
F Tracking Control
M Wind Erosion Control
F Non-Storm Water

**Definition and Purpose**

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by applying biodegradable blankets and matting materials to disturbed areas to protect soils from erosion by wind or water.

**Appropriate Applications**

Construction sites where disturbed soils must be stabilized. Site conditions that may warrant use of blankets and mats include:

- # Slopes and disturbed soils where mulch must be anchored and other methods such as crimping or tackifying are not feasible nor adequate.
- # Step slopes, generally steeper than 1:3 (V:H).
- # Slopes where the erosion hazard is high.
- # Critical slopes adjacent to sensitive areas, such as streams, wetlands, or other highly valued resources needing protection.
- # Disturbed soil areas where plants are slow to develop adequate protective cover.
- # Channels with flows exceeding 0.6 m/s (2 ft/s) to 1.2 m/s (4 ft/s).

# CD26B(2)

## Geotextiles, Mats/Plastic Covers and Erosion Control Blankets

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# Channels intended to be vegetated and where the design flow exceeds the permissible velocity. The allowable velocity for turf reinforcement mats after vegetative establishment is up to 3 m/s (10 ft/s).

Appropriate mat and/or blanket materials must be selected for the specific site application.

### Limitations

Blankets and mats are typically more expensive than other erosion control measures, primarily due to labor costs. This usually limits their application to areas inaccessible to hydraulic equipment, or where other measures are not applicable, such as channels. Blankets and mats are generally not suitable for excessively rocky sites, or areas where the final vegetation will be mowed (since staples and netting can catch in mowers).

Plastic sheeting is easily vandalized, easily torn, not degradable, and must be disposed of at a landfill. Plastic results in 100 percent runoff, which may cause serious erosion problems in the areas receiving the increased flow. The use of plastic should be limited to covering stockpiles, or very small graded areas for short periods of time (such as through one imminent storm event), until alternative measures, such as seeding and mulching, may be installed.

### Standards and Specifications

#### *Material Selection*

There are many types of erosion control blankets and mats, and selection of the appropriate type should be based on the type of application and site conditions. The following criteria should be considered in selection of the appropriate material:

#### # Cost

- Material cost
- Preparation cost
- Installation cost
- Add-ons

#### # Effectiveness

- Reduction of erosion
- Reduction of flow velocity
- Reduction of runoff



# CD26B(2) Geotextiles, Mats/Plastic Covers and Erosion Control Blankets

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- # Acceptability
  - Environmental compatibility
  - Institutional/regulatory acceptability
  - Visual impact
  
- # Vegetation Enhancement
  - Native plant compatibility
  - Germination rate
  - Growth rate
  - Moisture retention
  - Temperature modification
  - Open space/coverage
  - Nutrient uptake
  
- # Installation
  - Durability
  - Longevity
  - Ease of installation
  - Safety
  
- # Operation and Maintenance
  - Maintenance frequency
  - Need for fertilization
  - Need for irrigation

## *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.
  
- # Prepare seedbed by loosening 50 mm (2 in) to 75 mm (3 in) of topsoil.
  
- # Incorporate amendments, such as lime and fertilizer, into the soil according to soil tests, the seeding plan, and manufacturer's recommendations.

# CD26B(2)

## Geotextiles, Mats/Plastic Covers and Erosion Control Blankets

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### *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 reseeded. 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 geotextile stake pins or triangular wooden stakes can be used to anchor mats and blankets to the ground surface. Wire staples should be minimum of 11 gauge. Metal stake pins should be 5 mm (0.188 in) diameter steel with a 40 mm (1.5 in) steel washer at the head of the pin. Wire staples and metal stakes should be driven flush to the soil surface. All anchors should be 150 mm (6 in) to 450 mm (18 in) long and have sufficient ground penetration to resist pullout. 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:

- # Begin at the top of the slope and anchor the blanket in a 150 mm (6 in) deep by 150 mm (6 in) wide trench. Backfill trench and tamp earth firmly.
- # Unroll blanket downslope in the direction of water flow.
- # Overlap the edges of adjacent parallel rolls 50 mm (2 in) to 75 mm (3 in) and staple every 1 m (3 ft).
- # When blankets must be spliced, place blankets end over end (shingle style) with 150 mm (6 in) overlap. Staple through overlapped area, approximately 300 mm (12 in) apart.
- # Lay blankets loosely and maintain direct contact with the soil—do not stretch.
- # 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. Steep slopes, 1:1

# CD26B(2)

## Geotextiles, Mats/Plastic Covers and Erosion Control Blankets

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(V:H) to 1:2 (V:H), require a minimum of 2 staples/m<sup>2</sup> (2 staples/yd<sup>2</sup>). Moderate slopes, 1:2 (V:H) to 1:3 (V:H), require a minimum of 1½ staples/m<sup>2</sup> (1 ½ staples/yd<sup>2</sup>), placing 1 staple/m (1 staple/yd) on centers. Gentle slopes require a minimum of 1 staple/m<sup>2</sup> (1 staple/yd<sup>2</sup>).

### *Installation in Channels*

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

- # Dig initial anchor trench 300 mm (12 in) deep and 150 mm (6 in) wide across the channel at the lower end of the project area.
- # Excavate intermittent check slots, 150 mm (6 in) deep and 150 mm (6 in) wide across the channel at 8 m (25 ft) to 10 m (30 ft) intervals along the channels.
- # Cut longitudinal channel anchor slots 100 mm (4 in) deep and 100 mm (4 in) wide along each side of the installation to bury edges of matting, whenever possible extend matting 50 mm (2 in) to 75 mm (3 in) above the crest of the channel side slopes.
- # 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 300 mm (12 in) intervals. Note: matting will initially be upside down in anchor trench.
- # In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 75 mm (3 in).
- # Secure these initial ends of mats with anchors at 300 mm (12 in) 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 75 mm (3 in) overlap.
- # 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 300 mm (12 in) intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.

# CD26B(2)

## Geotextiles, Mats/Plastic Covers and Erosion Control Blankets

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- # Alternate method for noncritical installations: Place two rows of anchors on 150 mm (6 in) centers at 8 m (25 ft) to 10 m (30 ft) intervals in lieu of excavated check slots.
- # Shingle-lap spliced ends by a minimum of 300 mm (12 in) apart on 300 mm (12 in) intervals.
- # Place edges of outside mats in previously excavated longitudinal slots, anchor using prescribed staple pattern, backfill and compact soil.
- # Anchor, fill and compact upstream end of mat in a 300 mm (12 in) by 150 mm (6 in) terminal trench.
- # Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
- # 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. In general, these will be as follows:

- # After seeding, spread and lightly rake 6 mm (0.25 in) to 13 mm (0.5 in) of fine topsoil into the mat apertures to completely fill mat thickness. Use backside of rake or other flat implement.
- # Spread topsoil using lightweight loader, backhoe, or other power equipment. Avoid sharp turns with equipment.
- # Do not drive tracked 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.

### *Plastic Sheeting*

Plastic sheeting shall have a minimum thickness of 6 mils, and shall be firmly held in place with sandbags or other weights placed no more than 3 m (10 ft) apart. All seams shall be taped or weighted down their entire length, and there shall be at least a 300 mm (12 in) to 600 mm (24 in) overlap of all seams.

# CD26B(2) Geotextiles, Mats/Plastic Covers and Erosion Control Blankets

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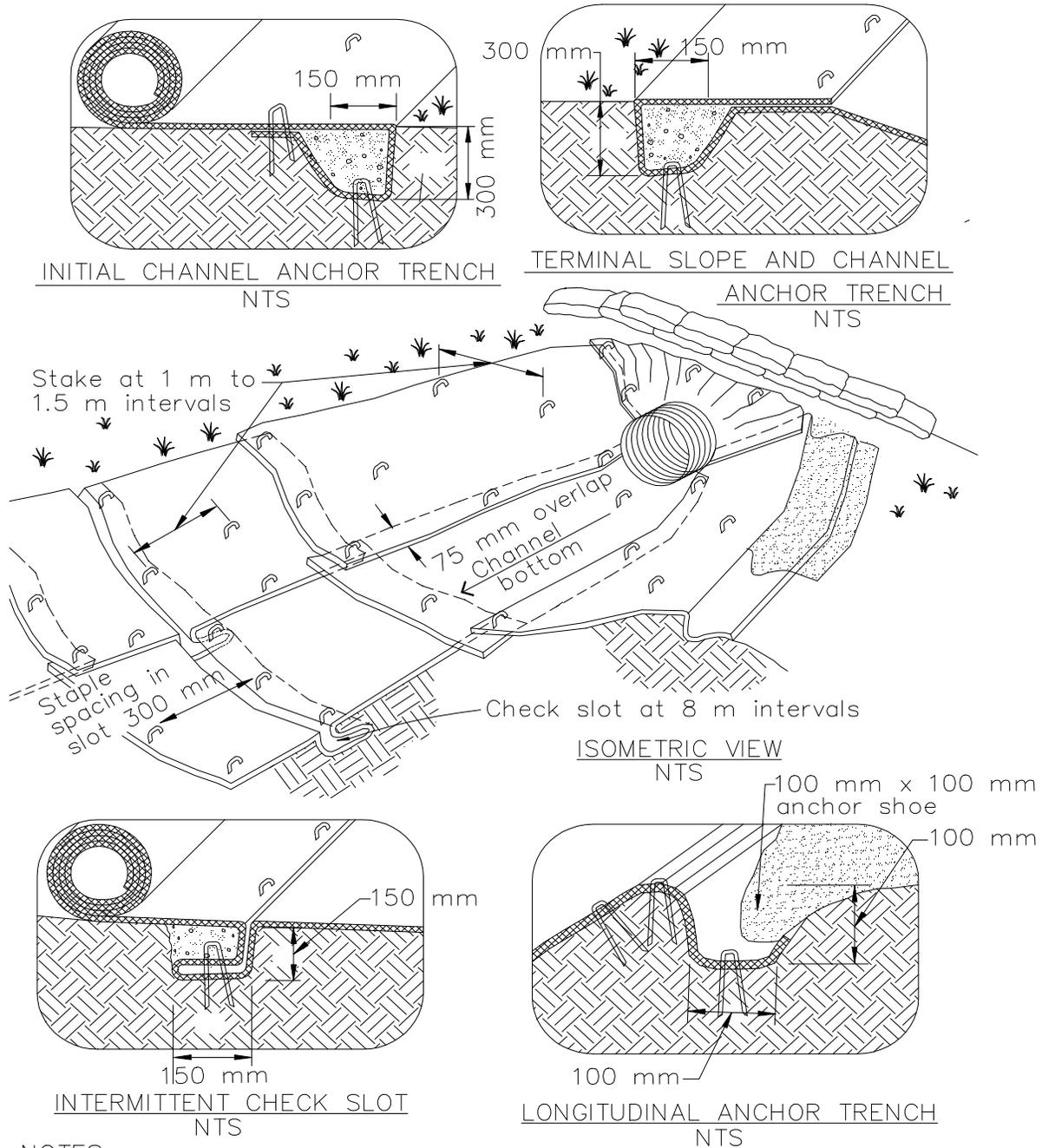
## Maintenance and Inspection

- # All blankets and mats shall be inspected periodically after installation.
- # Installation shall be inspected after significant rain storms to check for erosion and undermining. Any failures shall be repaired immediately.
- # If washout or breakages occur, re-install the material after repairing the damage to the slope or channel.



# CD26B(2)

## Geotextiles, Mats/Plastic Covers and Erosion Control Blankets

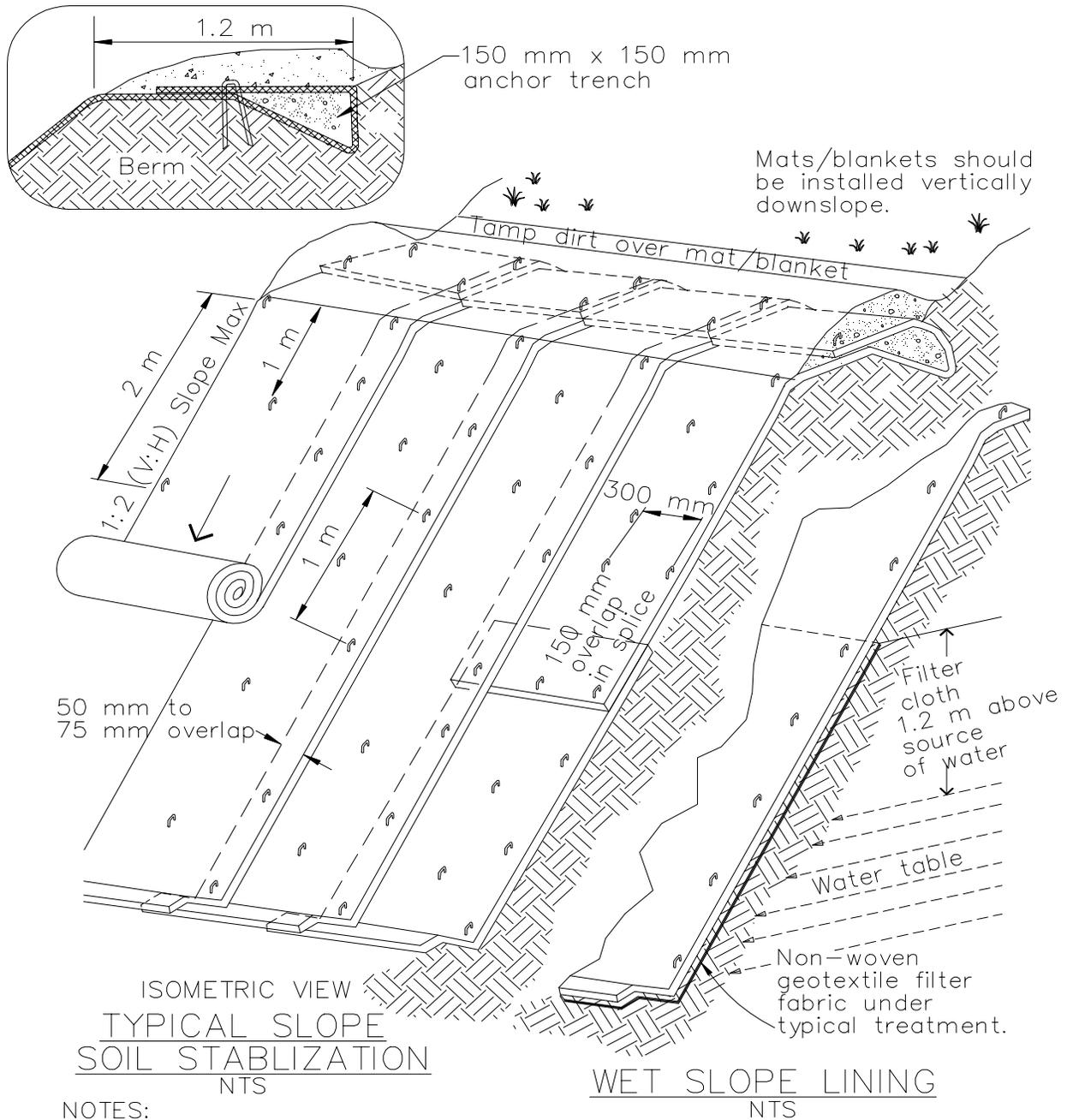


**NOTES:**

1. Check slots to be constructed per manufacturers specifications.
2. Staking or stapling layout per manufacturers specifications.

# CD26B(2)

## Geotextiles, Mats/Plastic Covers and Erosion Control Blankets



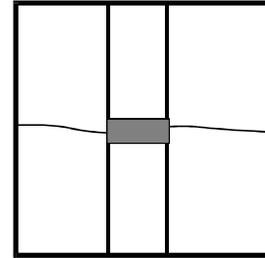
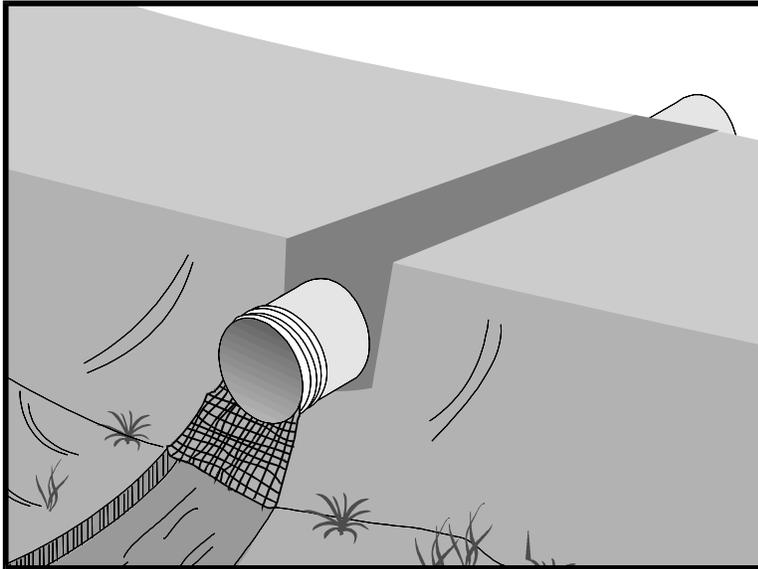
**NOTES:**

1. Slope surface shall be free of rocks, clods, sticks and grass. Mats/blankets shall have good soil contact.
2. Lay blankets loosely and stake or staple to maintain direct contact with the soil. Do not stretch.

# CD28(2)

## Temporary Stream Crossing

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### BMP Objectives

- M** Soil Stabilization
- F** Sediment Control
- F** Tracking Control
- F** Wind Erosion Control
- F** Non-Storm Water

<b>Definition and Purpose</b>	Procedures and practices to reduce the discharge of pollutants to watercourses as a result of stream crossings during construction activity by establishing controlled above water and/or non-erosive crossing facilities.
<b>Appropriate Applications</b>	<ul style="list-style-type: none"> <li># When crossing perennial streams, ephemeral waterways, etc., which may be significantly eroded by construction traffic.</li> <li># When construction equipment or vehicles need to frequently cross the waterway.</li> <li># When alternate access routes impose significant constraints such as length, narrowness, or poor soil strength.</li> <li># Where construction activities will not last longer than one year.</li> </ul>
<b>Limitations</b>	<ul style="list-style-type: none"> <li># Will usually disturb the waterway during installation and removal.</li> <li># May require U.S. Army Corps of Engineers 404 permit and approval by California Department of Fish and Game.</li> <li># Installation may require dewatering or temporary diversion of the stream. See CD7(2) - Dewatering.</li> <li># May become a constriction in the waterway, which can obstruct flood flow and cause flow backups or washouts. If improperly</li> </ul>

# CD28(2) Temporary Stream Crossing

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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.

Design and installation requires knowledge of stream flows and soil strength. Designs should 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 Caltrans 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 overtopping, flow backups, or washout.
- # Install sediment traps immediately downstream of crossings to capture sediments. See CD41(2) - Sediment Traps.
- # Avoid oil or other potentially hazardous waste materials for surface treatment.



# CD28(2)

## Temporary Stream Crossing

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### *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 stream bed to prevent potential flooding upstream of the crossing.

### *Specific Considerations:*

- # Culverts are relatively easy to construct and able to support heavy equipment loads.
- # Fords are 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.

### Maintenance and Inspection

Maintenance provisions should include:

- # Periodic removal of silt behind fords, in culverts, and under bridges.
- # Replacement of lost aggregate from inlets and outlets of culverts.
- # Removal of temporary crossing promptly when it is no longer needed.

Inspection, at a minimum, should occur weekly and after each significant rainfall, including:

- # Check for blockage in the channel, sediment buildup in culverts or behind fords, or trapped debris.
- # Check for erosion of abutments, channel scour, riprap displacement, or piping in the soil.



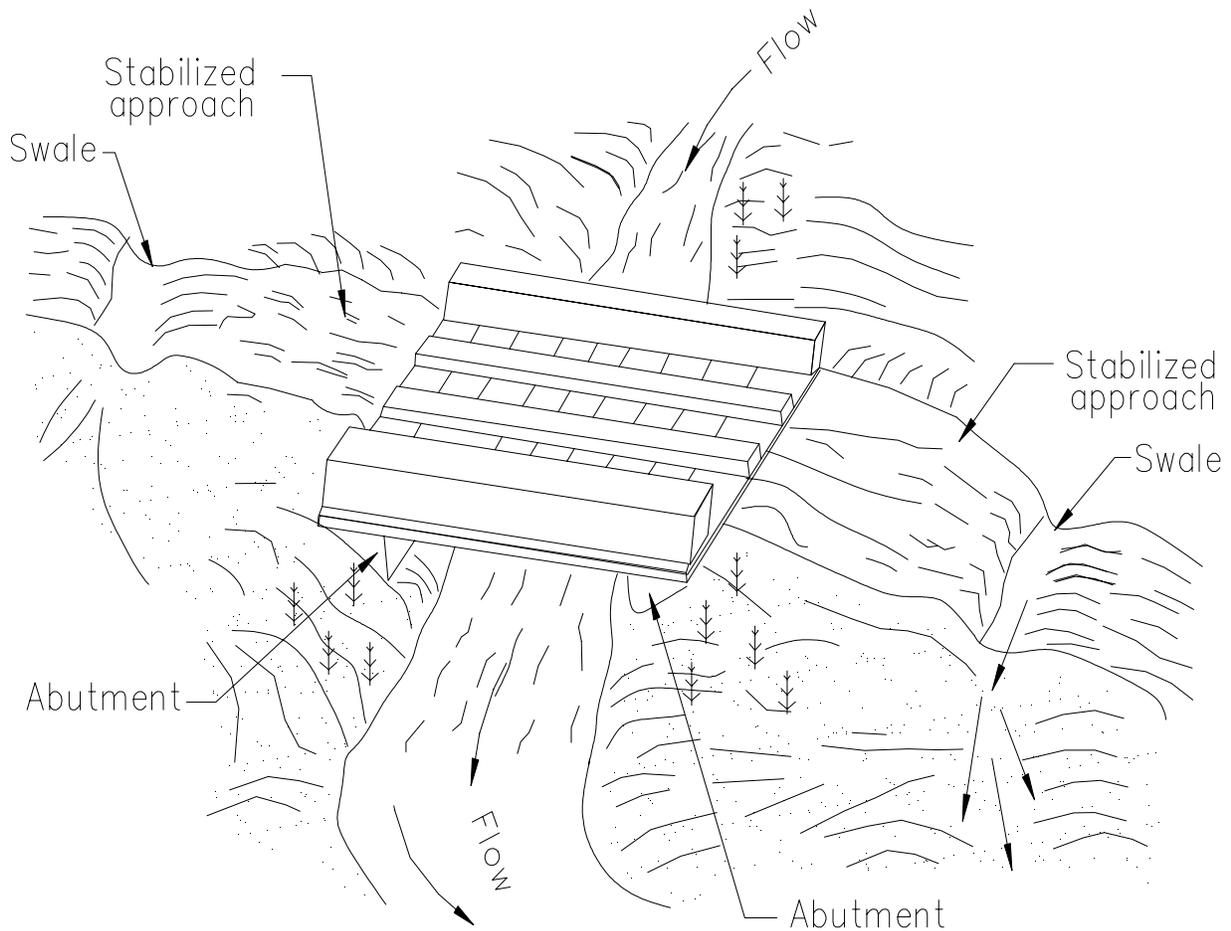
# CD28(2) Temporary Stream Crossing

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- # Check for structural weakening of the temporary crossing, such as cracks, and undermining of foundations and abutments.



# CD28(2) Temporary Stream Crossing



NOTE:  
Surface flow of road diverted  
by swale and/or dike.

TYPICAL BRIDGE CROSSING  
NOT TO SCALE

Sheet 1



# CD28(2)

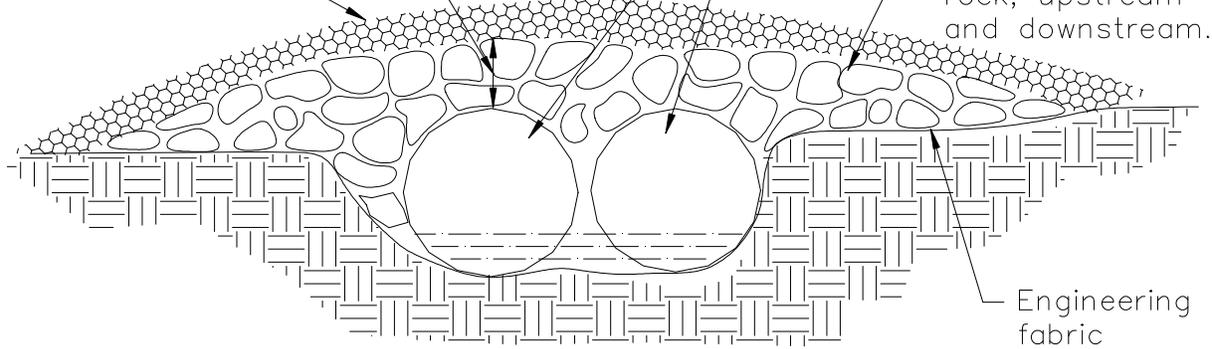
## Temporary Stream Crossing

1/2 Diameter of pipe  
300 mm, or as  
needed to support loads,  
whichever is greater.

Capacity of pipe culverts  
together = design flow +  
safety factor

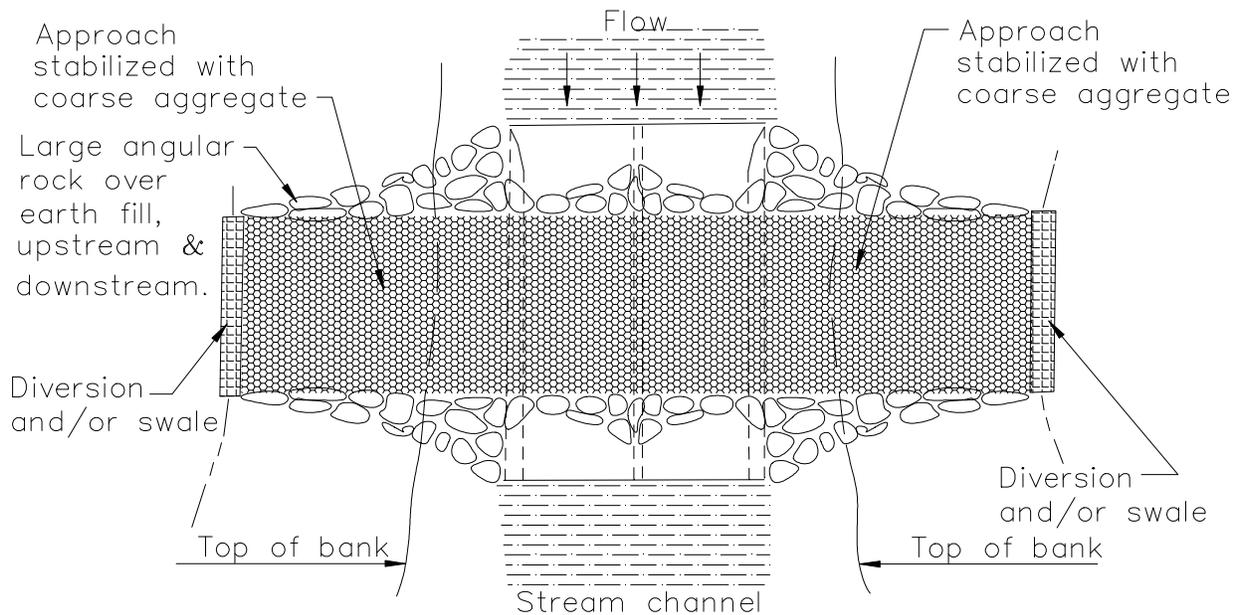
Coarse aggregate

Earth fill covered  
by large angular  
rock, upstream  
and downstream.



Engineering  
fabric

ELEVATION



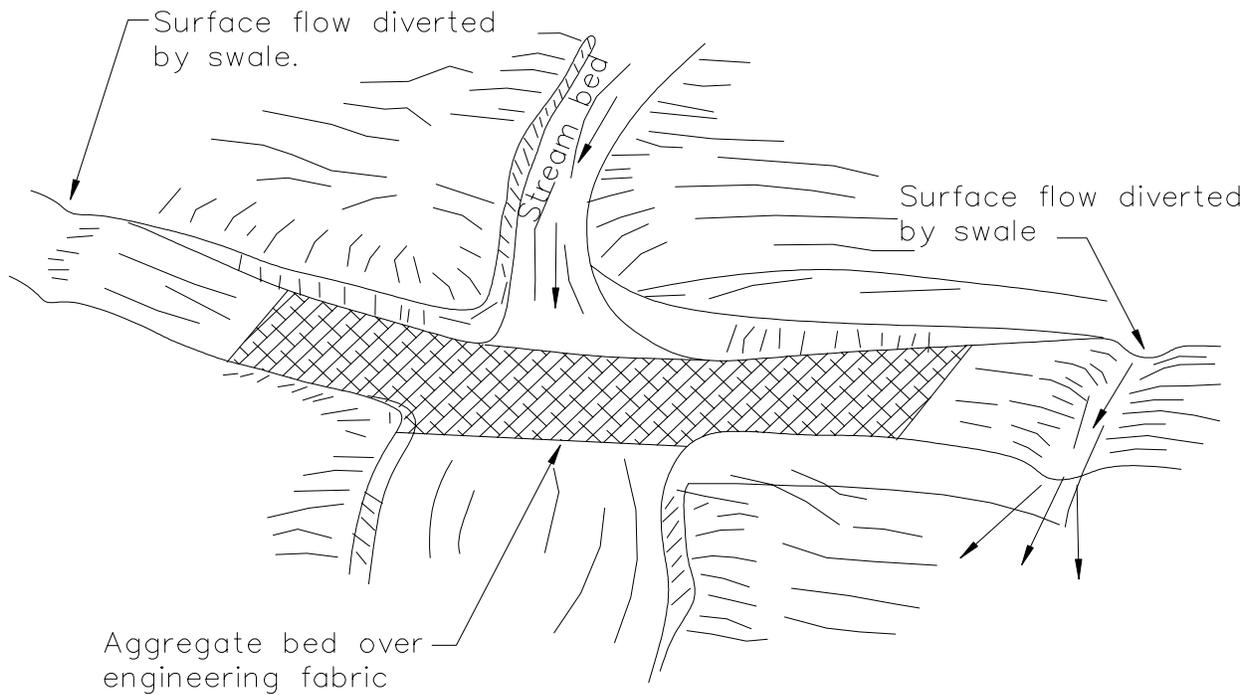
PLAN VIEW

TYPICAL CULVERT CROSSING  
NOT TO SCALE

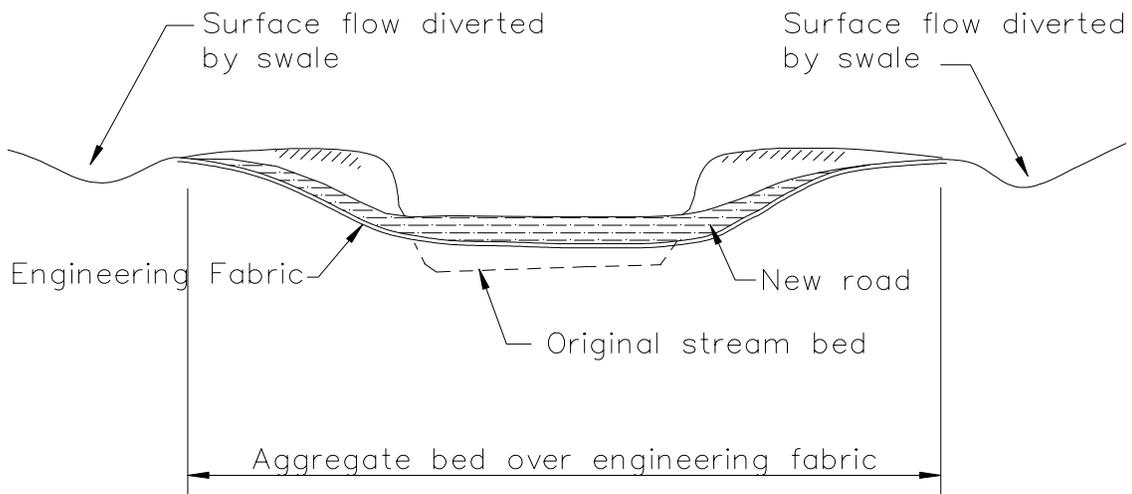
**Sheet 2**



# CD28(2) Temporary Stream Crossing



Aggregate approach  
1:5 (V:H) Maximum slope on road



TYPICAL FORD CROSSING  
NOT TO SCALE

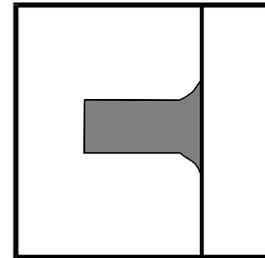
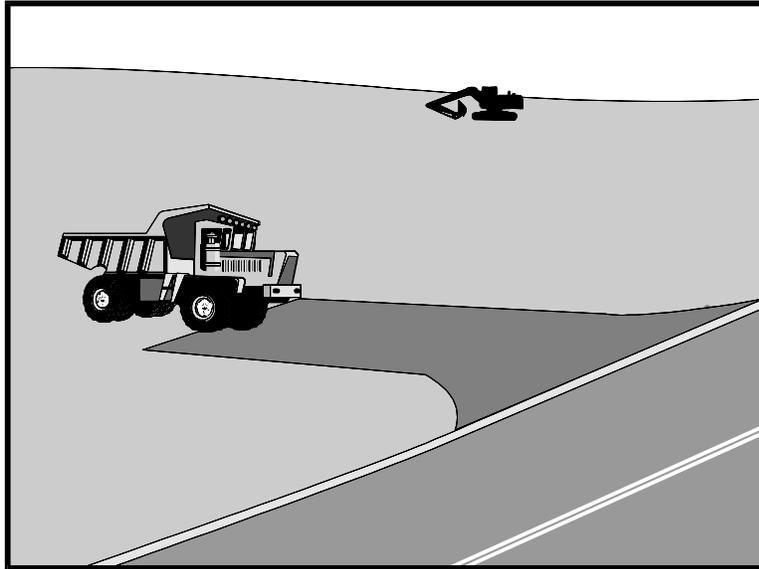
Sheet 3



# CD29A(2)

## Stabilized Construction Entrance

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### BMP Objectives

- M Soil Stabilization
- F Sediment Control
- M Tracking Control
- F Wind Erosion Control
- F Non-Storm Water

### Definition and Purpose

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of vehicular ingress and egress to the construction site by designating and then stabilizing entrances and exits to prevent tracking of mud and dirt onto public roads.

### Appropriate Applications

- # On construction sites where dirt or mud tracking onto public roads by construction vehicles may occur.
- # Includes combination ingress/egress points and single purpose ingress and egress points.

### Limitations

- # Site conditions will dictate design and need.

### Standards and Specifications

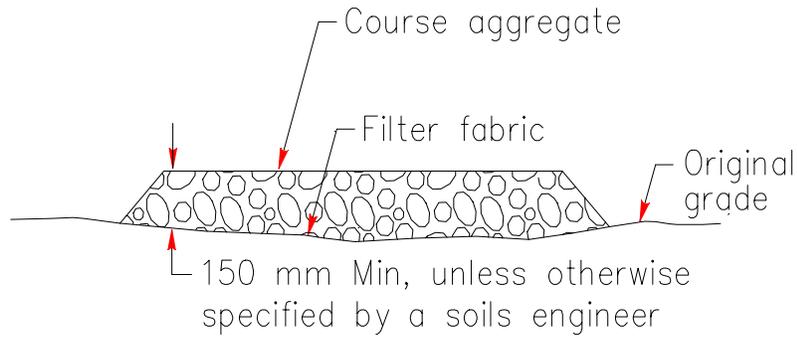
- # Design stabilized entrance to support heaviest vehicles and equipment that will use it.
- # Properly grade entrance to prevent runoff from leaving construction site. Route runoff from stabilized entrance through a sediment trapping device before discharge.
- # Select entrance stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions.

## Stabilized Construction Entrance

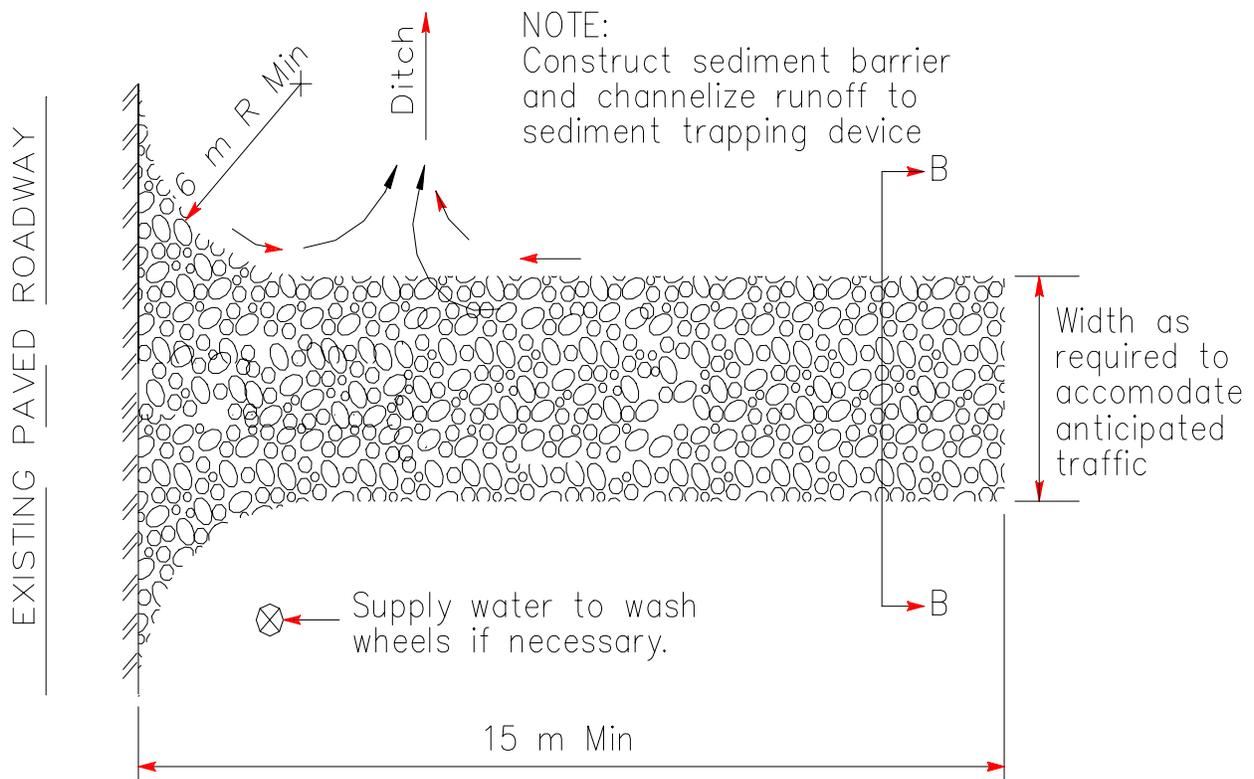
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- # If aggregate is selected, place a 150 mm (6 inch) course of aggregate over the geotextile fabric or a thickness of aggregate recommended by a soils engineer.
  - # Designate combination or single purpose entrances and exits to the construction site. Require all employees, subcontractors and others to use them.
  - # Require that all employees, subcontractors, and suppliers utilize the stabilized construction entrance.
- Maintenance and Inspection
- # Inspect routinely for damage and repair as needed.
  - # Service sediment trapping devices regularly.

# CD29A(2) Stabilized Construction Entrance



SECTION B-B  
NTS



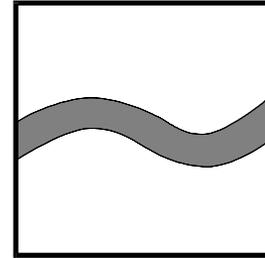
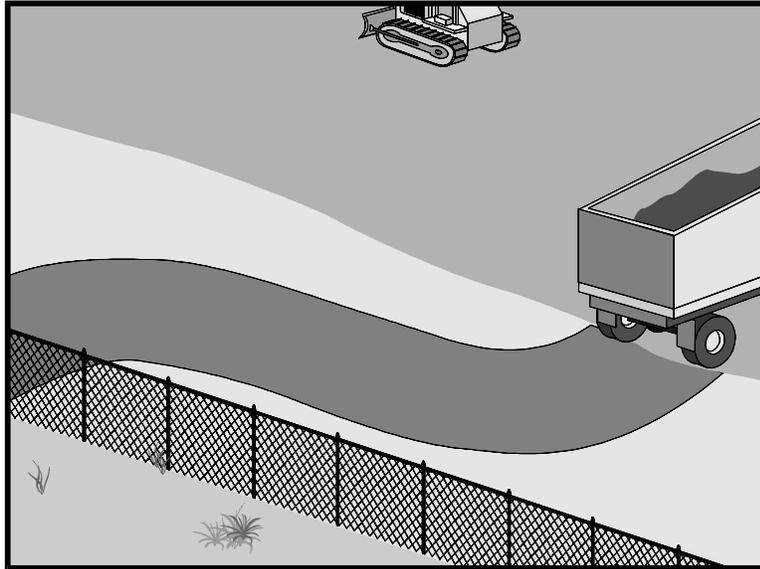
PLAN  
NTS

Sheet 1

# CD29B(2)

## Stabilized Construction Roadway

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### BMP Objectives

- M Soil Stabilization
- F Sediment Control
- M Tracking Control
- M Wind Erosion Control
- F Non-Storm Water

### Definition and Purpose

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of vehicular traffic within the construction site by designating and then stabilizing construction roadways to prevent erosion by wind and water and to control tracking of mud and dirt onto public roads.

### Appropriate Applications

# On construction sites where construction traffic may result in erosion by water and/or wind and where mud or dirt may be tracked onto public roads. Generally used in conjunction with CD29A(2)-Stabilized Construction Entrance.

### Limitations

# Site conditions will dictate design and need.

### Standards and Specifications

- # Select construction road stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions.
- # If aggregate is selected, place crushed aggregate over geotextile fabric to at least 150 mm (6 in) depth or to a depth recommended by soils engineer.
- # Designate stabilized construction roadways and require that employees, subcontractors, and others use them.
- # Limit speed of vehicles to control dust.

# CD29B(2)

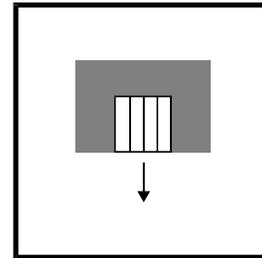
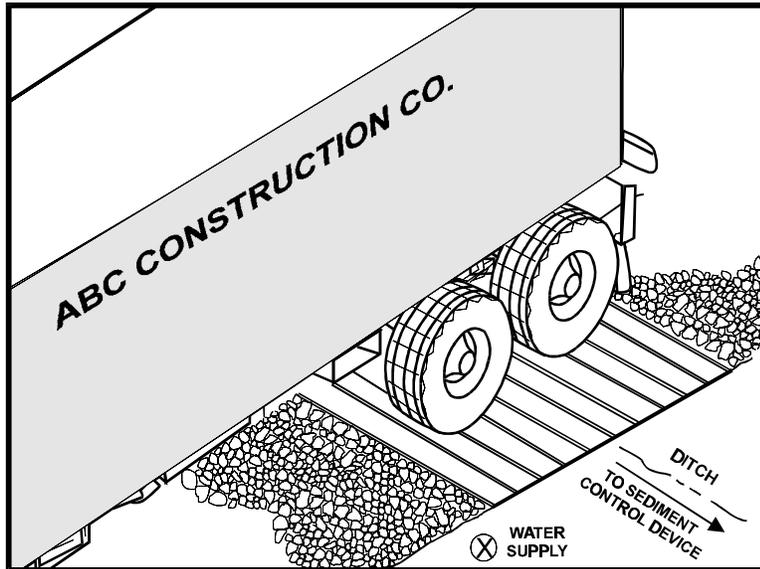
## Stabilized Construction Roadway

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- Maintenance and Inspection
- # Inspect routinely for damage and repair as needed.
  - # Keep all temporary roadway ditches clear.



# CD29C(2) Entrance/Outlet Tire Wash



<b>BMP Objectives</b>	
<b>M</b>	Soil Stabilization
<b>F</b>	Sediment Control
<b>M</b>	Tracking Control
<b>F</b>	Wind Erosion Control
<b>F</b>	Non-Storm Water

**Definition and Purpose**

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of vehicular ingress and egress to the construction site by providing facilities to remove mud and dirt from vehicle tires and undercarriages in order to prevent these materials from being deposited onto public roads.

**Appropriate Applications**

# On construction sites where dirt and mud tracking onto public roads by construction vehicles may occur. Generally used in conjunction with CD29A(2)-Stabilized Construction Entrance.

**Limitations**

- # Requires a supply of wash water.
- # Requires a turnout or double wide exit to avoid having entering vehicles from having to drive through the wash area.

**Standards and Specifications**

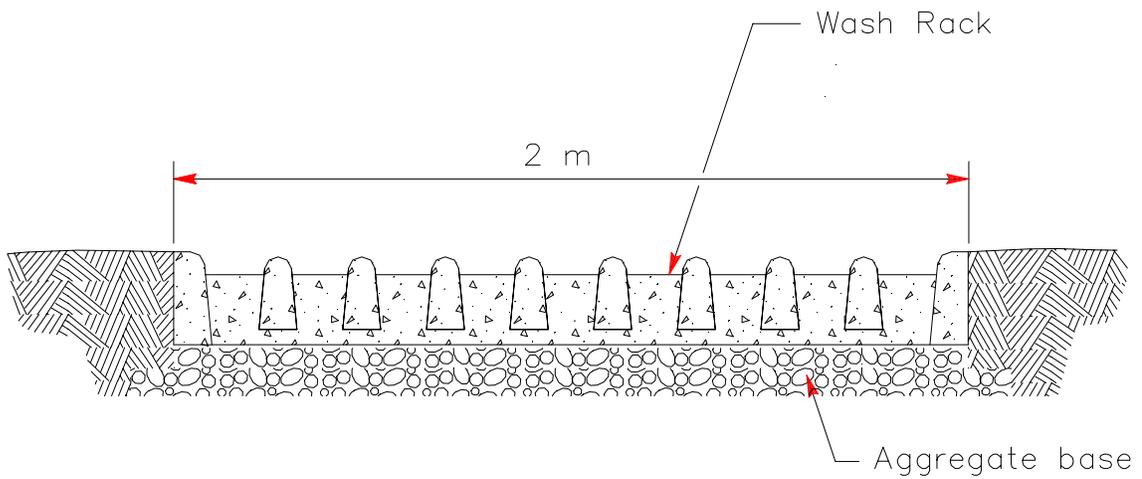
- # Incorporate with a stabilized construction entrance. See CD29A(2) - Stabilized Construction Entrance.
- # Construct on level ground when possible, on a pad of coarse aggregate.
- # Wash rack shall be designed for anticipated traffic loads.
- # Provide a drainage ditch that will convey the runoff from the wash area to a sediment trapping device.

# CD29C(2) Entrance/Outlet Tire Wash

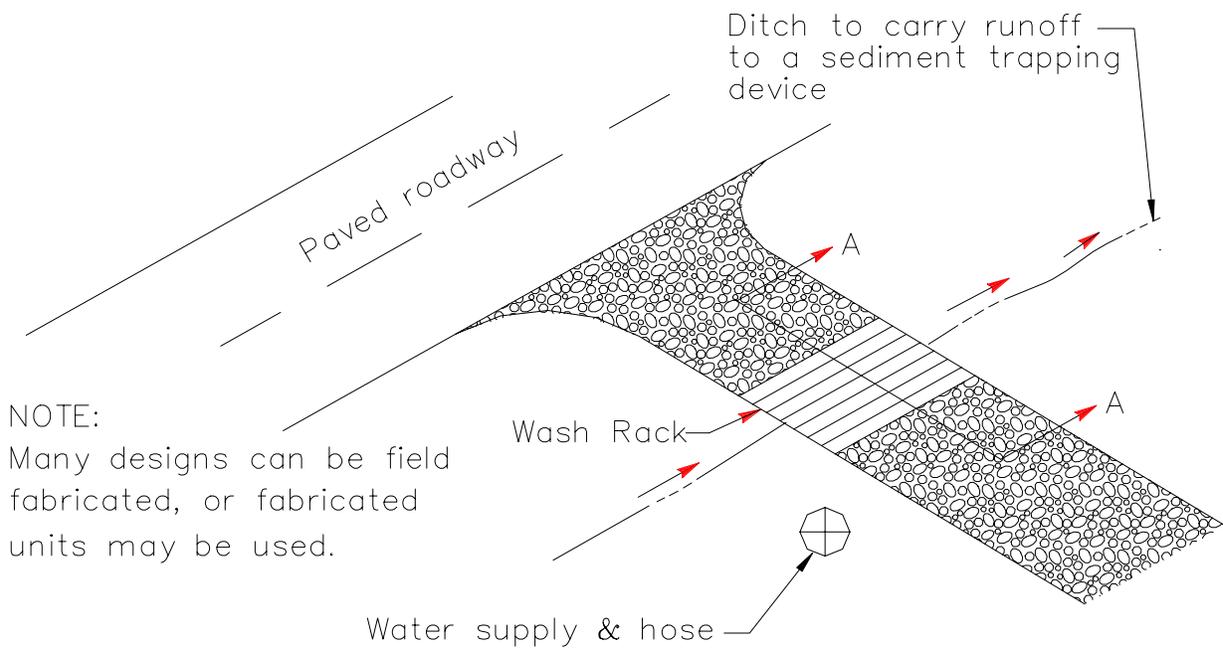
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- # Ditch shall be of sufficient grade, width, and depth to carry the wash runoff.
- # Require that all employees, subcontractors, and others that leave the site with mud-caked tires and/or undercarriages use the wash facility.
- Maintenance and Inspection
  - # Remove accumulated sediment in wash rack and/or sediment trap to maintain system performance.
  - # Inspect routinely for damage and repair as needed.

# CD29C(2) Entrance/Outlet Tire Wash



SECTION A-A  
NOT TO SCALE



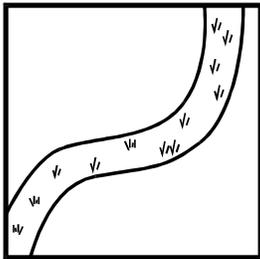
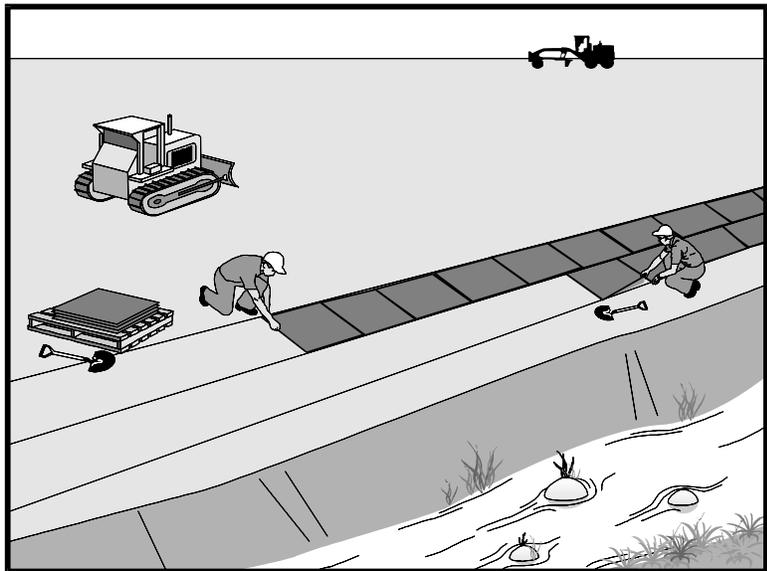
NOTE:  
Many designs can be field fabricated, or fabricated units may be used.

TYPICAL TIRE WASH  
NOT TO SCALE

Sheet 1

# CD30(2)

## Sodding, Grass Plugging, and Vegetative Buffer Strips



<b>BMP Objectives</b>	
<b>M</b>	Soil Stabilization
<b>F</b>	Sediment Control
<b>F</b>	Tracking Control
<b>F</b>	Wind Erosion Control
<b>F</b>	Non-Storm Water

**Definition and Purpose**

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by utilizing vegetation to protect soils from erosion and to slow the velocity of runoff to allow the removal of sediment through filtering and settling.

Sodding and plugging is the placement of permanent grass cover that has been grown elsewhere and brought to the site. Sodding stabilizes an area by immediately covering the soil surface with grass, thereby protecting the soil from erosion, enhancing infiltration, filtering sediment and other pollutants, and slowing runoff velocities. Plugging stabilizes an area by planting clumps of grass material, which then grow and spread to provide complete covers. Plugging is generally used for hybrid grasses that cannot be established from seed.

A vegetative buffer strip is a vegetated strip of land that is either created with new vegetation as part of a project, or may be a strip of existing vegetation left undisturbed on a construction site. The purpose of a vegetative buffer strip is to achieve temporary or permanent water quality benefits by slowing the velocity and filtering certain pollutants from storm water runoff.

**Appropriate Applications**

Sodding is appropriate for areas that contained turf prior to construction, or for any graded or cleared area that might erode and where a permanent, long-lived plant cover is needed immediately.

# CD30(2)

## Sodding, Grass Plugging, and Vegetative Buffer Strips

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Examples of locations where sodding may be used include buffer zones, stream banks, grassed dikes, swales, slopes, outlets, level spreaders, and filter strips.

Plugging is appropriate for the same areas as sodding, except that a longer establishment period before protection is provided as required.

Vegetative buffer strips may be used on any site that will support vegetation. Buffer strips are particularly effective on flood plains, adjacent to wetlands or other sensitive water bodies, and on steep, unstable slopes.

**Limitations** The purchase and placement of sod is more expensive than growing vegetation from seed. Additionally, sod is generally more expensive to maintain than other types of vegetation because of the need for irrigation, weeding, and mowing. Sod will not survive unless properly maintained.

Plugging is more expensive than seed but less expensive than sod. Plugging requires a longer establishment period than for sod before effective control is provided.

Site conditions will dictate need and design of vegetative buffer strips. Vegetative buffer strips are most economical when there is existing vegetation that can be retained to serve as the buffer strip; otherwise, vegetation will need to be established.

### Standards and Specifications

#### *Sodding and Grass Plugging*

- # Sod shall be protected with tarps or other protective covers during delivery and shall not be allowed to dry out between harvesting and placement.
- # All weeds and debris shall be removed before cultivation of the area to be planted and shall be disposed in accordance with Standard Specifications Section 7-1.13.
- # After cultivation, installation of irrigation systems, and excavation and backfilling of plant holes are completed, areas to be planted with sod shall be fine graded and rolled. Topsoil may be needed in areas where the soil textures are inadequate. Areas to be planted with sod shall be smooth and uniform prior to placing sod. Areas to be planted with sod adjacent to sidewalks, concrete headers, header boards, and other paved borders and surface areas shall be 38 mm ± 6 mm (1.5 in ± 0.25 in) below the top grade of such

# CD30(2)

## Sodding, Grass Plugging, and Vegetative Buffer Strips

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facilities after fine grading, rolling, and settlement of the soil. Sod shall be placed so that ends of adjacent strips of sod are staggered a minimum of 600 mm (24 in). All edges and ends of sod shall be placed firmly against adjacent sod and against sidewalks, concrete headers, header boards, and other paved borders and surfaced areas.

- # After placement of the sod, the entire sodded area shall be lightly rolled to eliminate air pockets and to ensure close contact with the soil. After rolling, the sodded areas shall be watered so that the soil is moistened to a minimum depth of 100 mm (4 in). Sod shall not be allowed to dry out. Sod should not be planted during very hot or wet weather. Sod should not be placed on slopes that are greater than 1:3 (V:H) if they are to be mowed.
- # If irregular or uneven areas appear before or during the plant establishment period, such areas shall be restored to a smooth and even appearance.
- # When the sod has reached a height of 75 mm (3 in), it shall be mowed to a height of 25 mm (1 in) or as recommended by the grower of the sod. All turf edges, including edges adjacent to sidewalks, concrete headers, header boards, and other paved borders and surfaced areas, shall be trimmed to a uniform edge not extending beyond the edge of turf or such facilities
- # Mowed and trimmed growth shall be removed and disposed in accordance with Standard Specifications Section 7-1.13. Trimming shall be repeated whenever the edge of the turf exceeds 25 mm (1 in).
- # Sod shall be healthy, field-grown sod containing not more than 13 mm (0.5 in) thick thatch. The age of the sod shall not be less than 8 months nor more than 16 months. Sod shall be grown in accordance with California agricultural codes. The sod shall be free from disease, weeds, insects, and undesirable types of grasses and clovers. Soil upon which the sod has been grown shall contain less than 50 percent silt and clay. Sod shall be machine cut at a uniform soil thickness of 16 mm  $\pm$  6 mm (0.625 in  $\pm$  0.25 in), not including top growth and thatch.

# CD30(2)

## Sodding, Grass Plugging, and Vegetative Buffer Strips

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- # A Certificate of Compliance for the sod shall be furnished to the Engineer in accordance with the Standard Specifications Section 6-1.07.

### *Vegetative Buffer Strips*

Many local storm water programs or zoning agencies have regulations that define required or allowable vegetative buffer zones, particularly near sensitive or protected areas such as wetlands. Contact the appropriate local agency for specific requirements.

If a vegetative buffer strip will be created from existing vegetation, see CD23(2) - Preservation of Existing Vegetation.

For development of a vegetative buffer strip from new vegetation, the following steps shall be followed:

- # Strip and stockpile good topsoil during construction. Use stockpiled topsoil for surface preparation prior to seeding operations.
- # Prepare a good, firm seed bed by adding soil amendments such as fertilizer as needed. After seeding, apply a mulch to protect the vegetation during establishment. Select a seed mixture appropriate to the site conditions, remembering that dense grasses are the most effective in slowing flow velocities and removing pollutants such as sediment. A thick root structure is needed to control erosion
- # Plant during the best time for the particular grass or vegetation selected.
- # Use planting equipment and methods that provide uniform distribution and proper placement of seed.
- # Water or irrigate the vegetation as needed to supplement rainfall until established.
- # Fertilize in accordance with label instructions and the needs of the grass and soil as indicated by soil tests.
- # Overseed, repair bare spots, or apply additional mulch as necessary.

# CD30(2)

## Sodding, Grass Plugging, and Vegetative Buffer Strips

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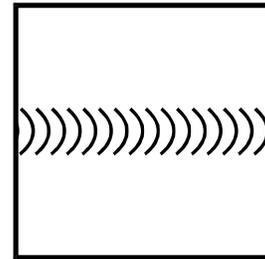
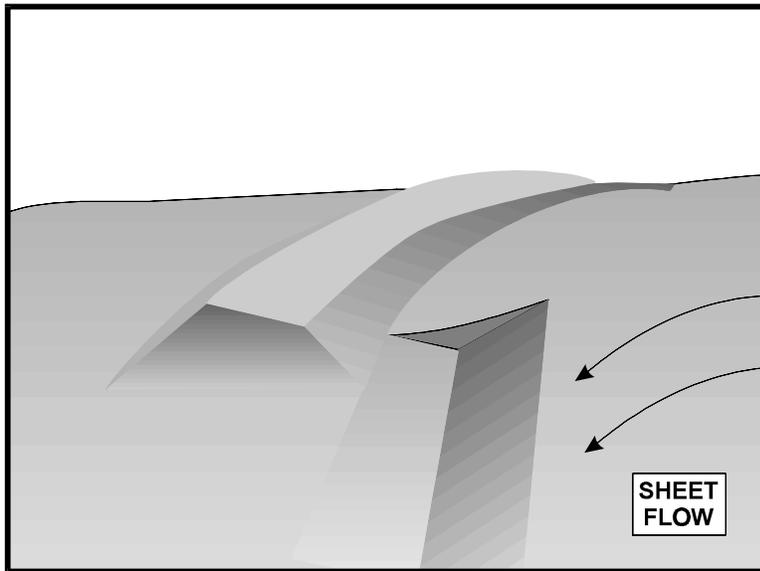
- # Avoid using the buffer strip for vehicular traffic as it will damage the vegetation and reduce its effectiveness as a buffer.
  - # Application of fertilizer, lime, or other soil amendments shall follow California Food and Agricultural codes, county, and/or local guidelines and label instructions.
- Maintenance and Inspection
- # Inspect sod installations weekly and after significant storm events, until the turf is established, and routinely thereafter.
  - # Maintenance shall consist of mowing, weeding, and ensuring that the irrigation system is operating properly and as designed to sustain growth.
  - # Inspect buffer strips weekly and after significant storm events until vegetation is established, and routinely thereafter. Repair eroded or damaged areas as needed to maintain original purpose and effectiveness of the buffer strip.



# CD31(2)

## Earth Dikes, Drainage Swales, and Lined Ditches

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<b>BMP Objectives</b>
M Soil Stabilization
F Sediment Control
F Tracking Control
F Wind Erosion Control
F Non-Storm Water

**Definition and Purpose**

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to water courses as a result of construction activity by utilizing earth dikes, drainage swales, and line ditches to intercept, divert, and convey runoff in a manner that prevents erosion and/or prevents runoff from flowing onto areas where it might become contaminated.

**Appropriate Applications**

- # Where needed to convey surface runoff down sloping land to avoid erosion.
- # Where needed to intercept and divert runoff to avoid sheet flow over sloped surfaces.
- # Where needed to direct runoff towards a stabilized watercourse, drainage pipe or channel.
- # Where needed to direct runoff away from material storage areas, equipment fueling and maintenance areas, and any other area where the runoff may become contaminated.
- # Below steep grades where runoff begins to concentrate.
- # Along roadways and around facility improvements that are subject to flood damage.

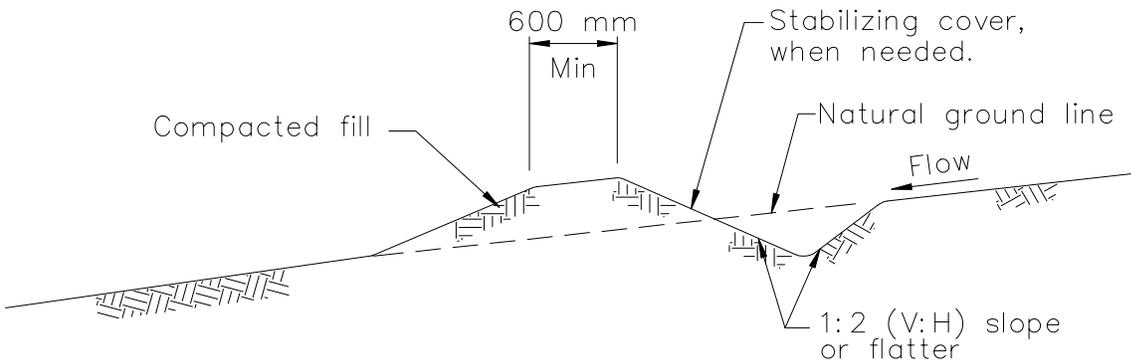
# CD31(2) Earth Dikes, Drainage Swales, and Lined Ditches

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- # In conjunction with other control measures such as CD32A(1) - Slope Drains and Subsurface Drains and CD32B(2) - Top and Toe of Slope Diversion Ditches/Berms.
- Limitations
- # Not suitable as sediment trapping devices.
  - # Conveyances must be stabilized.
  - # Use a lined ditch for high flow velocities.
- Standards and Specifications
- # Select design flow and safety factor based on careful evaluation of the risks due to erosion of the measure, over topping, flow backups, or washout.
  - # Compact any fills to prevent unequal settlement.
  - # When possible, install and utilize permanent dikes, swales, and ditches early in the construction process.
  - # Provide stabilized outlets. See CD33A(2)-Outlet Protection/Velocity Dissipation Devices.
- Maintenance and Inspection
- # Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.
  - # Inspect temporary facilities before and after significant storms, and at least once per week during the rainy season.
  - # Inspect the channel lining, embankments, and bed for erosion and accumulating debris and sediment build up. Remove debris and repair linings and embankment as required.



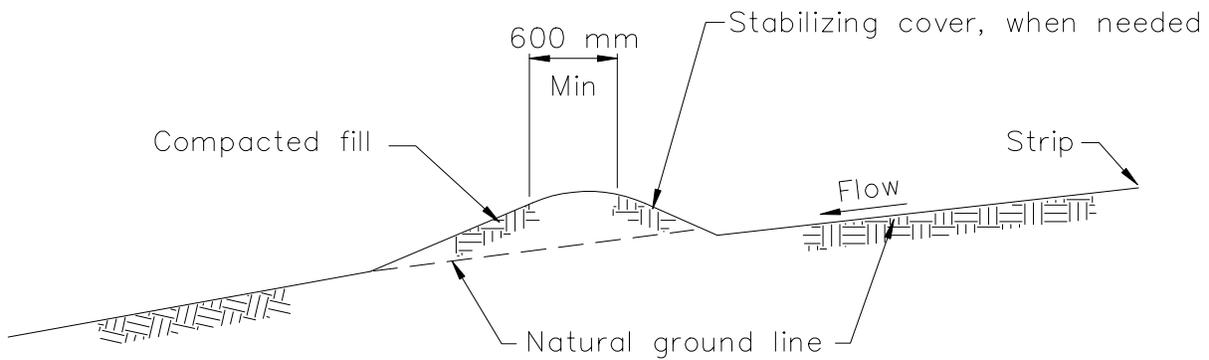
# CD31(2) Earth Dikes, Drainage Swales, and Lined Ditches



TYPICAL DRAINAGE SWALE  
NOT TO SCALE

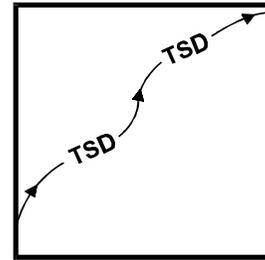
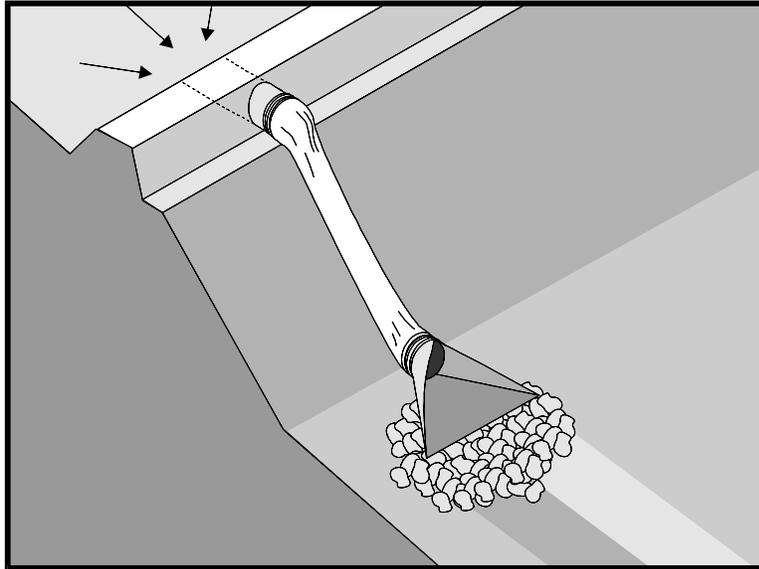
NOTES:

1. Stabilize inlet, outlets and slopes.
2. Properly compact the subgrade, in conformance with Section 19-5 of the Caltrans Standard Specifications.



TYPICAL EARTH DIKE  
NOT TO SCALE

# Slope Drains and Subsurface Drains



BMP Objectives	
M	Soil Stabilization
F	Sediment Control
F	Tracking Control
F	Wind Erosion Control
F	Non-Storm Water

**Definition and Purpose**

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by utilizing pipes to intercept and direct surface runoff down slopes in a non-erosive manner to a stabilized outlet and to intercept and direct groundwater to allow for slope drainage and stabilization in areas where slopes can become saturated.

**Appropriate Applications**

- # Slope drains: where slopes may be eroded by concentrated surface runoff.
- # Subsurface drains: where excessive water must be removed from the soil.

**Limitations**

- # Subsurface drains may remove fine soils which can result in collapse of the slope.
- # Severe erosion may result when slope drains fail by over topping, piping, or pipe separation.

**Standards and Specifications**

- # When using slope drains, limit drainage area to 4 ha (10 ac) per pipe. For larger areas, use a rock-lined channel or a series of pipes.
- # Maximum slope generally limited to 1:2 (V:H), as energy dissipation below steeper slopes is difficult.

# Slope Drains and Subsurface Drains

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# Direct surface runoff to slope drains with interceptor dikes. See CD31(2)-Earth Dikes, Drainage Swales, and Lined Ditches and CD32(B)- Top and Toe of Slope Diversion Ditches/Berms.

# When installing slope drains:

- Install slope drains perpendicular to slope contours.
- Compact soil around and under entrance, outlet, and length of pipe.
- Securely anchor and stabilize pipe and appurtenances into soil.
- Check to ensure that pipe connections are water tight.
- Protect inlet and outlet of slope drains: use standard flared end section at entrance for pipe slope drains 300 mm (12 in) and larger.

# When installing subsurface drains:

- Slightly slope subsurface drain towards outlet.
- Check to ensure that pipe connections are water tight.
- Install subsurface relief drains parallel to slope and drain to side of slope.
- Install subsurface interceptor drains perpendicular to slope and divert discharge to the side of the slope.

## Maintenance and Inspection

# Inspect before and after each rain storm, and twice monthly until the tributary drainage area has been stabilized. Follow routine inspection procedures for inlets thereafter.

# Inspect outlet for erosion and downstream scour. If eroded, repair damage and install additional energy dissipation measures. If downstream scour is occurring, it may be necessary to reduce flows being discharged into the channel unless other preventative measures are implemented.

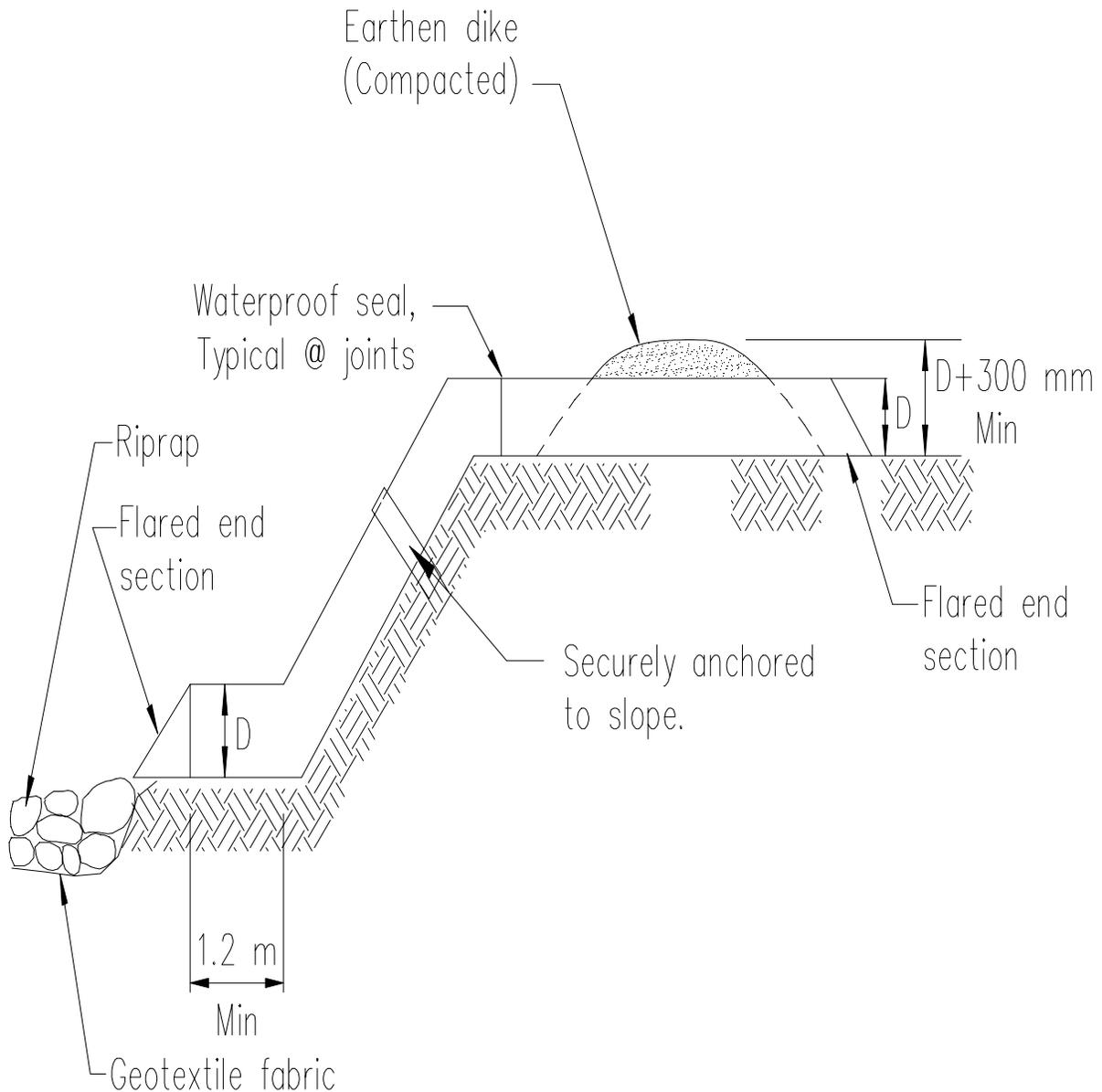
# Inspect slope drainage for accumulations of debris and sediment.

## Slope Drains and Subsurface Drains

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- # Remove built-up sediment from entrances and outlets as required. Flush drains if necessary; capture and settle out sediment from discharge.
  
- # Make sure water is not ponding onto inappropriate areas (e.g., active traffic lanes, material storage areas, etc.).

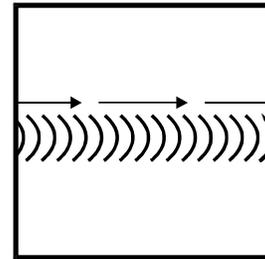
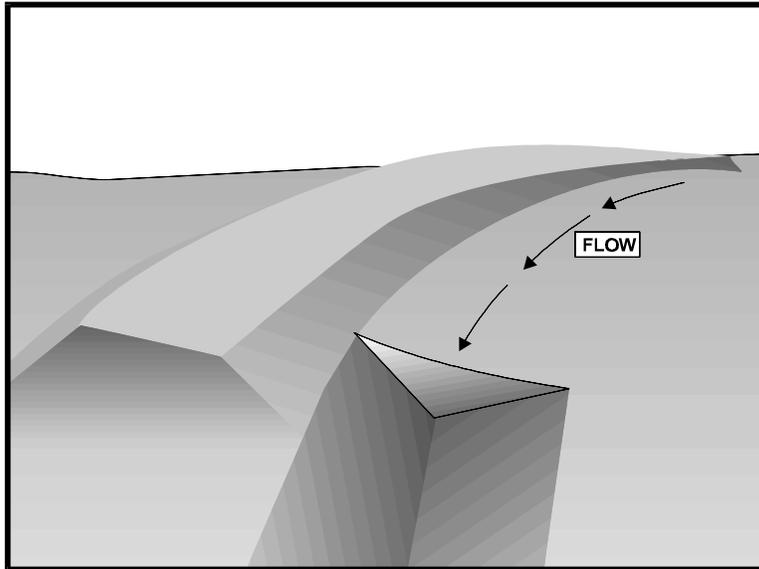
# CD32A(2) Slope Drains and Subsurface Drains



TYPICAL SLOPE DRAIN  
NOT TO SCALE

# CD32B(2)

## Top and Toe of Slope Diversion Ditches/Berms



<b>BMP Objectives</b>
M Soil Stabilization
F Sediment Control
F Tracking Control
F Wind Erosion Control
F Non-Storm Water

<b>Definition and Purpose</b>	Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by utilizing ditches and berms above and below slopes to prevent concentrated flows from eroding the slope surface or toe.
<b>Appropriate Applications</b>	<ul style="list-style-type: none"> <li># Where runoff must be prevented from flowing over a slope.</li> <li># Where runoff must be intercepted at the bottom of a slope.</li> <li># Where needed to direct runoff to a stable conveyance, such as a slope drain.</li> <li># Where needed to direct runoff to a sediment trapping device.</li> <li># Where needed to intercept runoff and direct it around the site.</li> </ul>
<b>Limitations</b>	Ditches/berms are not sediment trapping devices.
<b>Standards and Specifications</b>	<ul style="list-style-type: none"> <li># Select design flows and safety factor based on careful evaluation of risks due to erosion of the measure, over topping, flow backups, or washout.</li> <li># High flow velocities may require the use of a lined ditch, or other methods of stabilization.</li> </ul>

# CD32B(2) Top and Toe of Slope Diversion Ditches/Berms

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# When installing diversion ditches and berms:

- Protect outlets from erosion.
- Utilize planned permanent ditches/berms early in construction phase when practicable.

## Maintenance and Inspection

# Inspect temporary measures prior to the rainy season, after rainfall events, and regularly (approximately once per week) during the rainy season.

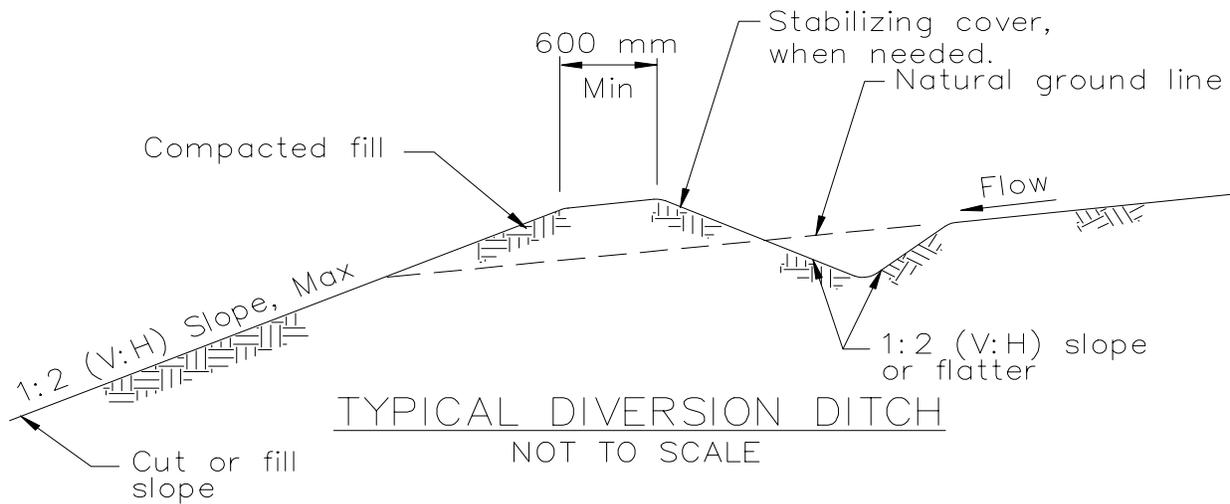
# Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.

# Inspect ditches and berms for accumulation of debris and sediment. Remove debris and sediment as needed.

# Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.

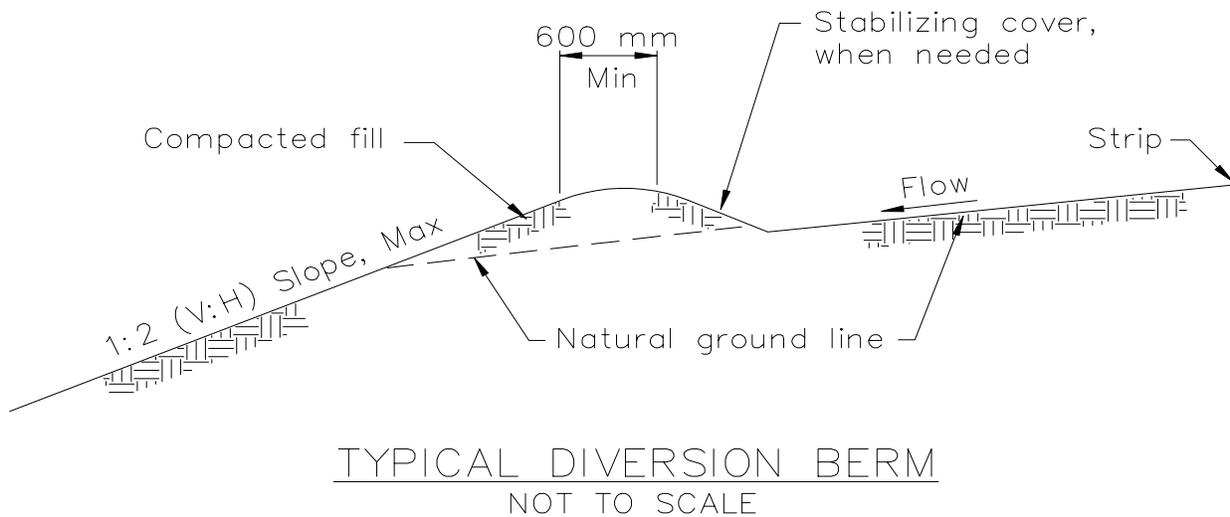


# CD32B(2) Top and Toe of Slope Diversion Ditches/Berms



## NOTES:

1. Stabilize inlet, outlets and slopes.
2. Properly compact the subgrade, in conformance with Section 19-5 of the Caltrans Standard Specifications.

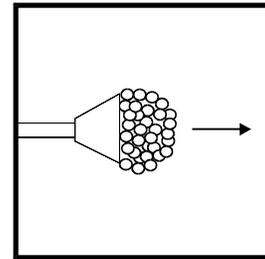
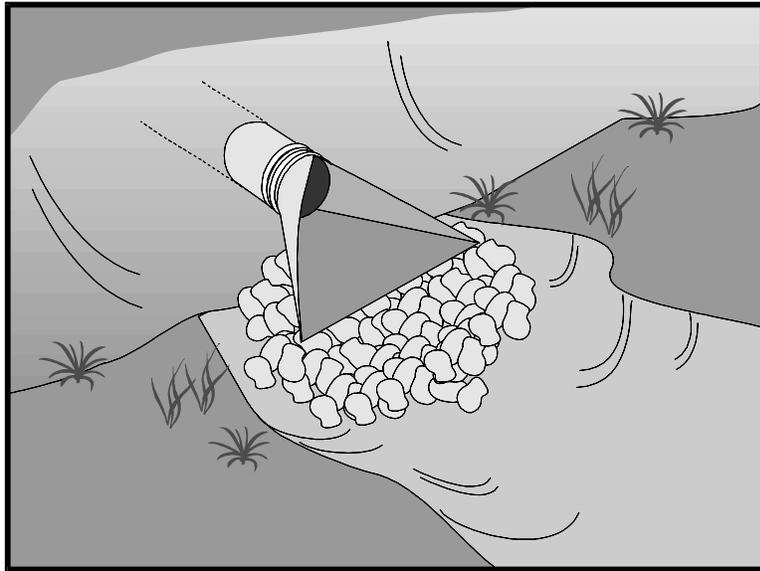


Sheet 1



# CD33A(2)

## Outlet Protection/Velocity Dissipation Devices



### BMP Objectives

- M Soil Stabilization
- F Sediment Control
- F Tracking Control
- F Wind Erosion Control
- F Non-Storm Water

<b>Definition and Purpose</b>	Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by utilizing devices placed at outlets to pipes and channels to reduce the velocity and/or energy of exiting water as a means of controlling erosion and scour.
<b>Appropriate Applications</b>	<ul style="list-style-type: none"> <li># Outlets of pipes, drains, culverts, conduits or channels.</li> <li># Outlets located at the bottom of mild to steep slopes.</li> <li># Outlets of channels which carry continuous flows of water.</li> <li># Outlets subject to short, intense flows of water, such as flash floods.</li> <li># Where lined conveyances discharge to unlined conveyances.</li> </ul>
<b>Limitations</b>	<ul style="list-style-type: none"> <li># Loose rock may have stones washed away during high flows.</li> <li># Grouted riprap may break up in areas of freeze and thaw.</li> <li># Grouted riprap may breakup from hydrostatic pressure without adequate drainage.</li> </ul>

# CD33A(2)

## Outlet Protection/Velocity Dissipation Devices

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### Standards and Specifications

- # Riprap aprons are best suited for temporary use during construction.
- # Carefully place riprap to avoid damaging the filter fabric.
- # For proper operation of apron:
  - Construct apron at zero grade.
  - Align apron with receiving stream and keep straight throughout its length. If a curve is needed to fit site conditions, place it in upper section of apron.

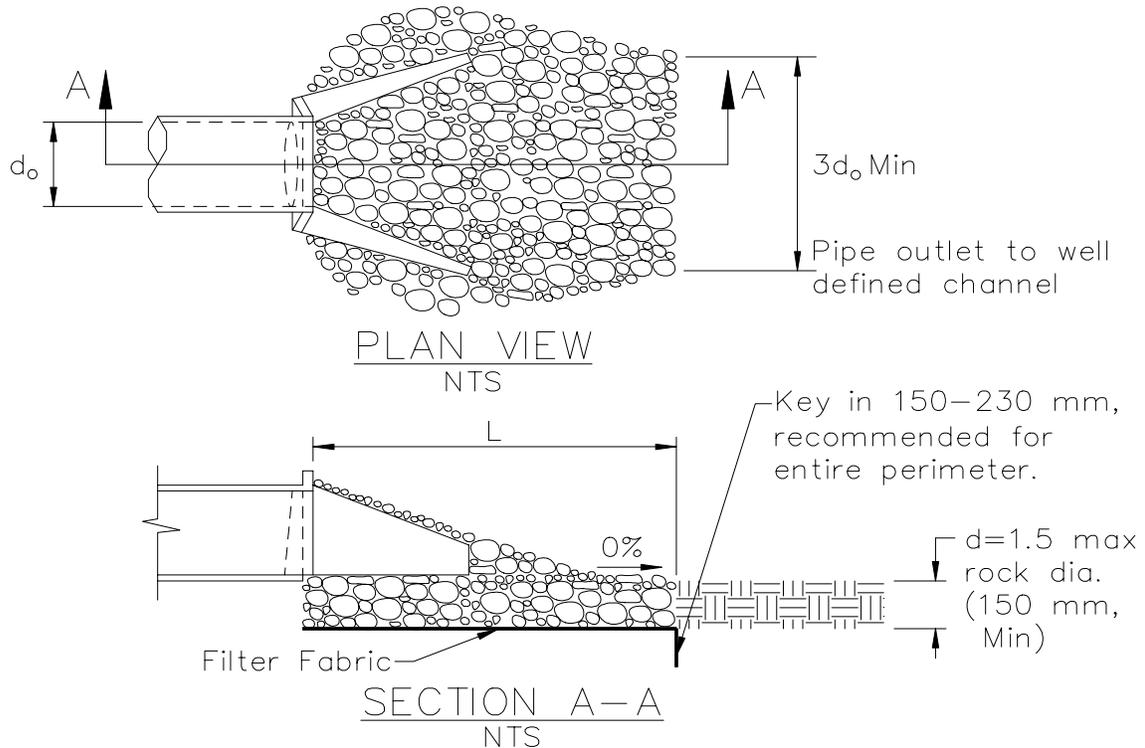
### Maintenance and Inspection

- # Inspect temporary measures prior to the rainy season, after rainfall events, and regularly (approximately once per week) during the rainy season.
- # Inspect apron for displacement of the riprap and/or damage to the underlying fabric. Repair fabric and replace riprap which has washed away.
- # Inspect for scour beneath the riprap and around the outlet. Repair damage to slopes or underlying filter fabric immediately.
- # Temporary devices should be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.



# CD33A(2)

## Outlet Protection/Velocity Dissipation Devices



Adapted from: Virginia Erosion & Sediment Control Handbook, 1992

Pipe Diameter mm	Discharge m <sup>3</sup> /s	Apron Length, L m	Rip Rap D <sub>50</sub> Diameter Min mm
300	0.14	3	100
	0.28	4	150
450	0.28	3	150
	0.57	5	200
	0.85	7	300
	1.13	8	400
600	0.85	5	200
	1.13	8	200
	1.42	8	300
	1.70	9	400

For larger or higher flows,  
consult a registered civil engineer

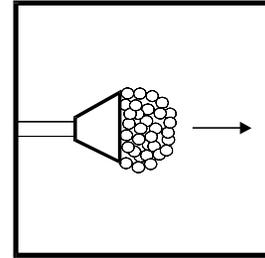
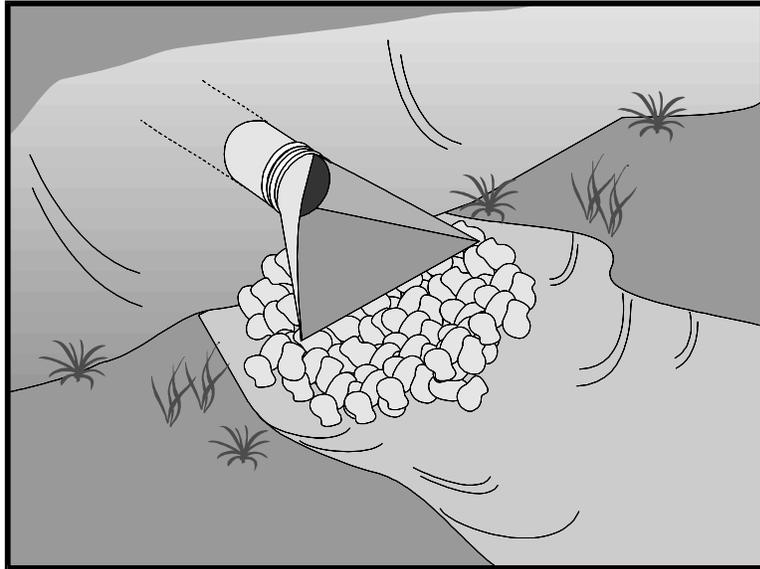
Source: USDA-SCS

**Sheet 1**

# CD33B(2)

## Flared Culvert End Sections

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### BMP Objectives

- M** Soil Stabilization
- F** Sediment Control
- F** Tracking Control
- F** Wind Erosion Control
- F** Non-Storm Water

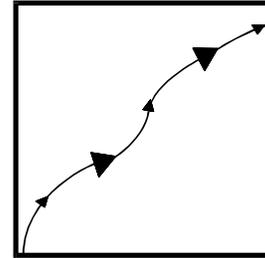
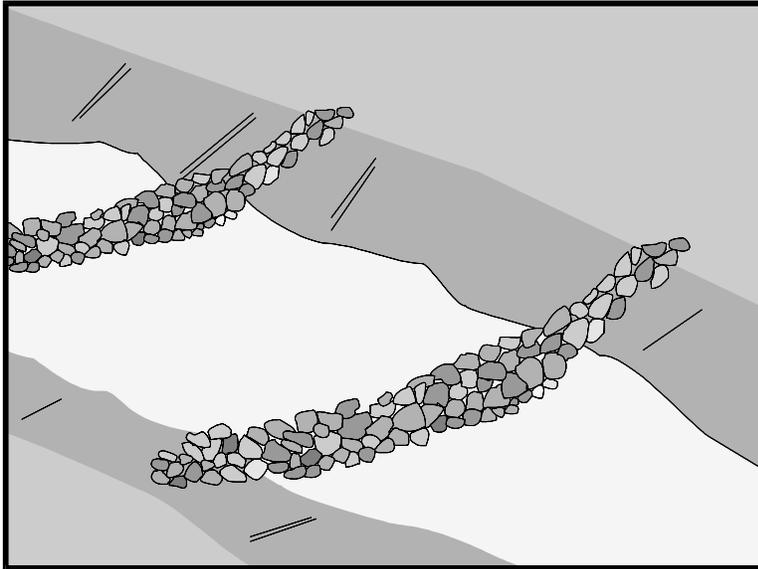
<b>Definition and Purpose</b>	Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by utilizing devices at inlets and outlets of pipes (culverts, slope drains) to improve hydraulic operation and retain the embankment near inlets and outlets to pipe conveyances, thus reducing erosion and scour.
<b>Appropriate Applications</b>	<ul style="list-style-type: none"> <li># Outlets of slope drains and culverts.</li> <li># Inlets of slope drains and culverts.</li> </ul>
<b>Limitations</b>	# Primarily for hydraulic efficiency, with some limited erosion control benefits.
<b>Standards and Specifications</b>	<ul style="list-style-type: none"> <li># Design and install in accordance with Caltrans Standard Plans D94A and D94B.</li> <li># Check to ensure that pipe connections are water tight.</li> <li># Construct at zero grade when possible.</li> <li># At outlets, use CD33A(2)-Outlet Protection/Velocity Dissipation Devices in conjunction with the flared culvert and section to prevent erosion and scour.</li> </ul>
<b>Maintenance and Inspection</b>	# Inspect temporary measures prior to the rainy season, after rainfall events, and regularly (approximately once per week) during the rainy season.

# CD33B(2) Flared Culvert End Sections

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- # Inspect for debris and sediment build up. Remove debris and sediment as needed.
  
- # Inspect for scour beneath and around flared end sections. Repair any damage as needed.





### BMP Objectives

- M Soil Stabilization
- M Sediment Control
- F Tracking Control
- F Wind Erosion Control
- F Non-Storm Water

### Definition and Purpose

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by utilizing temporary dams of rocks, logs, or timbers placed across a channel or ditch in order to reduce erosion of the conveyance and to help slow flows so that sediment can settle and be trapped.

### Appropriate Applications

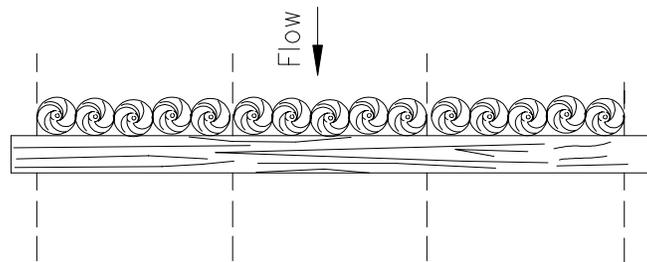
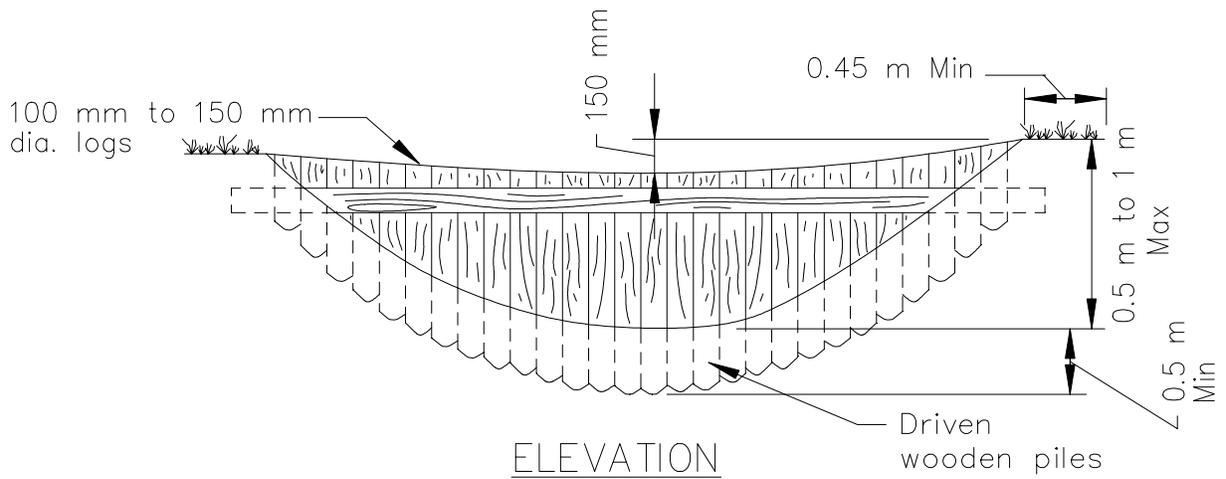
- # In small open channels which drain 4 ha (10 ac) or less.
- # In steep channels where storm water runoff velocities must be reduced to protect against erosion.
- # During the establishment of grass linings in drainage ditches or channels.
- # In temporary ditches or channels where the short length of service does not allow or warrant establishment or construction of erosion-resistant linings.
- # Where slowing the flow of water is required to settle suspended sediment.

### Limitations

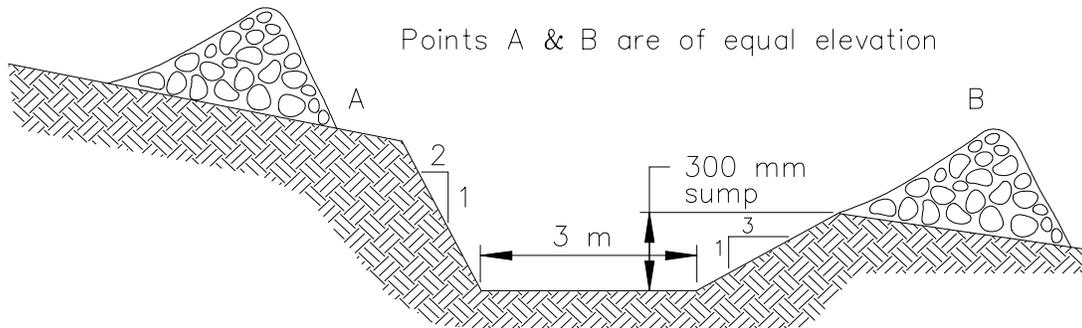
- # Not to be used in live streams.
- # Not appropriate in channels which drain areas greater than 4 ha (10 ac).
- # Not to be placed in channels which are already grass lined unless erosion is expected, as installation may damage vegetation.

- # Require extensive maintenance following high velocity flows.
  - # Promotes sediment trapping which can be resuspended during subsequent storms or removal of the check dam.
  - # Not to be constructed from straw bales or silt fences.
- Standards and Specifications
- # Check dams shall be placed at a distance and height to allow small pools to form behind them.
  - # For multiple check dam installation, backwater from downstream check dam shall reach the toe of the upstream dam.
  - # High flows (typically a 2 year storm or larger) shall safely flow over the check dam without an increase in upstream flooding or damage to the check dam.
  - # Where grass is used to line ditches, check dams shall be removed when grass has matured sufficiently to protect the ditch or swale.
  - # A sump shall be provided immediately upstream of the dam for the purpose of capturing excessive sediment.
  - # Rock shall be placed individually by hand or by mechanical methods (no dumping of rock) to achieve complete ditch or swale coverage.
- Maintenance and Inspection
- # Inspect check dams after each significant rainfall event. Repair damage as needed.
  - # Remove sediments when depth reaches one-third of the check dam height.

# CD34(2) Check Dams



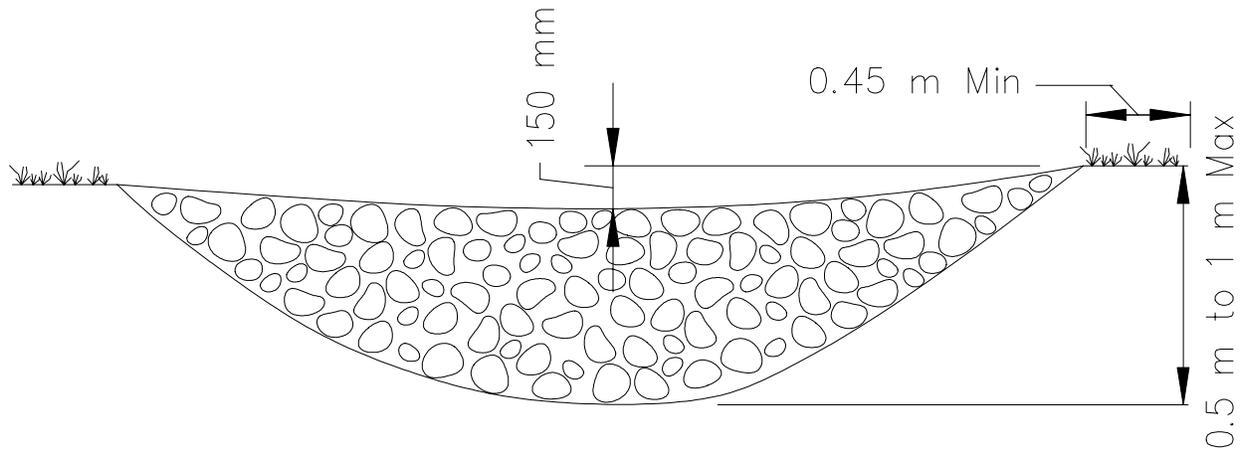
**LOG CHECK DAM**  
NOT TO SCALE



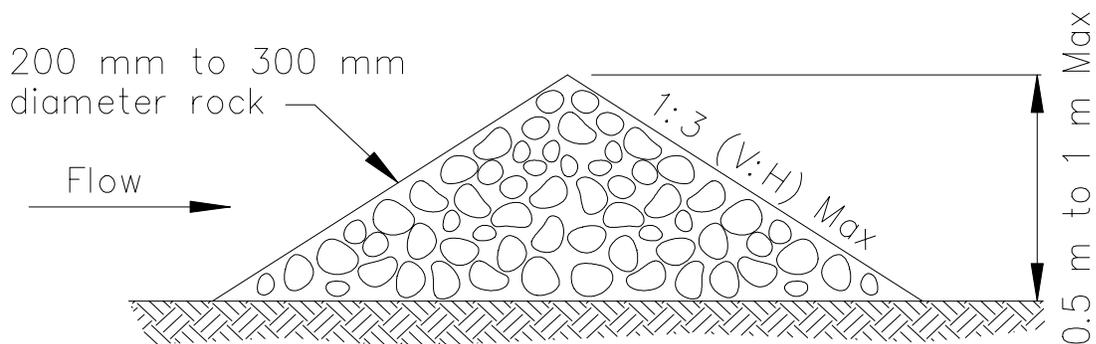
**TYPICAL SPACING BETWEEN CHECK DAMS**  
NOT TO SCALE

Sheet 1





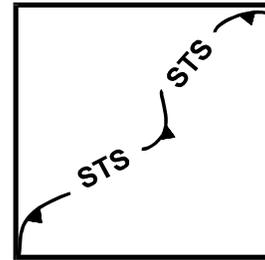
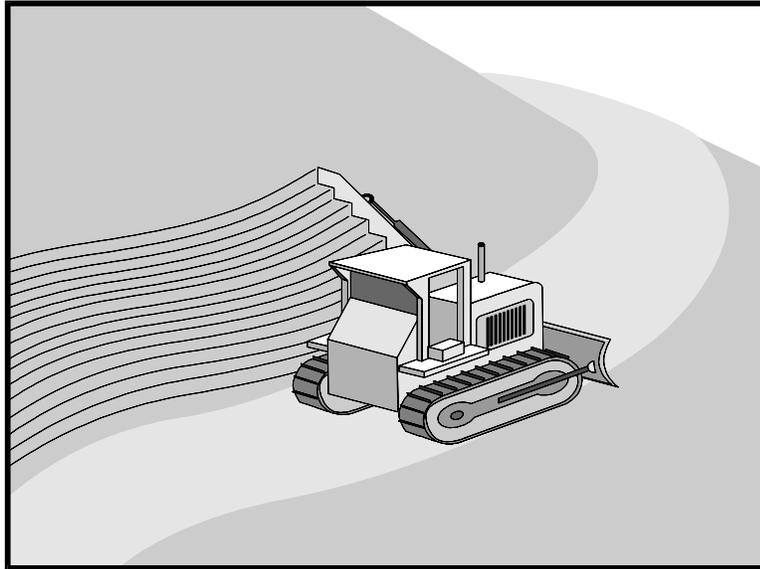
ELEVATION



TYPICAL ROCK CHECK DAM SECTION

ROCK CHECK DAM  
NOT TO SCALE

# Slope Roughening/Terracing/Rounding



BMP Objectives	
M	Soil Stabilization
F	Sediment Control
F	Tracking Control
F	Wind Erosion Control
F	Non-Storm Water

<b>Definition and Purpose</b>	Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by roughening, terracing, and rounding slopes to reduce erosion by decreasing runoff velocities, trapping sediment, increasing infiltration, and aiding in the establishment of vegetative cover from seed.
<b>Appropriate Applications</b>	<ul style="list-style-type: none"> <li># All construction slopes require surface roughening or terracing of some kind to facilitate long-term stabilization with vegetation, particularly slopes steeper than 1:3 (V:H), and greater than 1.5 m (5 ft) in height.</li> <li># Where seeding, planting, and mulching will benefit from surface roughening.</li> <li># Graded areas with smooth, hard surfaces.</li> <li># Where length of slopes needs to be shortened by terracing. Terracing is usually permanent, and should be designed under the direction of and approved by a registered professional civil engineer based on site conditions. Terraces must be designed with adequate drainage and stabilized outlets.</li> </ul>
<b>Limitations</b>	<ul style="list-style-type: none"> <li># Roughening may increase grading costs and result in sloughing in certain soil types.</li> <li># Stair-step grading may not be practical for sandy, steep, or shallow soils.</li> </ul>

# Slope Roughening/Terracing/Rounding

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- # Roughening alone as a temporary erosion control measure is of limited effectiveness in intense rainfall events. If roughening effects are washed away in a heavy storm, the surface will have to be re-roughened and new seed and mulch applied.

## Standards and Specifications

### *Cut Slope Roughening*

- # Stair-step grade or groove cut slopes that are steeper than 1:3 (V:H).
- # Use stair-step grading on erodible material which is soft enough to be ripped by a bulldozer. Slopes consisting of soft rock with some subsoil are particularly suited to stair-step grading.
- # Make the vertical cut distance less than the horizontal distance, and slightly slope the horizontal position of the "step" in towards the slope.
- # Do not make individual vertical cuts more than 600 mm (24 in) high in soft materials or more than 1 m (3 ft) high in rocky materials.
- # Groove the slope using machinery to create a series of ridges and depressions that run across the slope and on the contour.

### *Fill Slope Roughening*

- # Place fill slopes with a gradient steeper than 1:3 (V:H) in lifts not to exceed 200 mm (8 in), and make sure each lift is properly compacted.
- # Ensure that the face of the slope consists of loose, uncompacted fill 100 mm (4 in) to 150 mm (6 in).
- # Use grooving or tracking to roughen the face of the slopes, if necessary.
- # Apply seed, fertilizer, and mulch and then track or crimp in the mulch. See CD24B(2) - Temporary Seeding and Planting and CD25(2) - Mulching.
- # Do not blade or scrape the final slope face.

### *Cuts, Fills, and Graded Areas*

- # Slopes that will be maintained by mowing should be no steeper than 1:3 (V:H).

## Slope Roughening/Terracing/Rounding

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- # To roughen these areas, create shallow grooves by normal tilling, disking, harrowing, or use a cultipacker-seeder. Make the final pass of any such tillage on the contour.
- # Make grooves formed by such implements close together, less than 250 mm (10 in), and not less than 25 mm (1 in) deep.
- # Excessive roughness is undesirable where mowing is planned.

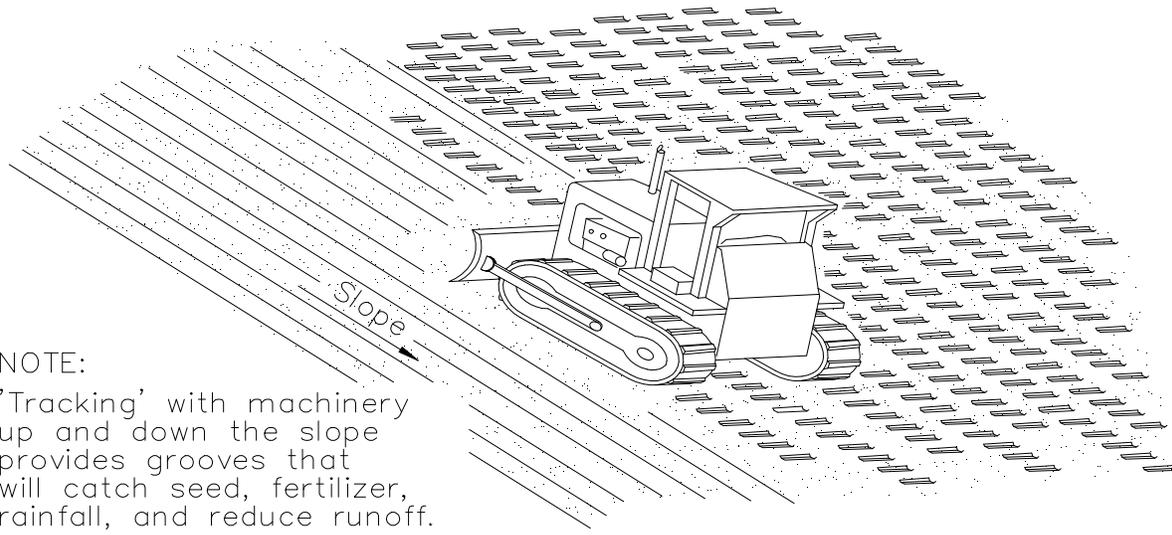
### *Roughening with Tracked Machinery*

- # Limit roughening with tracked machinery to soils with a sandy textural component to avoid undue compaction of the soil surface.
- # Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Do not backblade during the final grading operation.
- # Immediately seed and mulch roughened areas to obtain optimum seed germination and growth.

### Maintenance and Inspection

Periodically check the seeded or planted slopes for rills and washes, particularly after significant storm events greater than 12 mm (0.5 in). Fill these areas slightly above the original grade, then reseed and mulch as soon as possible.

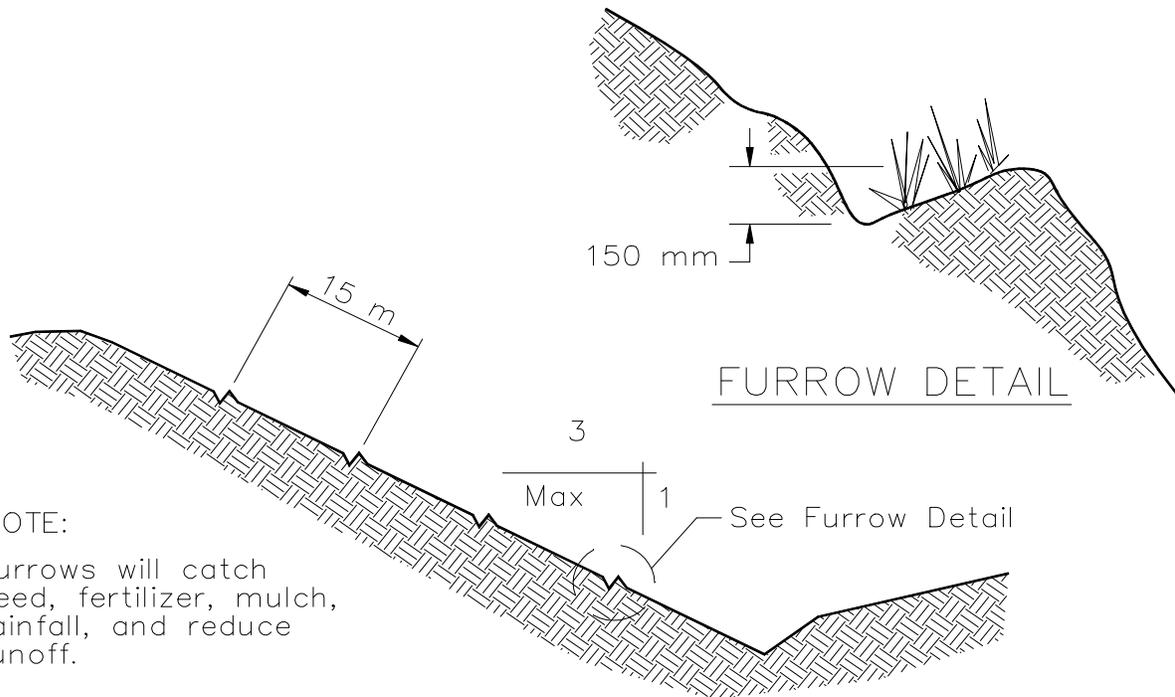
# Slope Roughening/Terracing/Rounding



NOTE:

'Tracking' with machinery up and down the slope provides grooves that will catch seed, fertilizer, rainfall, and reduce runoff.

TRACKING  
NTS

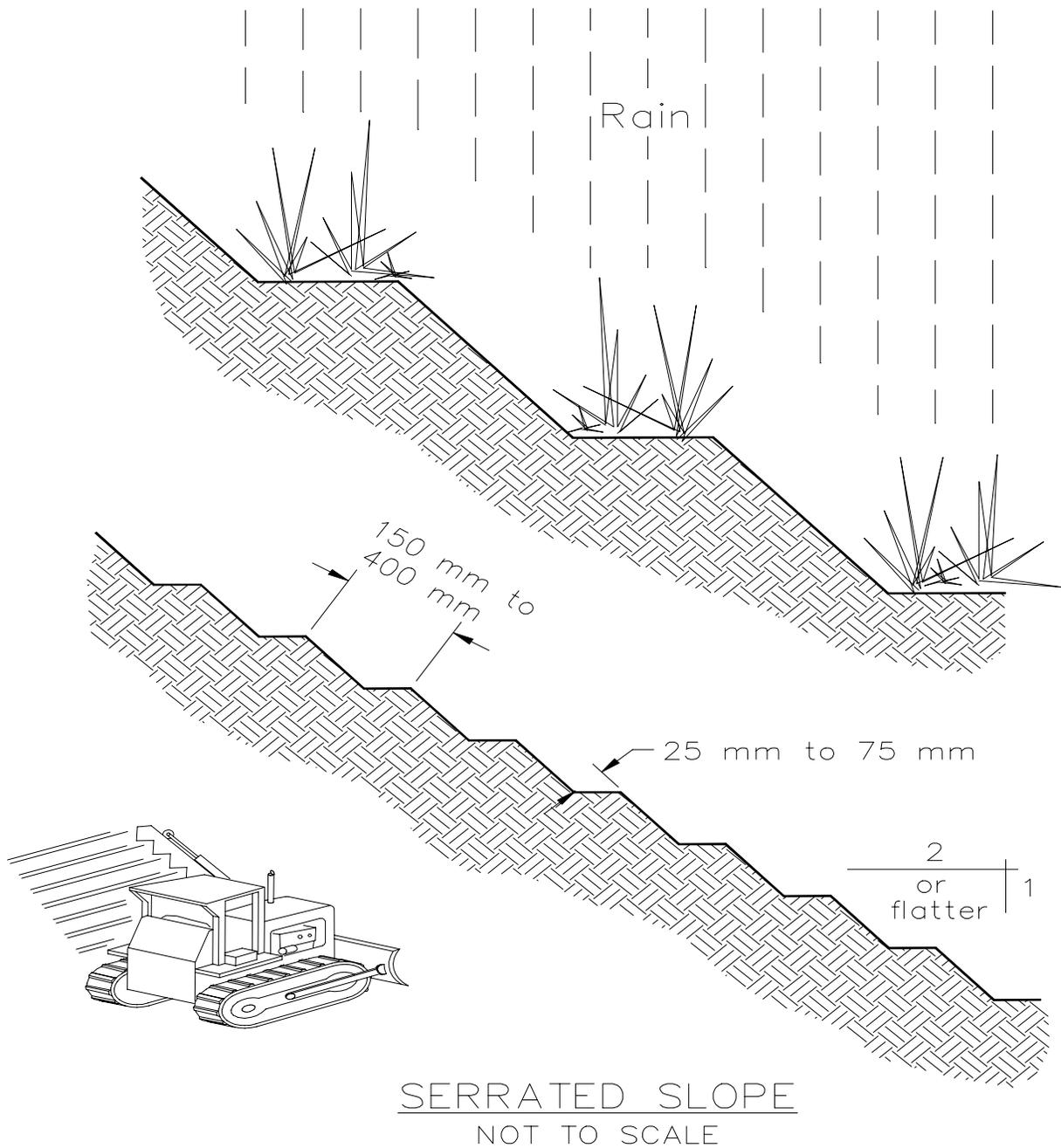


NOTE:

Furrows will catch seed, fertilizer, mulch, rainfall, and reduce runoff.

CONTOUR FURROWS  
NOT TO SCALE

# CD35(2) Slope Roughening/Terracing/Rounding

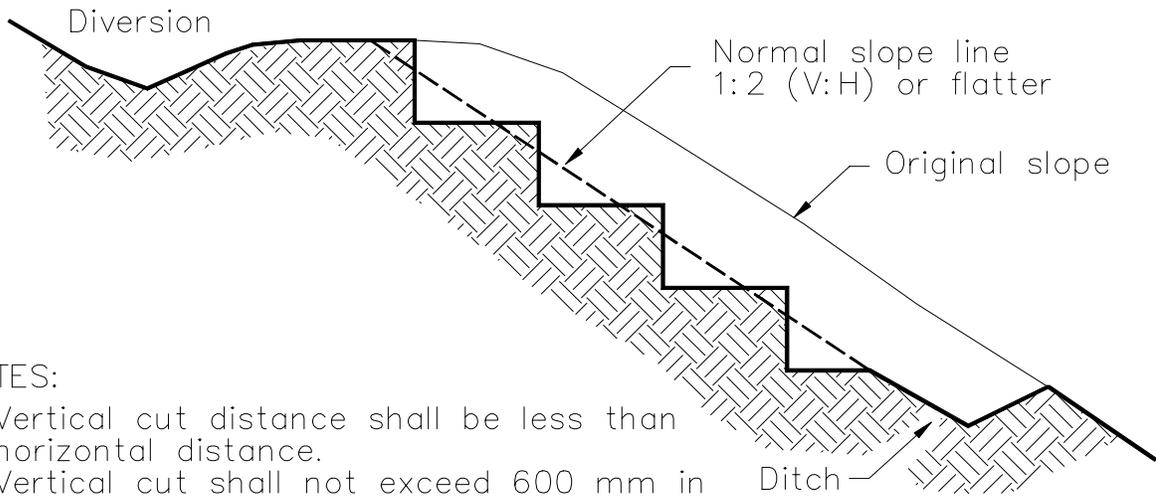


SERRATED SLOPE  
NOT TO SCALE

NOTE:  
Groove by cutting serrations  
along the contour. Irregularities  
in the soil surface catch rainwater,  
seed, mulch and fertilizer.

Sheet 2

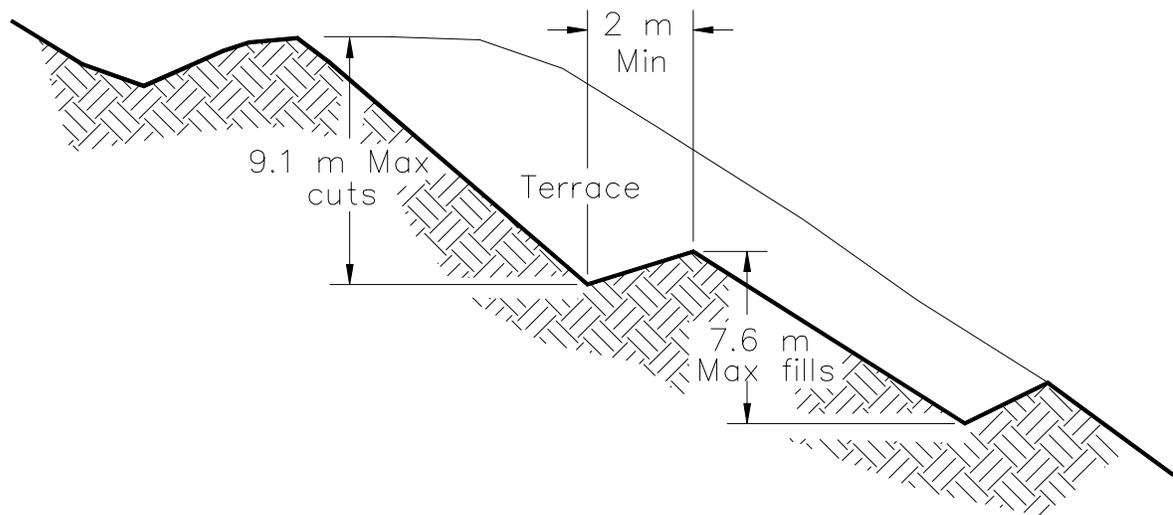
# Slope Roughening/Terracing/Rounding



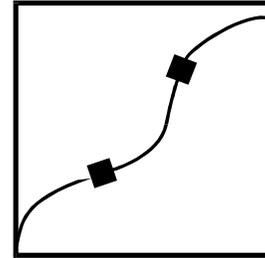
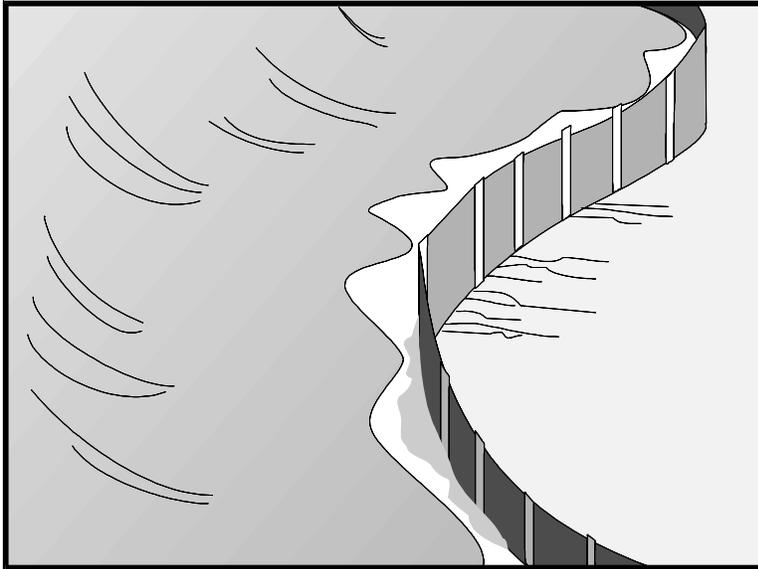
**NOTES:**

1. Vertical cut distance shall be less than horizontal distance.
2. Vertical cut shall not exceed 600 mm in soft material and 1 m in rocky material.

STEPPED SLOPE  
NOT TO SCALE



TERRACED SLOPE  
NOT TO SCALE



### BMP Objectives

- F Soil Stabilization
- M Sediment Control
- F Tracking Control
- F Wind Erosion Control
- F Non-Storm Water

### Definition and Purpose

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by utilizing a barrier of permeable fabric to intercept and slow sediment laden sheet flow runoff, allowing suspended sediment to be removed from the runoff by settling and filtration, and then releasing the runoff as sheet flow.

### Appropriate Applications

- # Along the perimeter of a site.
- # Along streams and channels.
- # Below the toe of significant erodible slopes.
- # Downslope of exposed soil areas.
- # Around temporary soil stockpiles.

### Limitations

- # Limit tributary drainage area upstream of the silt fence to less than 0.3 ha/100 m (0.25 ac/100 ft) of fence.
- # Limit the length of slope draining to any point along the silt fence to 30 m (100 ft) or less.
- # Limit length of any single run of silt fence to 150 m (500 ft).
- # Limit to locations suitable for temporary ponding or deposition of sediment.

- # Must be placed along a level contour.
- # Don't use below slopes subject to creep, slumping, or landslides.
- # Don't use in streams, channels, or anywhere flow is concentrated.
- # Don't use silt fences to divert flow.

## Standards and Specifications

### *Materials*

- # Fence fabric shall consist of material approved by its manufacturer for use in silt fence applications.
- # Select standard duty or heavy duty prefabricated silt fence based on criteria shown below:

### ***Standard Duty Silt Fence***

- Slope of area draining to fence is 1:4 (V:H) or less.
- Use is generally limited to less than five months.
- Area draining to fence produces low sediment loads.
- Use prefabricated standard duty silt fence.
- Lay out in accordance with Sheet 1.
- Install in accordance with Sheet 2.

### ***Heavy Duty Silt Fence***

- Slope of area draining to fence is 1:1 (V:H) or less.
- Use generally limited to eight months. Longer periods may require fabric replacement.
- Area draining to fence produces moderate sediment loads.
- Use prefabricated heavy duty silt fence. Heavy duty silt fences typically have the following physical characteristics:
  - (1) Fence fabric has greater tensile strength than other fabric types available from manufacturer.
  - (2) Fence fabric has a greater permittivity than other fabric types available from manufacturer.

- (3) Fence fabric may be reinforced with a backing or additional support to increase fabric strength.
  - (4) Posts may be spaced closer together than other premanufactured silt fence types available from manufacturer.
- Lay out in accordance with Sheet 1.
  - Install in accordance with Sheet 2.

### *Installation*

# Install silt fence along a level contour, with the last 2 m (6 ft) of fence turned up slope. Except for the ends, the difference in elevation between the highest and lowest point along the top of the silt fence shall not exceed one-third the fence height.

# Generally, should be used in conjunction with erosion source controls up slope to provide effective control.

### Maintenance and Inspection

# Repair undercut silt fences.

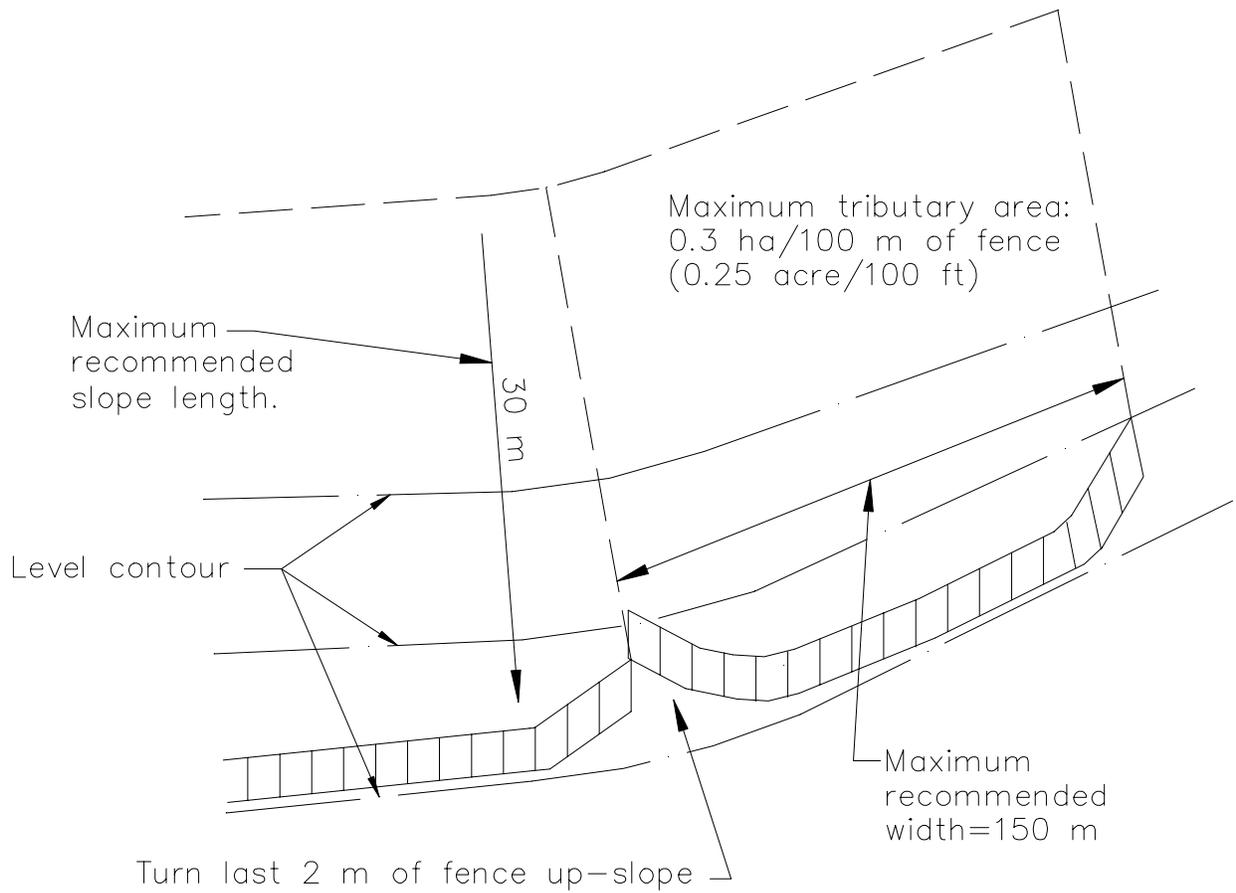
# Repair or replace split, torn, slumping, or weathered fabric.

# Inspect silt fence when rain is forecast. Perform required maintenance.

# Inspect silt fence following rainfall events. Perform required maintenance.

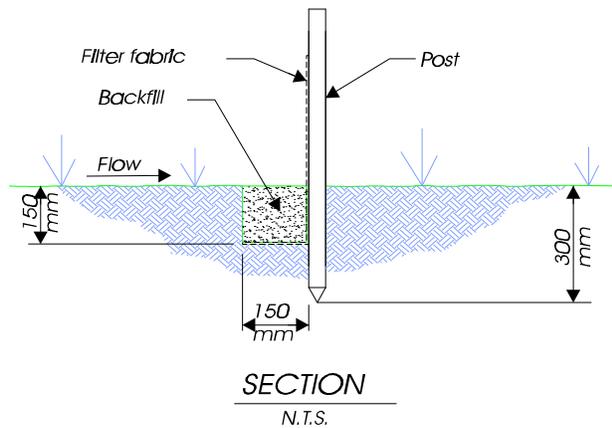
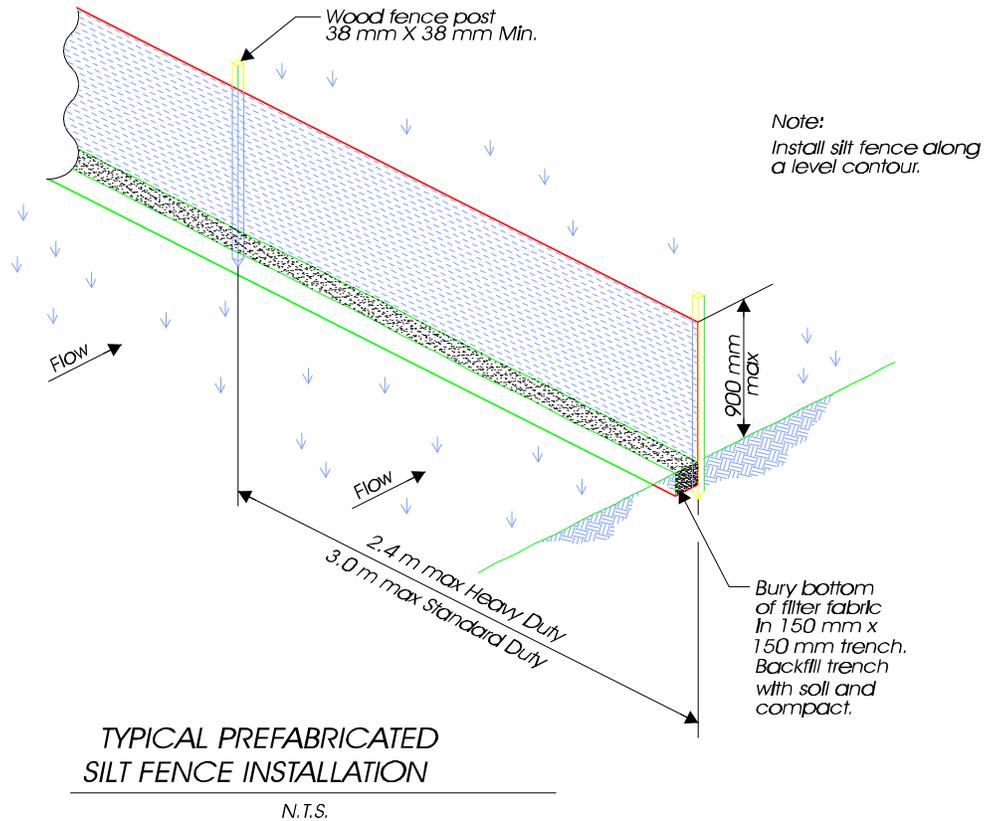
# Remove sediment when accumulation reaches one-third fence height. Sediments removed shall be disposed of properly.

# Remove silt fence when no longer needed. Fill and compact post holes and anchorage trench, remove sediment accumulation, and grade fence alignment to blend with adjacent ground.



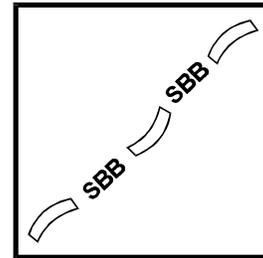
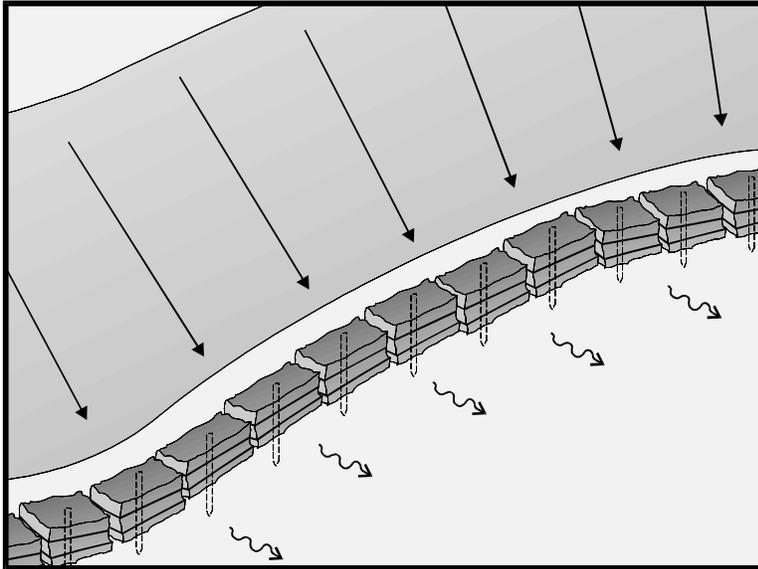
NOTE:  
Locate silt fence along  
a level contour.

## TYPICAL SILT FENCE LAYOUT NOT TO SCALE



Sheet 2

# CD37(2) Straw Bale Barrier



## BMP Objectives

- M Soil Stabilization
- M Sediment Control
- F Tracking Control
- F Wind Erosion Control
- F Non-Storm Water

### Definition and Purpose

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by utilizing a barrier of straw bales to intercept and slow sediment laden runoff, allowing suspended sediment to be removed from the runoff by settling and filtration, and then releasing the runoff as sheet flow.

### Appropriate Applications

- # Along the perimeter of the site.
- # Along streams and channels.
- # Below the toe of exposed and significant erodible slopes.
- # Downslope of exposed soil areas.
- # Around temporary stockpiles.
- # Across minor swales or ditch lines with small catchments.

### Limitations

- # Must be constructed along a level contour.
- # Limit the drainage area upstream of the straw bale barriers to 0.3 ha/100 m (0.25 ac/100 ft) of barrier.
- # Limit the slope length draining to the straw bale to 30 m (100 ft).
- # Limit use to construction activities that can be completed in less than three months.

# CD37(2) Straw Bale Barrier

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- # Slopes of 2:100 (V:H)(2%) or flatter are preferred. If the slope exceeds 1:10 (V:H)(10%), the length of slope upstream of the barrier must be less than 15 m (50 ft).
- # Limit length of any single row of straw bales to 150 m (500 ft).
- # Limit to locations suitable for temporary ponding or deposition of sediment.
- # Straw bales are maintenance intensive and often less capable than CD36(2) - Silt Fences for comparable applications.
- # Don't use in areas subjected to highly concentrated flows, such as channels or live streams.
- # Degraded straw bales may fall apart when removed or left in place for extended periods.

## Standards and Specifications

### *Materials*

- # **Straw Bales:** Each straw bale shall be a minimum of 360 mm (14 in) wide, 450 mm (18 inches) in height, 900 mm (36 in) in length and 23 kg (50 lbs) in weight. The straw bale shall be composed entirely of vegetative matter.
- # **Bale Bindings:** Bales shall be bound by either wire, nylon or polypropylene string. Jute or cotton binding is unacceptable. The wire shall be a minimum of 16 gauge baling wire. The nylon or polypropylene string shall be approximately 2 mm (0.094 in) in diameter with 36 kg (80 lb) of breaking strength.
- # **Stakes:** Stakes shall be at least rough or finished 50 mm x 50 mm (2 in x 2 in) wood posts. Each stake shall have a minimum length of 1 m (3 ft).

### *Installation*

- # Install straw bale barriers along a level contour, with the last 2 m (6 ft.) turned up slope.
- # Straw bales should be installed in a trench, and tightly abut adjacent bales, as shown on Sheet 1.
- # Generally, should be used in conjunction with soil stabilization BMPs up slope to provide effective control.



# CD37(2) Straw Bale Barrier

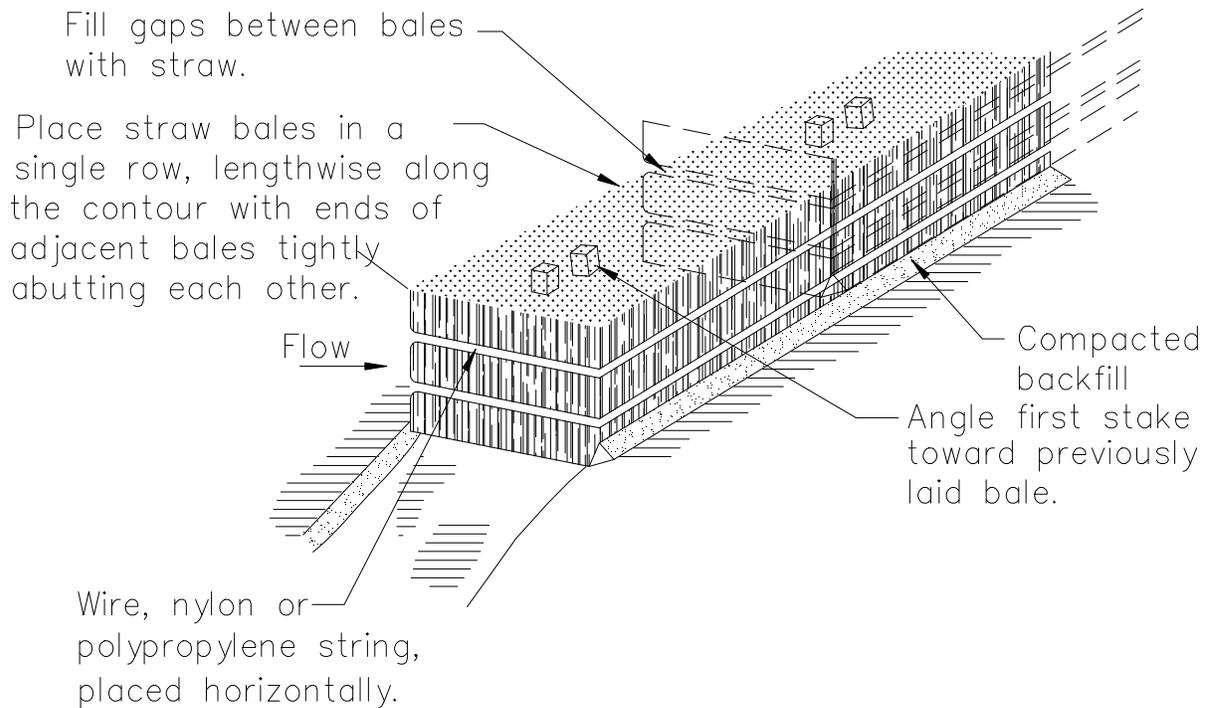
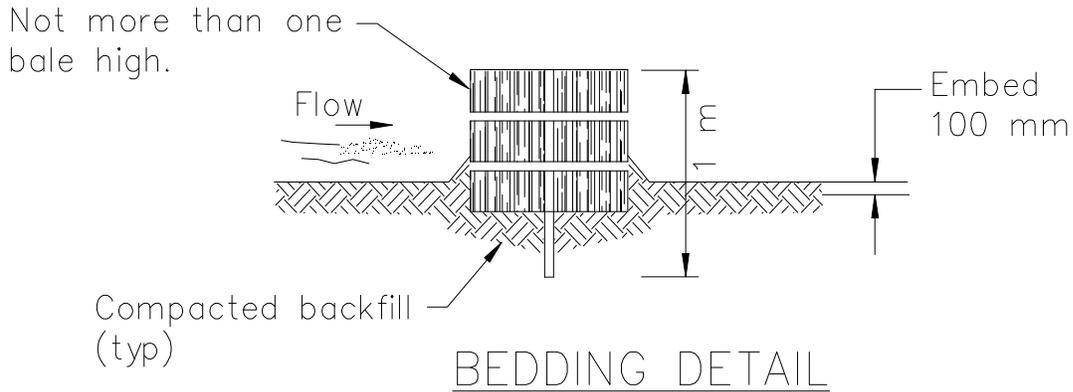
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## Maintenance and Inspection

- # Inspect straw bale barrier immediately after each significant rainfall event and at least daily during prolonged rainfall. Repair or replace damaged bales as needed.
- # Remove sediment when accumulations reach one-third the height of the barrier. Sediments removed shall be disposed of properly.
- # Remove straw bale barrier when no longer needed. Regrade and stabilize the area.

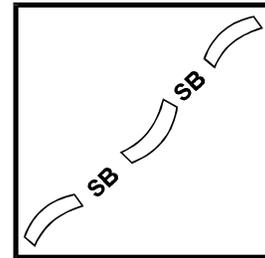
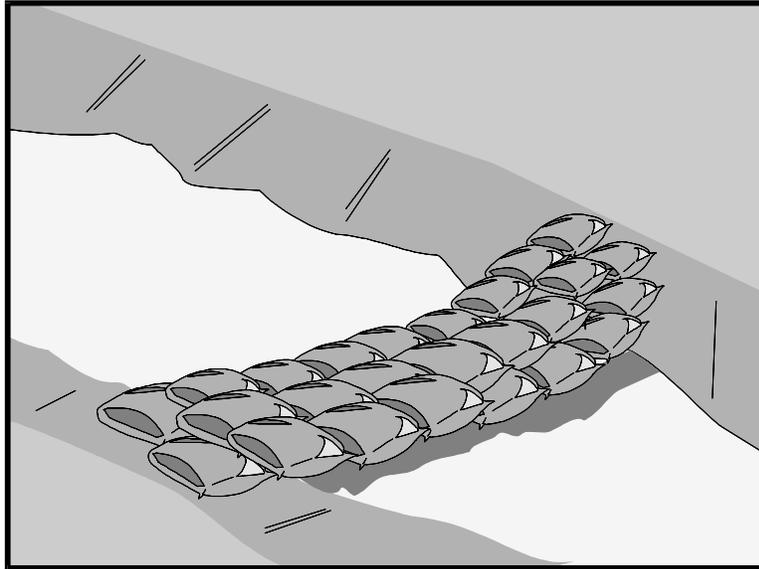


# CD37(2) Straw Bale Barrier



TYPICAL STRAW BALE BARRIER  
NOT TO SCALE

Sheet 1



**BMP Objectives**

- F Soil Stabilization
- M Sediment Control
- F Tracking Control
- F Wind Erosion Control
- F Non-Storm Water

**Definition and Purpose**

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by utilizing a barrier of sand bags to intercept and slow sediment laden runoff, allowing suspended sediment to be removed by settling, and then releasing the runoff as sheet flow. Sand bags can also be used where flows are moderately concentrated, such as ditches and swales, to divert flows. While often referred to as sand bags, they are often filled with gravel.

**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 temporary 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.
- # To divert or direct flow or create a temporary sediment basin.

# CD38(2) Sand Bag Barrier

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- # During construction activities in stream beds when the contributing drainage area is less than 2 ha (5 ac).
- # When extended construction period limits the use of either silt fences or straw bale barriers.
- # When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.

## Limitations

- # Limit the drainage area upstream of the barrier to 2 ha (5 ac).
- # Degraded sand bags may rupture when removed, spilling sand.
- # Installation can be labor intensive.
- # When used to detain concentrated flows, maintenance requirements increase.

## Standards and Specifications

### *Materials*

- # **Sand Bag Material:** Sand bag shall be polypropylene, polyethylene or polyamide woven fabric, minimum unit weight 135 grams per square meter (four ounces per square yard), mullen burst strength exceeding 2,070 kPa (300 psi) and ultraviolet stability exceeding 70 percent. Use of burlap is not acceptable since it rots and deteriorates easily.
- # **Sand Bag Size:** Each sand-filled bag shall have a length of 600 mm (24 in) to 800 mm (32 in), width of 400 mm (16 in) to 450 mm (18 in), thickness of 150 mm (6 in) to 200 mm (8 in), and weight of 40 kg (90 lb) to 55 kg (125 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.
- # **Fill Material:** All sand bag material shall be non-cohesive, coarse sand or gravel, free from deleterious material. Fill material subject to approval by the Engineer.
- # **Pipe:** Polyvinyl chloride (PVC) pipe with a nominal internal diameter of 100 mm (4 in), shall be used. The PVC pipe material shall conform to Section 68-3.02A of Caltrans Standard Specifications or alternate material as approved by the Resident Engineer.

# CD38(2) Sand Bag Barrier

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## *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 the ends.
- Generally, should be used in conjunction with erosion source controls up slope to provide effective control.

# When used for concentrated flows:

- Stack sand bags to required height using a pyramid approach as shown in Sheet 1.
- Upper rows of sand bags should overlap joints in lower rows.

## Maintenance and Inspection

# Inspect sand bag barriers before and after each rainfall event, and weekly throughout the rainy season.

# Reshape or replace sand bags as needed.

# Repair washouts or other damages as needed.

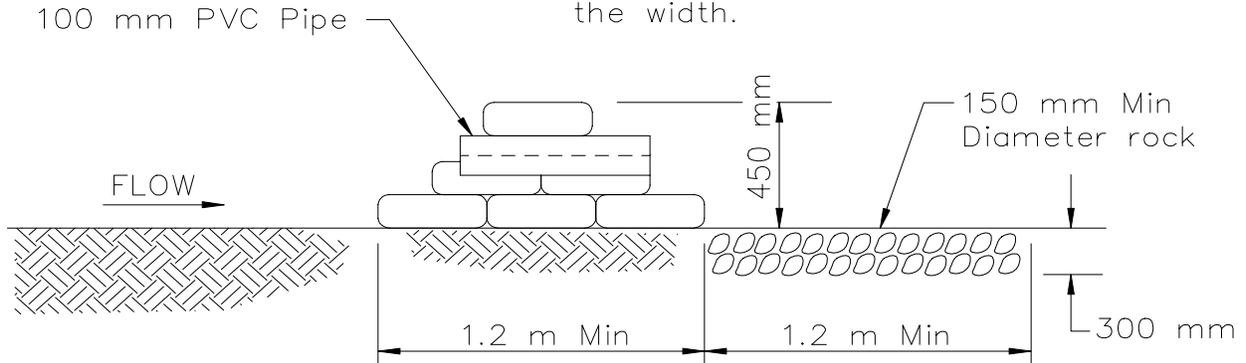
# Inspect sand bag barriers for sediment accumulations and remove sediments when depth reaches one-third the barrier height. Sediment removed shall be disposed of properly.

# Remove sand bags when no longer needed. Remove sediment accumulation, and clean, regrade, and stabilized the area.

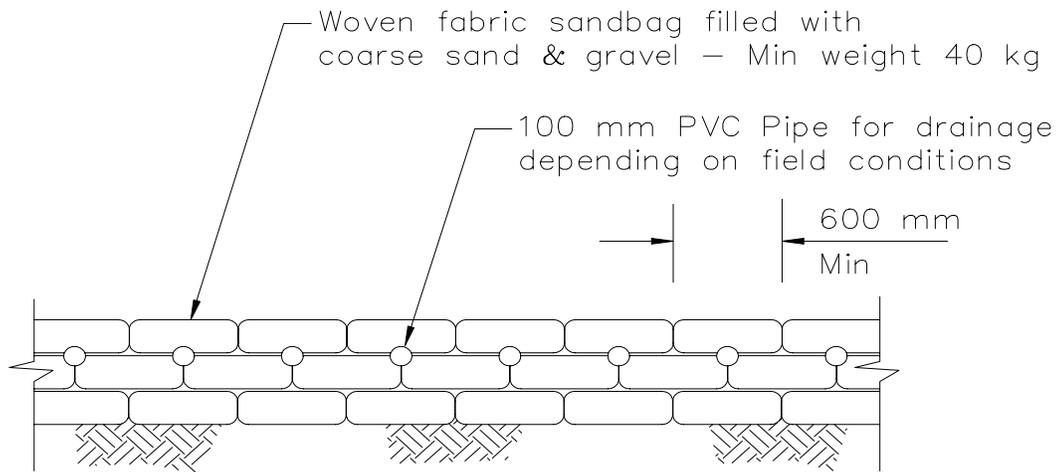
# CD38(2) Sand Bag Barrier

NOTES:

1. Stack sand bags in at least three vertical rows abutting each other and in a staggered arrangement.
2. For each additional vertical row, add an additional row to the width.

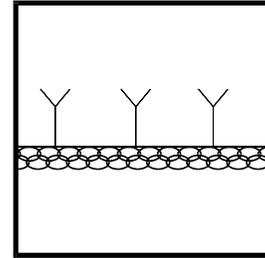
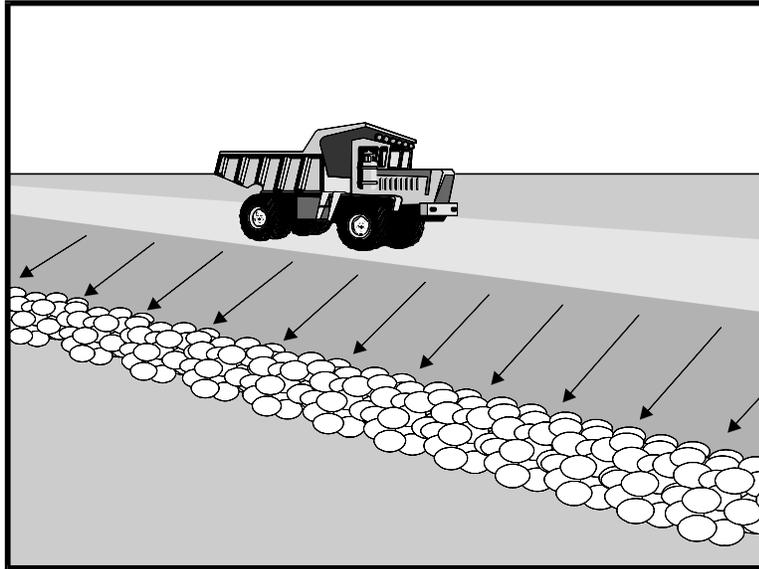


CROSS-SECTION



FRONT VIEW

TYPICAL SANDBAG BARRIER  
NOT TO SCALE



**BMP Objectives**

- F Soil Stabilization
- M Sediment Control
- F Tracking Control
- F Wind Erosion Control
- F Non-Storm Water

**Definition and Purpose**

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by utilizing barriers composed of filter fabric wrapped brush or rock to intercept and slow sediment laden runoff, allowing suspended sediment to be removed from the runoff by settling and filtration, and then releasing the runoff as sheet flow.

**Appropriate Applications**

- # Construction projects with disturbed areas during wet season.
- # Where contributing drainage areas less than 2 ha (5 ac).
- # Along the perimeter of disturbed areas.
- # Near the toe of slopes which may be subject to sheet flow and rill erosion.
- # Around temporary spoil areas.
- # Along streams and channels.
- # Across mildly sloped construction roads (rock filter berms, only).

**Limitations**

- # Not appropriate for contributing drainage areas greater than 2 ha (5 ac).
- # Requires sufficient space for ponded water.

# CD39(2)

## Brush or Rock Filter

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### Standards and Specifications

- # Not effective for diverting runoff since filters allow runoff to slowly seep through.
- # Performance of brush filters relatively unpredictable.
- # Rock filter berms are difficult to remove when construction is complete.
- # Brush and rock filters shall be installed on a level contour.
- # Provide adequate area upstream of filter to accommodate ponding.
- # Brush shall consist of site-cleared brush, or alternative material approved by the Engineer.
- # Filter fabric shall conform to Caltrans Standard Specifications Section 88 - "Engineering Fabrics."
- # Stakes: 38 mm x 38 mm (1.5 in x 1.5 in) wooden stake, or metal stake with equal holding capabilities.
- # Rock: open-graded rock, 19 mm (0.75 in) to 75 mm (3 in) or 75 mm (3 in) to 125 mm (5 in) for concentrated flow applications.
- # Woven wire sheathing: 25 mm (1 in) diameter, hexagonal mesh, galvanized 20 gauge (used with rock filters in areas of concentrated flow).
- # In construction traffic areas, maximum rock berm heights shall be 300 mm (12 in). Multiple berms should be constructed every:
  - 90 m (300 ft) on slopes less than 5:100 (V:H) (5%)
  - 60 m (200 ft) on slopes between 5:100 (V:H) (5%) and 10:100 (V:H) (10%)
  - 30 m (100 ft) on slopes greater than 10:100 (V:H) (10%).

### Maintenance and Inspection

- # Inspect berms before and after each significant rainfall event, and weekly throughout the rainy season.
- # Reshape berms as needed and replace lost or dislodged rock, brush and/or filter fabric.



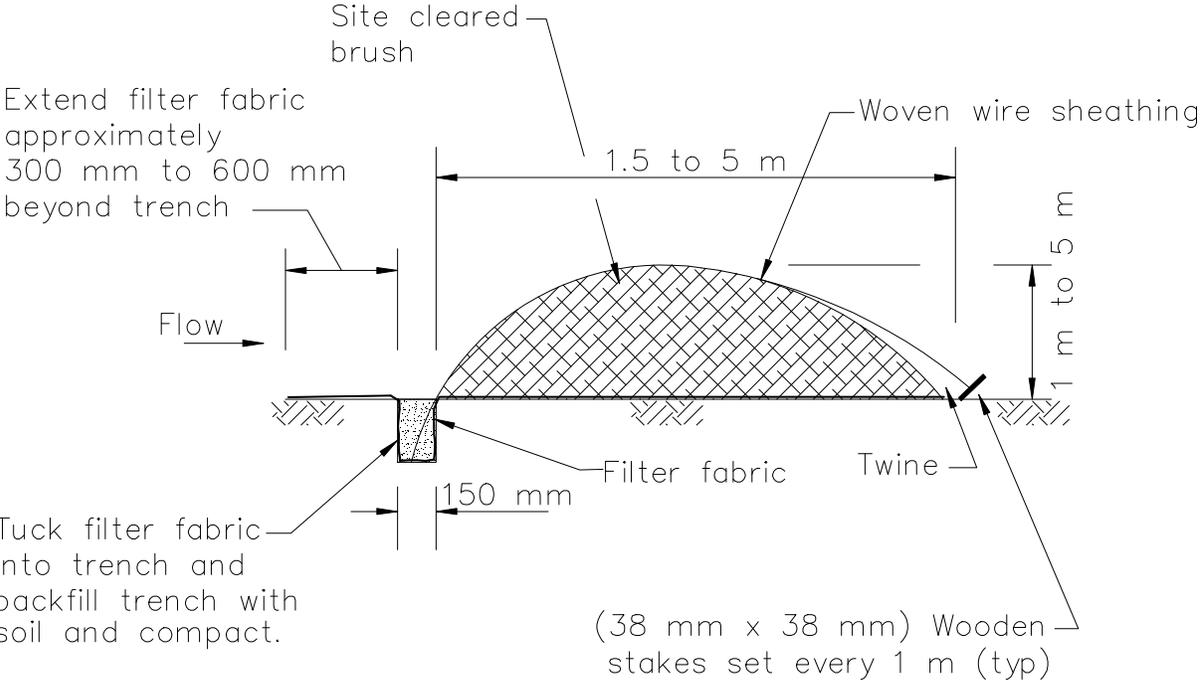
## CD39(2) Brush or Rock Filter

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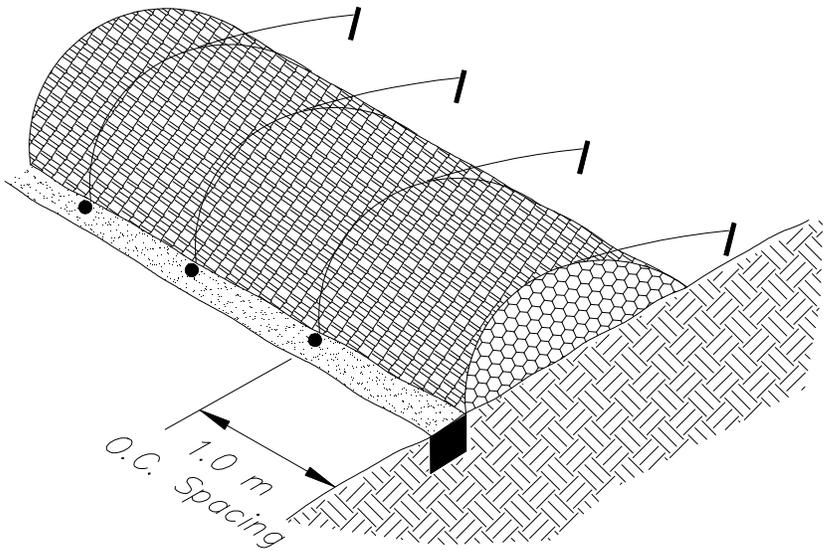
- # Inspect for sediment accumulation and remove sediments when depth reaches one-third of the berm height or 300 mm (12 in), whichever occurs first.
  
- # Filter berms should be removed upon completion of construction activities.



# CD39(2) Brush or Rock Filter

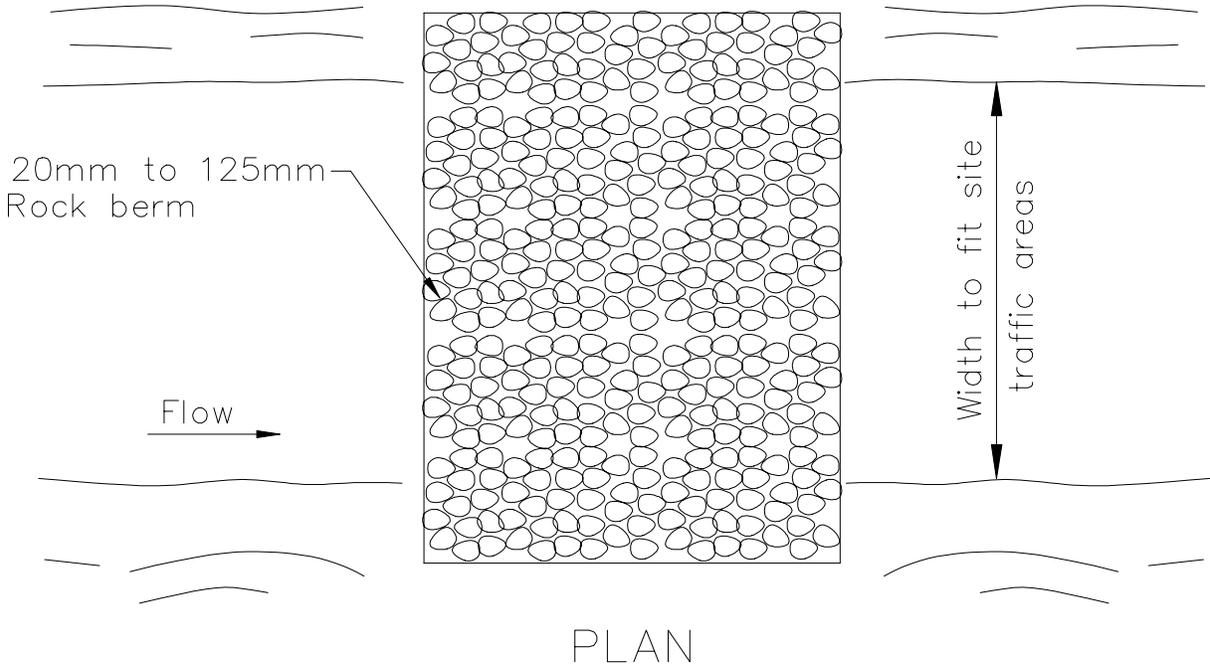
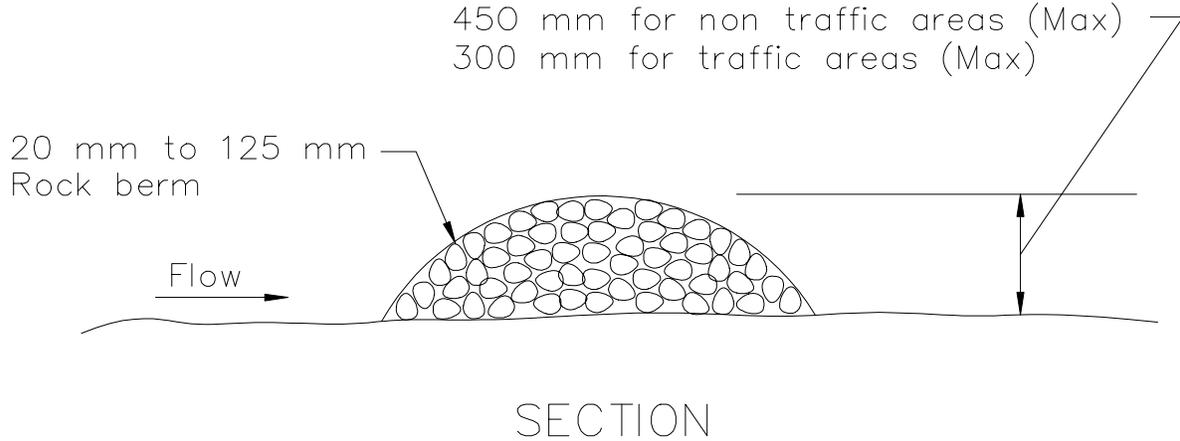


SECTION



TYPICAL BRUSH FILTER  
NOT TO SCALE

# CD39(2) Brush or Rock Filter

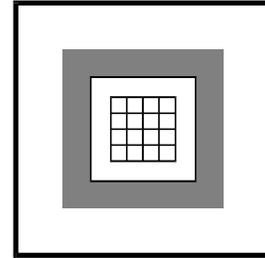
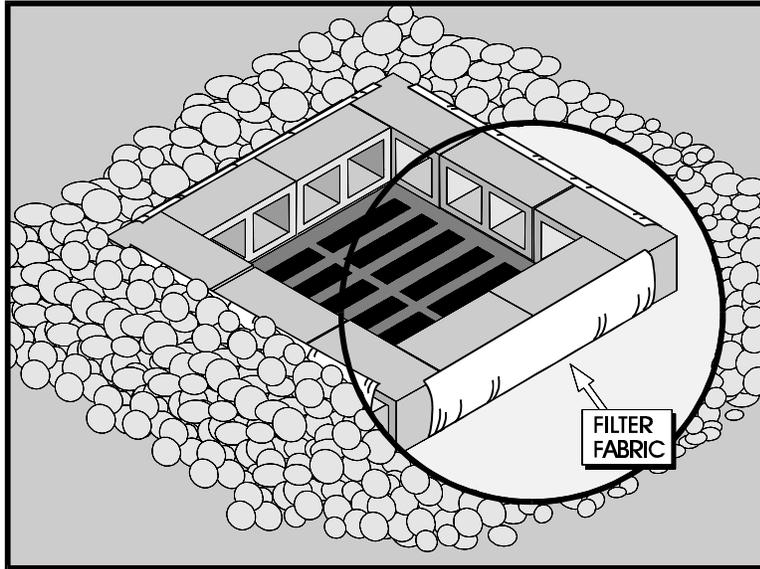


TYPICAL ROCK FILTER  
NOT TO SCALE

# CD40(2)

## Storm Drain Inlet Protection

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<b>BMP Objectives</b>	
<b>F</b>	Soil Stabilization
<b>M</b>	Sediment Control
<b>F</b>	Tracking Control
<b>F</b>	Wind Erosion Control
<b>F</b>	Non-Storm Water

<b>Definition and Purpose</b>	Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by installing devices around storm drain inlets to intercept and slow sediment laden runoff, allowing suspended sediment to be removed from the runoff by settling and/or filtration, before releasing the runoff into the storm drain inlet.
<b>Appropriate Applications</b>	<ul style="list-style-type: none"> <li># Where ponding will not encroach into highway traffic.</li> <li># Where sediment laden surface runoff may enter an inlet.</li> <li># Where disturbed drainage areas have not yet been permanently stabilized.</li> <li># Where the drainage area is 0.4 ha (1 ac) or less.</li> <li># Appropriate during wet and snow-melt seasons.</li> </ul>
<b>Limitations</b>	<ul style="list-style-type: none"> <li># Use only when ponding will not encroach into highway traffic or onto erodible surfaces and slopes.</li> <li># Sediment removal may be difficult in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use other on-site sediment trapping techniques in conjunction with inlet protection.</li> <li># Frequent maintenance is required.</li> </ul>

# CD40(2)

## Storm Drain Inlet Protection

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- # For drainage areas larger than 0.4 ha (1ac), runoff should be routed to a sediment trapping device designed for larger flows. See CD41(2) - Sediment Traps and CD42(2) - Sediment Basin.
- # Filter fabric fence inlet protection appropriate in open areas is subject to sheet flow and for flows not exceeding 0.014 m<sup>3</sup>/s (0.5 cfs).
- # Block and gravel filter and sand bag barriers for inlet protection are applicable when sheet flows or concentrated flows exceed 0.014 m<sup>3</sup>/s (0.5 cfs), and it is necessary to allow for overtopping to prevent flooding.
- # Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected and overflow capability is needed.

### Standards and Specifications

Identify existing and/or planned storm drain inlets that have the potential to receive sediment laden surface runoff. Determine if storm drain inlet protection is needed, and which method to use.

#### *Methods and Installation*

- # **Filter Fabric Fence** - The filter fabric fence is illustrated in Sheet 1. Similar to constructing a silt fence. See CD36(2) - Silt Fences. Do not place filter fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced.
- # **Block and Gravel Filter** - The block and gravel filter is illustrated in Sheet 2. Construct using concrete blocks, 13 mm (0.5 in) to 19 mm (0.75 in) clean gravel, and geotextiles fabrics.
- # **Sand Bag Barrier** - The sand bag barrier is illustrated in Sheet 3. Flow from a severe storm should not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct sand bags in accordance with CD38(2) - Sand Bag Barrier.
- # **Excavated Drop Inlet Sediment Trap** - The excavated drop inlet sediment trap is illustrated in Sheet 4. Similar to constructing a silt fence, See CD36(2) - Silt Fences. Size excavated trap to provide a minimum storage capacity calculated at the rate of 130 m<sup>3</sup>/ha (67 yd<sup>3</sup>/ac) of drainage area.

# CD40(2)

## Storm Drain Inlet Protection

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### Maintenance and Inspection

#### *General*

- # Inspect all inlet protection devices before and after every rainfall event, and weekly during the rest of the rainy season. During extended rainfall events, inspect inlet protection devices at least once every 24 hours.
  
- # Inspect the storm drain inlet after severe storms in the rainy season to check for bypassed material.
  
- # Dispose of removed sediment properly.
  
- # Remove all inlet protection devices within thirty days after the site is stabilized, or when the inlet protection is no longer needed.
  - Bring the disturbed area to final grade and smooth and compact it. Appropriately stabilize all bare areas around the inlet.
  
  - Clean around and inside the storm drain inlet as it must be free of sediment and debris at the time of final inspection.

#### *Requirements by Method*

##### # **Filter Fabric Fence**

- Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground).
  
- Replace or clean the fabric when the fabric becomes clogged with sediment. Make sure the fabric does not have any holes or tears.
  
- At a minimum, remove the sediment behind the fabric fence when it reaches one-third the height of the fabric fence.

##### # **Block and Gravel Filter**

- Make sure the blocks are in good shape and not displaced.
  
- Check the gravel piled around the blocks to make sure gravel is not washing through the fabric and blocks.
  
- Do not clean gravel adjacent to any inlet or waterway.
  
- Remove sediment behind the gravel pack when it reaches one-third the block height.

# CD40(2) Storm Drain Inlet Protection

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## # *Sand Bag Barrier*

- Inspect bags for holes, gashes, and snags.
- Check sand bags for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier.

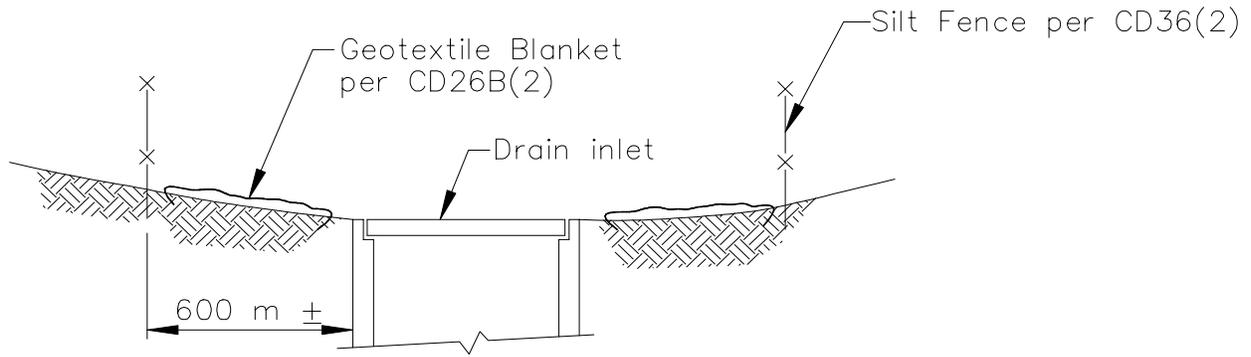
## # *Excavated Drop Inlet Sediment Trap*

- Remove sediment from basin when the volume of the basin has been reduced by one-half.

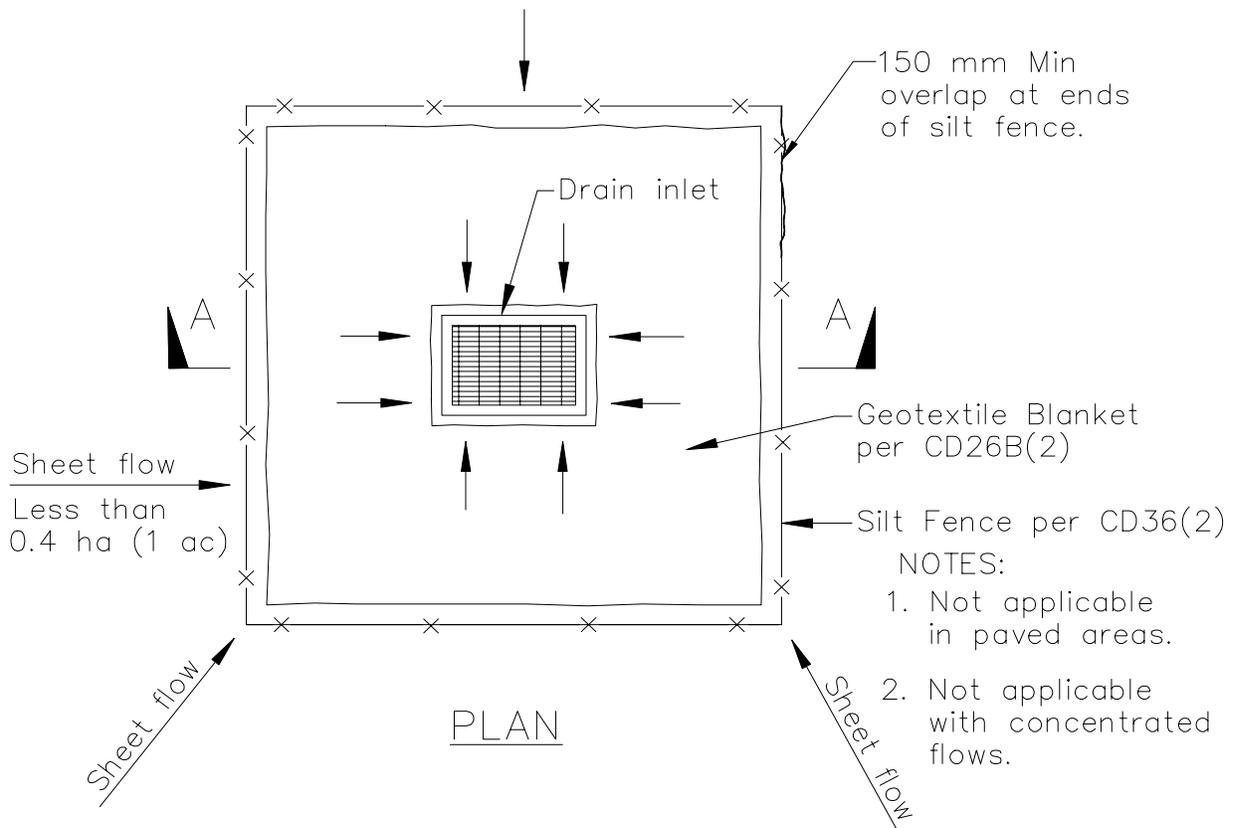


# CD40(2)

## Storm Drain Inlet Protection



SECTION A-A

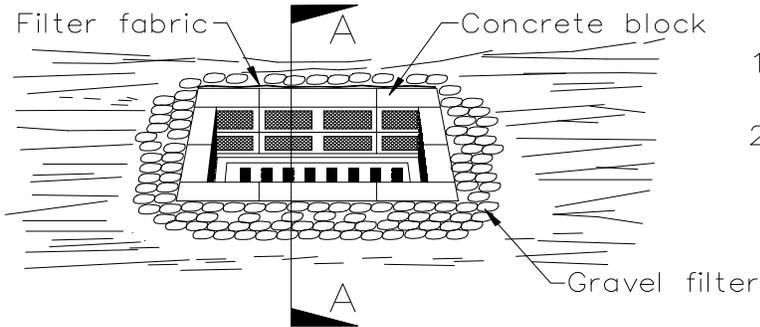


PLAN

TYPICAL FILTER FABRIC FENCE  
NOT TO SCALE

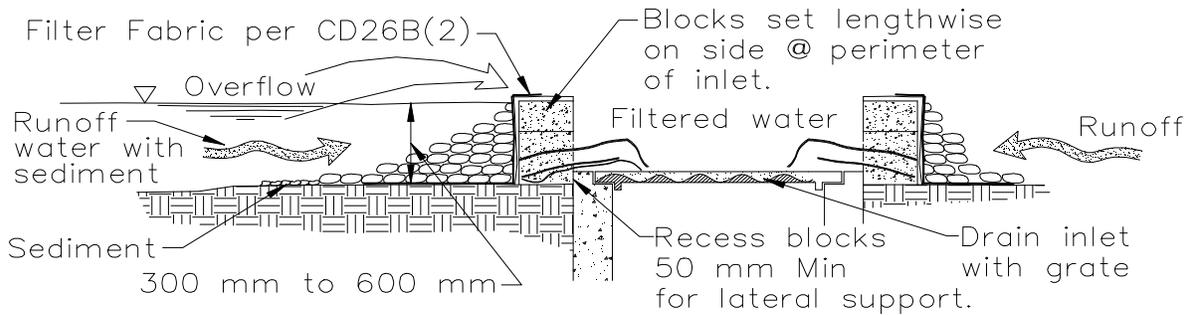
- NOTES:
1. Not applicable in paved areas.
  2. Not applicable with concentrated flows.

# CD40(2) Storm Drain Inlet Protection



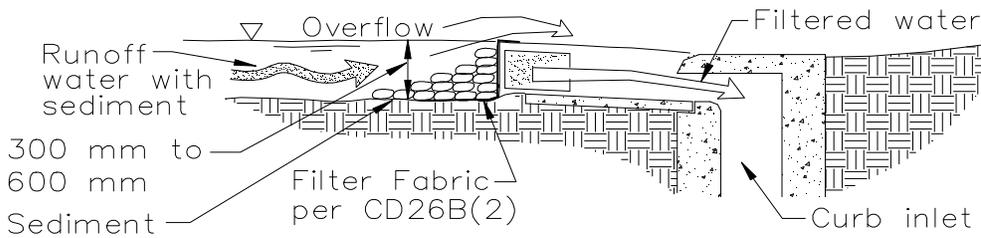
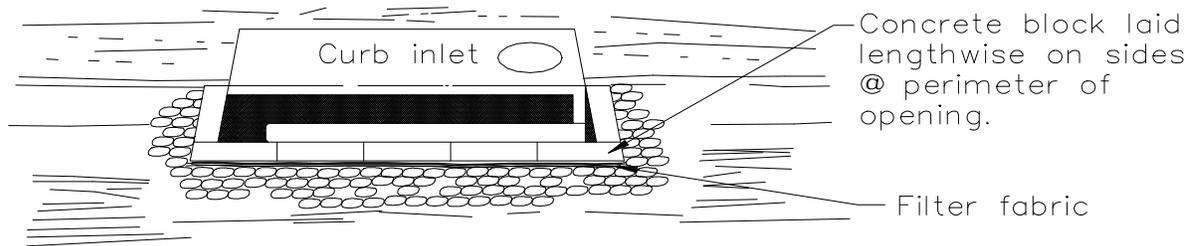
**NOTES:**

1. Use clean 19 mm gravel or approved equal.
2. Periodically change gravel with new, clean gravel. Old gravel may be used as backfill material if approved by Engineer.



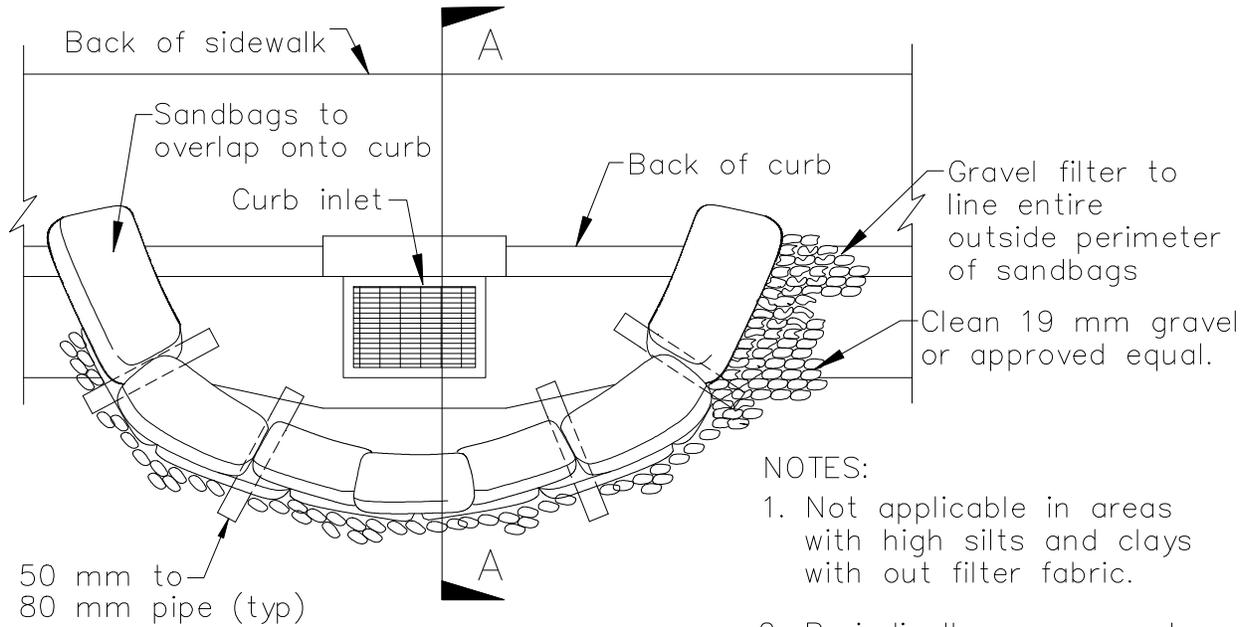
SECTION A-A

TYPICAL BLOCK & GRAVEL FILTER W/O CURB  
NOT TO SCALE



TYPICAL BLOCK & GRAVEL FILTER W/ CURB  
NOT TO SCALE

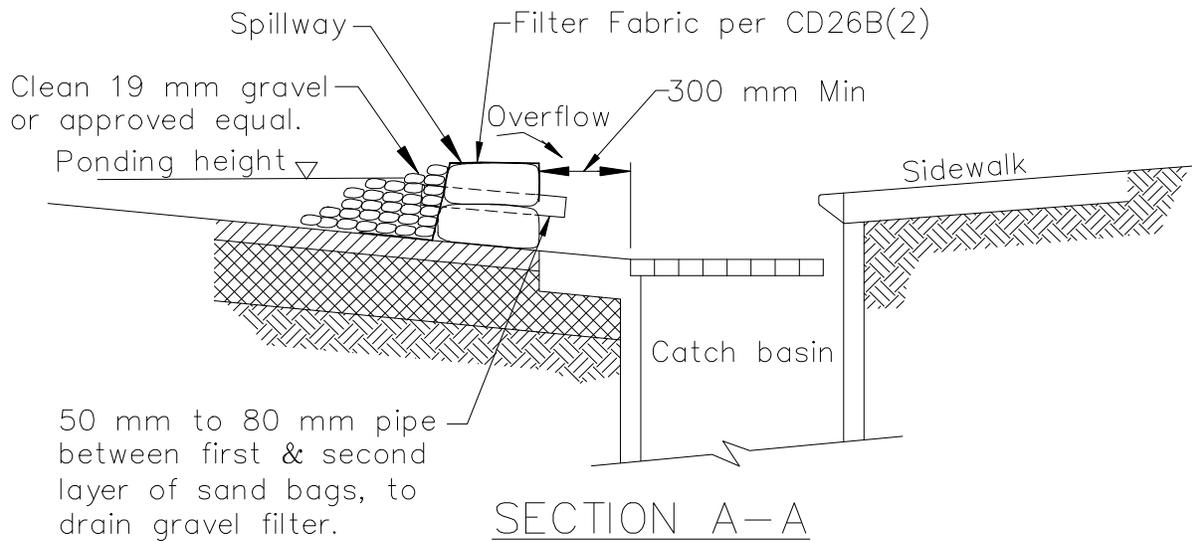
# CD40(2) Storm Drain Inlet Protection



PLAN

**NOTES:**

1. Not applicable in areas with high silts and clays with out filter fabric.
2. Periodically remove and replace gravel. Old gravel may be used as backfill material if approved by Engineer.

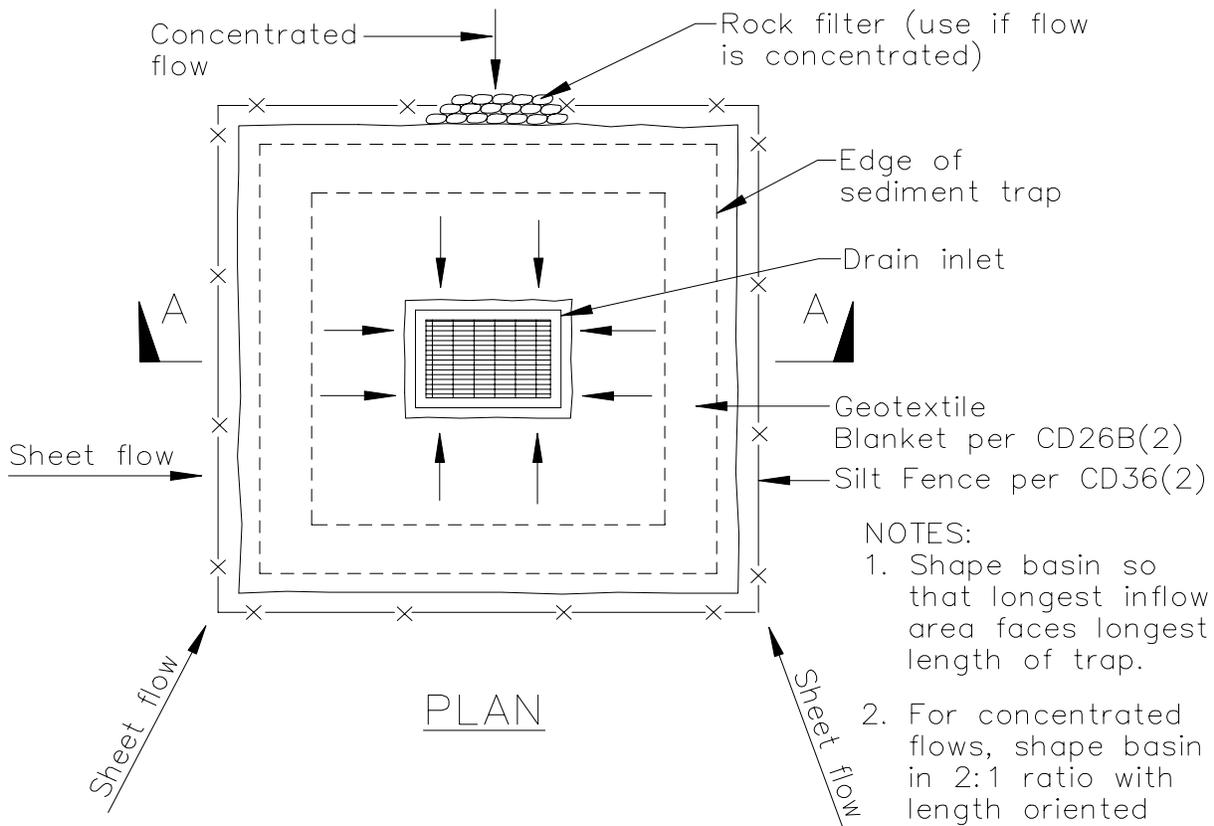
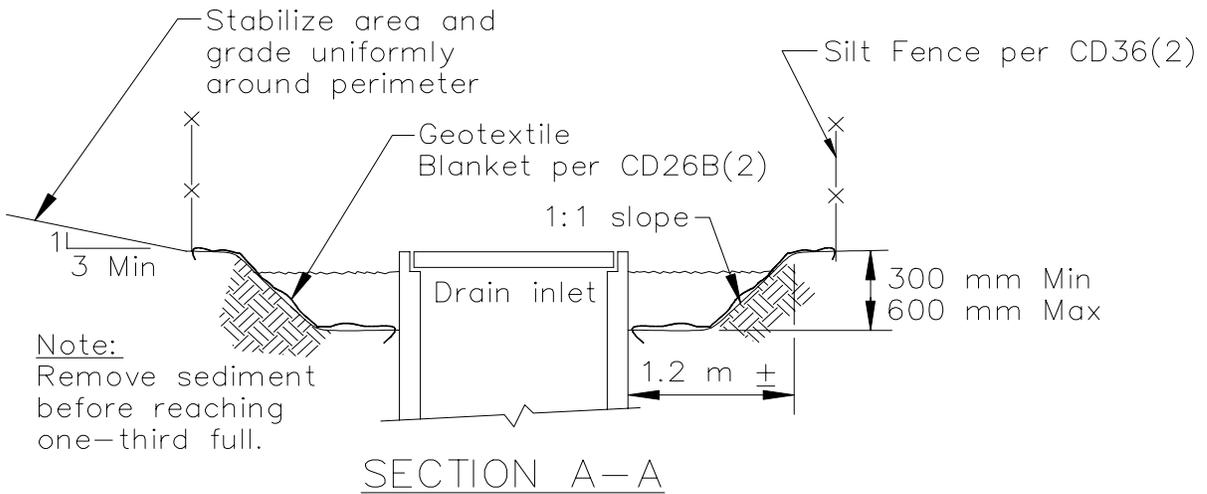


SECTION A-A

TYPICAL SAND BAG BARRIER  
NOT TO SCALE

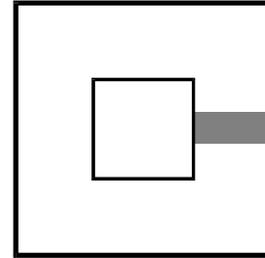
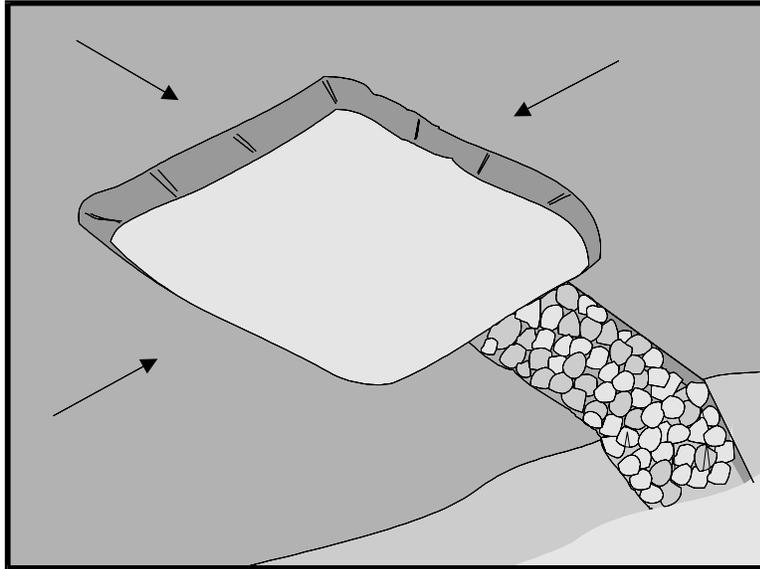
# CD40(2)

## Storm Drain Inlet Protection



TYPICAL EXCAVATED DROP INLET SEDIMENT TRAP  
NOT TO SCALE

# CD41(2) Sediment Traps



## BMP Objectives

- F Soil Stabilization
- M Sediment Control
- F Tracking Control
- F Wind Erosion Control
- F Non-Storm Water

### Definition and Purpose

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by utilizing traps formed by excavation and/or by constructing an embankment so that sediment laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out before the runoff is discharged.

### Appropriate Applications

- # Construction projects with disturbed areas during wet season.
- # Where sediment laden storm water may enter the storm drain system or watercourses.
- # At outlets of disturbed drainage areas less than 2 ha (5 ac).
- # In place of CD42(2) - Sediment Basins, only when the contributing drainage area is divided into smaller subareas (less than 2 ha) (5 ac) contributing to each trap.
- # Around and/or up slope from storm drain inlet protection measures.

### Limitations

- # Requires large surface areas to permit settling of sediment.
- # Not appropriate for drainage areas greater than 2 ha (5 ac).
- # Only removes large and medium sized particles and requires upstream erosion control.

# CD41(2)

## Sediment Traps

---

### Standards and Specifications

- # Attractive and dangerous to children, requiring protective fencing.
- # Not to be located in live streams.
- # Construct sediment traps prior to wet season and construction activities.
- # Trap shall be located: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where failure would not cause loss of life or property damage, and (3) to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area.
- # Trap shall be sized to accommodate a settling zone and sediment storage zone with recommended minimum volumes of 130 m<sup>3</sup>/ha (67 yd<sup>3</sup>/ac) and 65 m<sup>3</sup>/ha (33 yd<sup>3</sup>/ac) of contributing drainage area, respectively, based on 12.7 mm (0.5 in) of runoff volume over a 24-hr period. Multiple traps and/or additional volume may be required to accommodate site specific rainfall and soil conditions.
- # Earthwork shall be in accordance with Standard Specifications Section 19 - Earthwork. Contractor is specifically directed to Sections 19-5 and 19-6 entitled, "Compaction" and "Embankment Construction," respectively.
- # Areas under embankments, structural works, and sediment traps shall be cleared and stripped of vegetation in accordance with Standard Specifications Section 16 - Clearing and Grubbing.
- # Trap length to width ratio shall be greater than 3:1 (L:W) or baffles are required to prevent short circuiting of the inlet flow.
- # Baffles shall be constructed of 89 mm x 89 mm (4 in x 4 in) posts and 1.2 m x 2.4 m x 12 mm thick (4 ft x 8 ft x 0.5 in) exterior plywood. Posts shall be set at least 1 m (3 ft) into the ground, no further apart than 2.5 m (8 ft) center to center, and shall reach a height of 150 mm (6 in) below the riser crest elevation.
- # Trap inlets shall be located to maximize the travel distance to the trap outlet.
- # Use rock or vegetation to protect the trap outlets against erosion.
- # Fencing, in accordance with Standard Specifications Section 80 - Fencing, shall be provided to prevent unauthorized entry.

# To dewater the trap, the outlet should be constructed in one of the following two ways:

(1) Use corrugated metal or reinforced concrete riser pipe with dewatering holes encased in gravel to prevent floating debris from flowing out of the trap or obstructing the system (See Sheet 1).

- Pipe shall be in accordance with Standard Specifications Sections 65, 66 and 68, titled - Reinforced Concrete Pipe, Corrugated Metal Pipe, and Subsurface Drains.
- Top two-thirds of the riser shall be perforated with 12 mm (0.5 in) diameter holes spaced 200 mm (8 in) vertically and 250 mm (10 in) to 300 mm (12 in) horizontally.
- Structure shall be placed on a firm, smooth foundation with the base securely anchored with concrete or other means to prevent floatation.
- Securely attach to the riser pipe (watertight connection) a horizontal pipe (barrel) which extends through the embankment to the toe of fill.

(2) Construct a crushed stone outlet section of the embankment at the low point of the trap (See Sheet 2). The stone section serves as a nonerosive spillway outlet for flood flows and the bottom section provides a means of dewatering the trap between rainfall events.

## Maintenance and Inspection

# Inspect sediment traps before and after rainfall events and weekly during the rest of the rainy season. During extended rainfall events, inspect sediment traps at least every 24 hours.

# Examine trap banks for seepage and structural soundness.

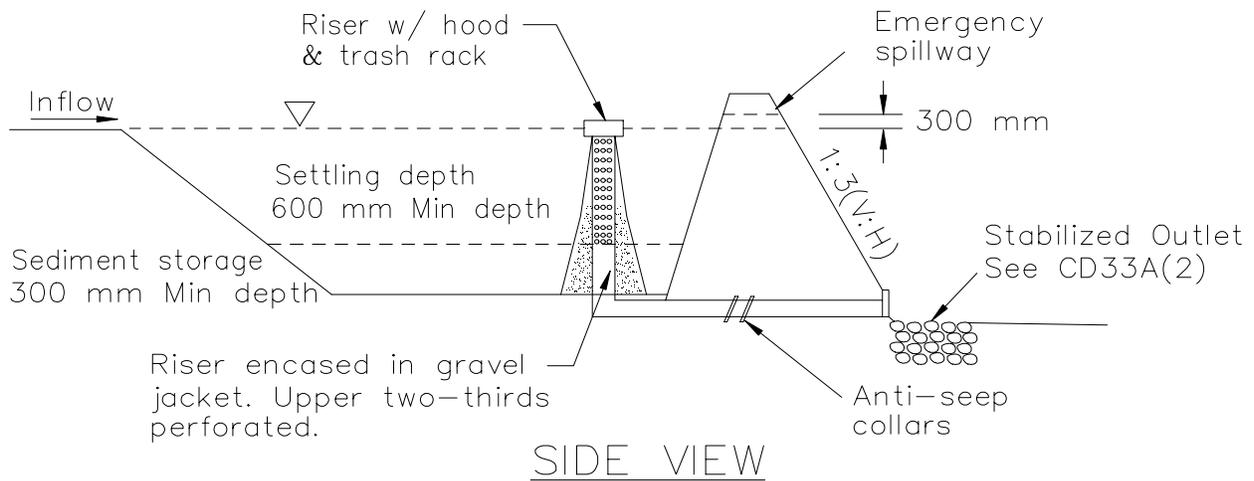
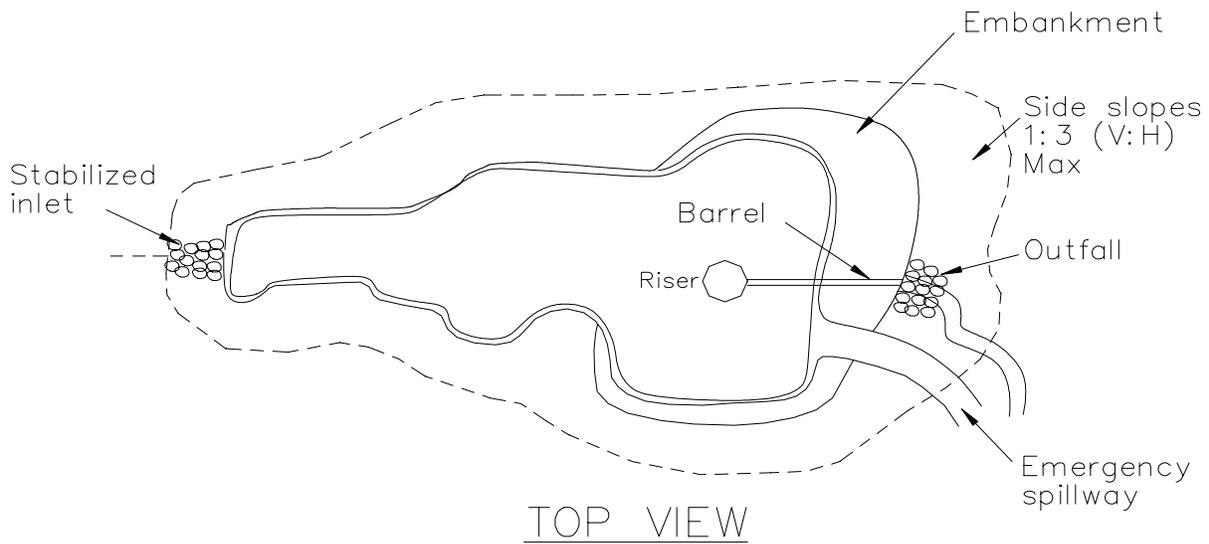
# Check outlet structure and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.

# Check outlet area for erosion and stabilize, if required.

# Remove accumulated sediment when the volume has reached one-third the original trap volume.

# Properly disposed of sediment and debris removed from the trap.

# CD41(2) Sediment Traps

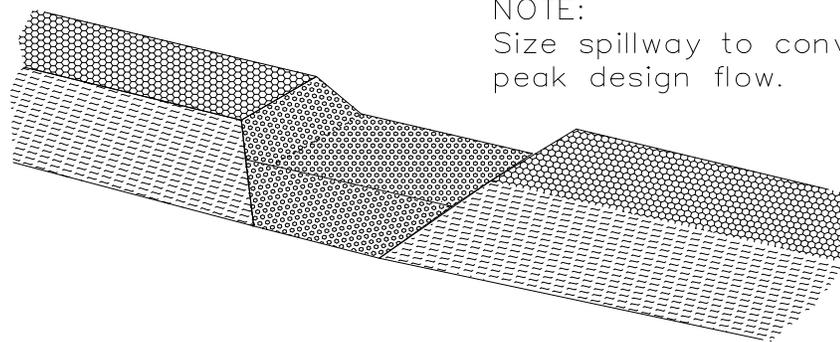


**NOTES:**

1. Typical trap design shown will handle 12.7 mm of runoff over a 24 hour period.
2. Settling volume: 130 m<sup>3</sup> per hectare of drainage area.
3. Sediment storage volume: 65 m<sup>3</sup> per hectare of drainage area.

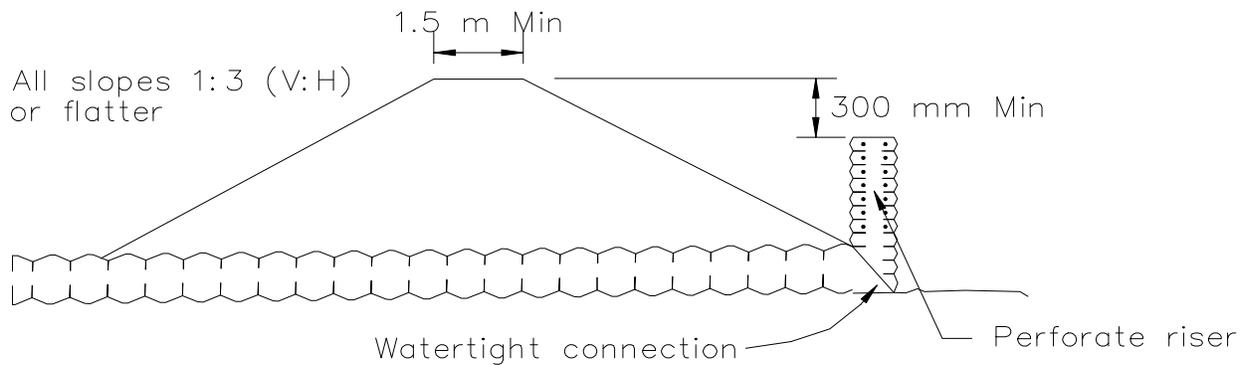
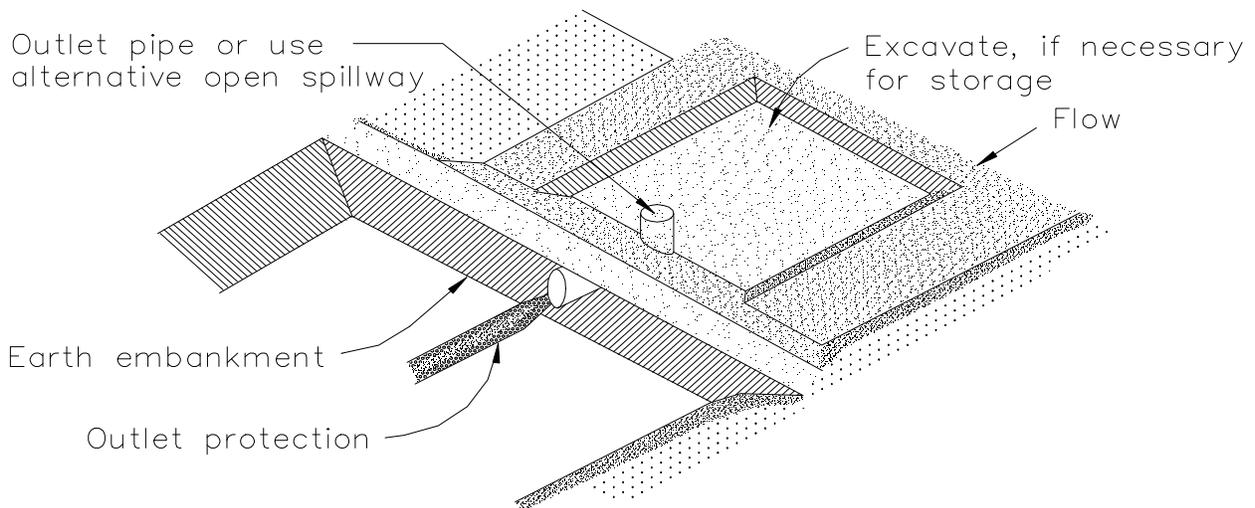
TYPICAL SEDIMENT TRAP  
NOT TO SCALE

# CD41(2) Sediment Traps



NOTE:  
Size spillway to convey  
peak design flow.

TYPICAL OPEN SPILLWAY

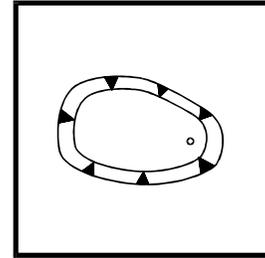
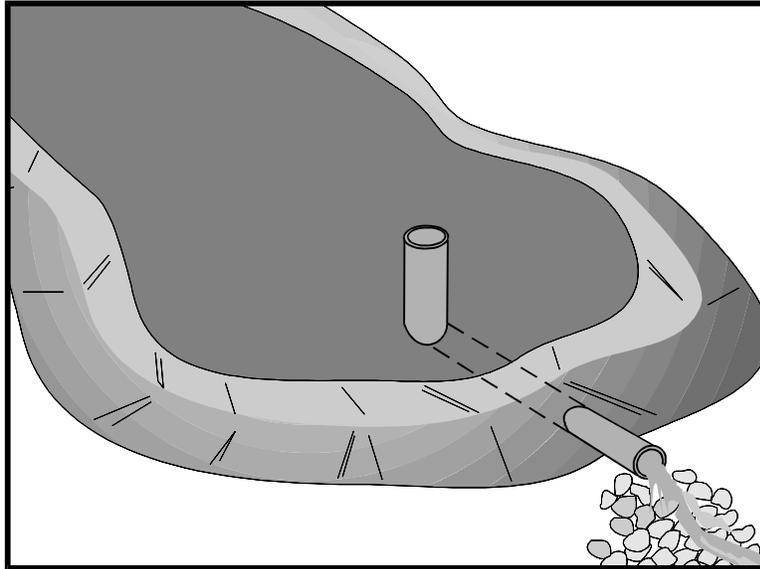


EMBANKMENT SECTION THRU RISER

TYPICAL SEDIMENT TRAP  
NOT TO SCALE

Sheet 2





<b>BMP Objectives</b>	
<b>F</b>	Soil Stabilization
<b>M</b>	Sediment Control
<b>F</b>	Tracking Control
<b>F</b>	Wind Erosion Control
<b>F</b>	Non-Storm Water

<b>Definition and Purpose</b>	Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by utilizing basins formed by excavation and/or by constructing an embankment so that sediment laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out before the runoff is discharged.
<b>Appropriate Applications</b>	<ul style="list-style-type: none"> <li># Construction projects with disturbed areas during wet season.</li> <li># Where sediment laden storm water may enter the storm drain system or watercourses.</li> <li># At outlets of disturbed drainage areas ranging from 2 ha (5 ac) to 40 ha (100 ac).</li> </ul>
<b>Limitations</b>	<ul style="list-style-type: none"> <li># Alternative BMPs must be thoroughly investigated for erosion control before selecting sediment basins.</li> <li># Requires large surface areas to permit settling of sediment.</li> <li># Not appropriate for drainage areas greater than 40 ha (100 ac).</li> <li># Not to be located in live streams</li> <li># Attractive and dangerous to children, requiring protective fencing.</li> <li># Shall be designed by a registered professional civil engineer with review and/or approval by the Caltrans District Hydraulics Unit.</li> </ul>

# CD42(2)

## Sediment Basin

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### Standards and Specifications

- # Where practical, contributing drainage areas shall be subdivided into smaller areas, and multiple sediment traps shall be used in lieu of sediment basins. See CD41(2) - Sediment Traps.
- # Construct sediment basins prior to the wet season and construction activities.
- # 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) to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area.
- # Size basin to accommodate a settling zone and sediment storage zone with recommended minimum volumes of 130 m<sup>3</sup>/ha (67 yd<sup>3</sup>/ac) and 65 m<sup>3</sup>/ha (33 yd<sup>3</sup>/ac) of contributing drainage area, respectively. These recommended volumes are based upon 12.7 mm (0.5 in) of runoff over a 24 hour period. For other runoff amounts, size sediment basin to provide 12-24 hrs of detention. Larger or multiple basins may be required to accommodate the local rainfall conditions as determined by the designing engineer.
- # Areas under embankments, structural works, and sediment basin must be cleared, stripped of vegetation in accordance with Standard Specifications Section 16 - Clearing and Grubbing.
- # Earthwork shall be in accordance with Standard Specifications Section 19 - Earthwork. Contractor is specifically directed to Section 19-5 - Compaction and 19-6 - Embankment Construction.
- # Basin length to width ratio shall be greater than 3:1 (L:W) or baffles are required to prevent short circuiting of the inlet flow.
- # Baffles shall be constructed of 89 mm x 89 mm (4 in x 4 in) posts and 1.2 m x 2.4 m x 12 mm thick (4 ft x 8 ft x .0.5 in) exterior plywood. Posts shall be set at least 1 m (3 ft) into the ground, no further apart than 2.5 m (8 ft) center to center and shall reach a height of 150 mm (6 in) below the riser crest elevation.
- # 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.



# CD42(2)

## Sediment Basin

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- # A forebay, constructed upstream of the basin may be provided to remove debris and larger particles.
- # Principal outlet shall consist of a corrugated metal 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 should be designed to accommodate the inflow design storm.
- # Pipe should be in accordance with Standard Specifications Sections 65, 66 and 68, titled Reinforced Concrete Pipe, Corrugated Metal Pipe, and Subsurface Drains.
- # 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) which 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.
- # One of the following dewatering configurations for the principal outlet shall be used:

### Outlet #1, See Sheet 1

- Perforate the top one-third of the riser with 13 mm (0.5 in) diameter holes spaced 200 mm (8 in) vertically and 250 mm (10 in) - 300 mm (12 in) horizontally.
- Wrap with well-secured filter fabric.
- Place 19 mm (0.75 in) gravel over perforated holes to approximately 50 mm (2 in) minimum thickness to assist in prevention of clogging of dewatering holes. Gravel will naturally settle into a cone surrounding the riser pipe.

### Outlet #2, See Sheet 2

- Perforate the lower one-half of the riser pipe with 13 mm (0.5 in) diameter holes spaced approximately 75 mm (3 in) apart, in each outside valley (CMP pipe).
- Place 19 mm (¾ in) gravel over perforated holes to approximately 50 mm (2 in) minimum thickness to assist in prevention of clogging of dewatering holes. Gravel will naturally settle into a cone surrounding the riser pipe.



# CD42(2) Sediment Basin

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## Outlet #3, See Sheet 3

- Provide two 25 mm (1 in) 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 4 ha (10 ac).

# 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 6 m (20 ft) in length.

# Use outlet protection at the pipe outlet. See CD33A(2) - Outlet Protection/Velocity Dissipation Devices.

# Safety fence shall be provided to prevent unauthorized entry to the basin. Fencing shall be in accordance with Standard Specifications Section 80 - Fencing.

## Maintenance and Inspection

# Inspect temporary sediment 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.

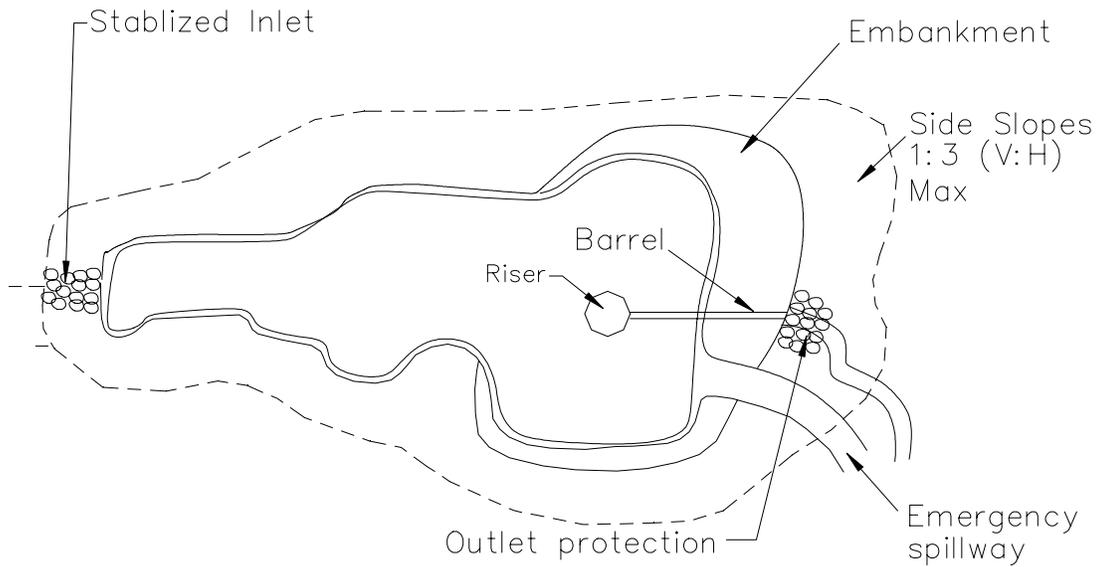
# Check outlet structure and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.

# Check outlet area for erosion and stabilize, if required.

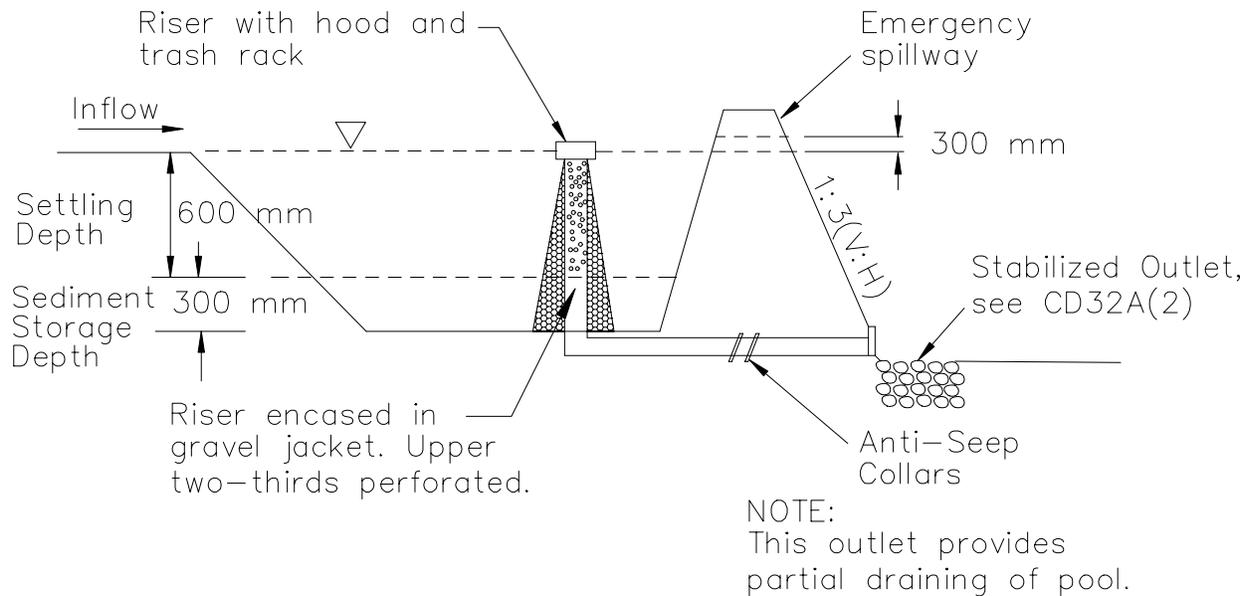
# Remove sediments when storage zone is one-third full.



# CD42(2) Sediment Basin



## TOP VIEW

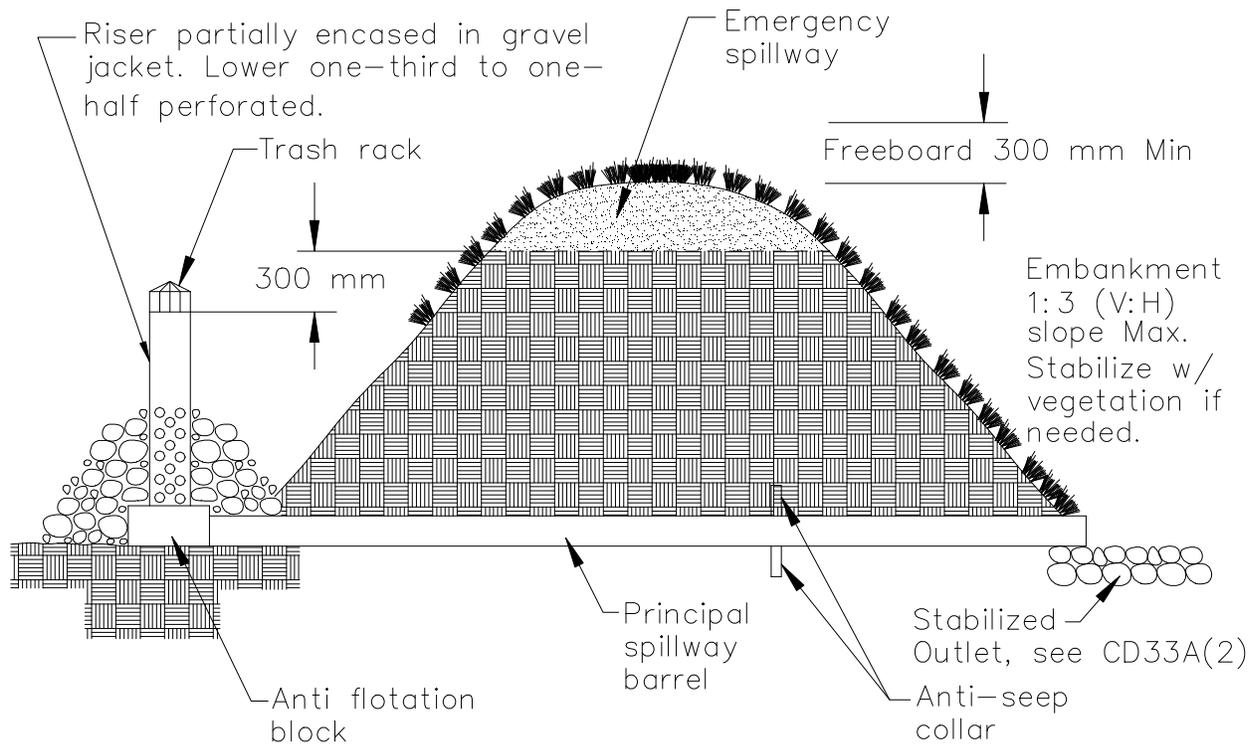


## TYPICAL TEMPORARY SEDIMENT BASIN – OUTLET #1 NOT TO SCALE

Sheet 1



# CD42(2) Sediment Basin



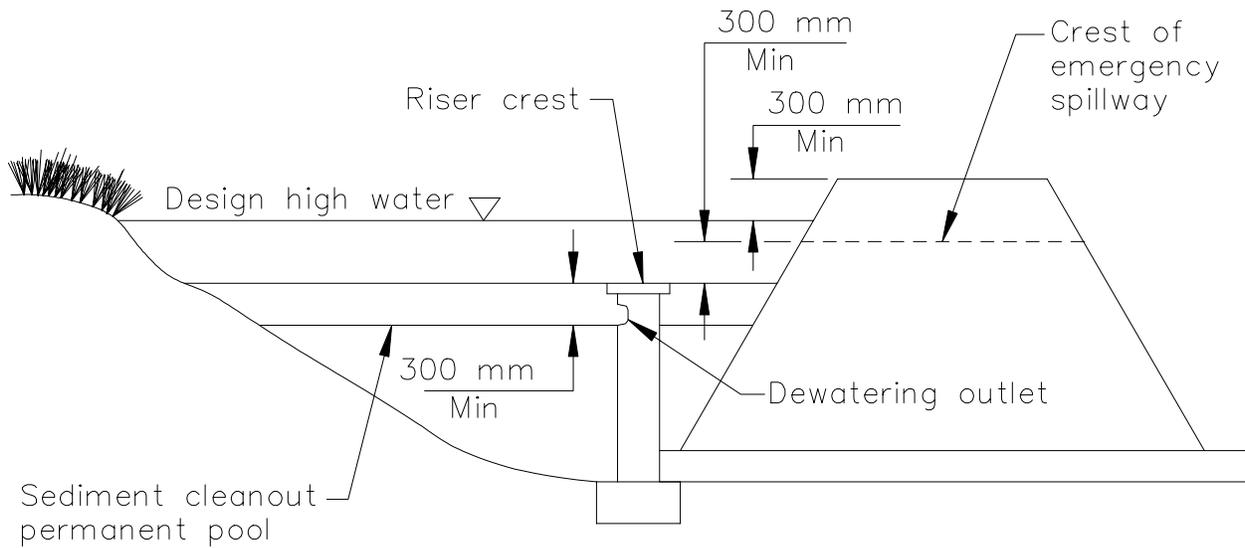
NOTE:  
This outlet provides complete draining of pool.

TYPICAL TEMPORARY SEDIMENT BASIN – OUTLET #2  
NOT TO SCALE

Sheet 2



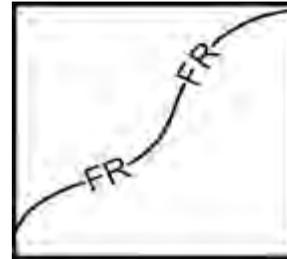
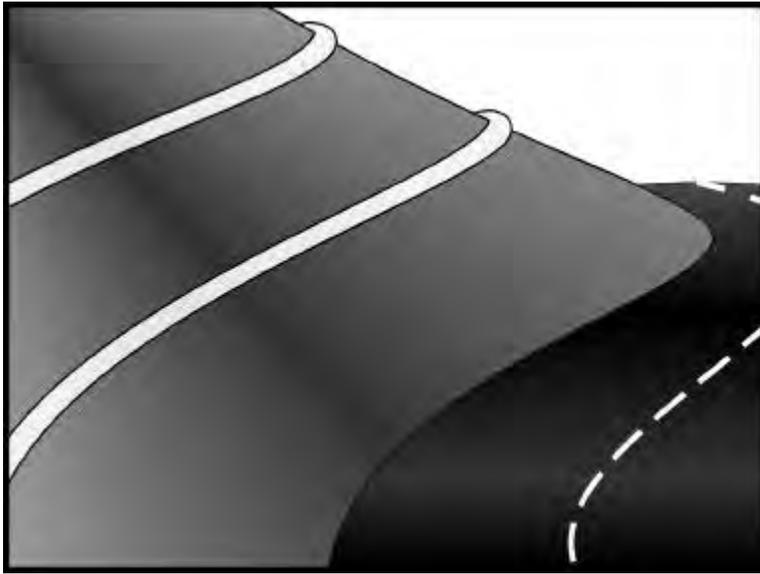
# CD42(2) Sediment Basin



**NOTE:**

This outlet provides no drainage for permanent pool.

TYPICAL TEMPORARY SEDIMENT BASIN – OUTLET #3  
NOT TO SCALE



BMP Objectives	
M	Soil Stabilization
M	Sediment Control
F	Tracking Control
F	Wind Erosion Control
F	Non-Storm Water

**Definition and Purpose**

Procedures and practices to reduce the discharge of pollutants to the storm drain system or to watercourses as a result of construction activity by stabilizing soil utilizing rolled and bound fiber material to intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide some removal of sediment from runoff.

**Appropriate Applications**

- # Along face of exposed and erodible slopes to shorten slope length.
- # Along top of exposed and erodible slopes to spread runoff as sheet flow.
- # At grade breaks where slope transitions to a steeper slope.

**Limitations**

- # Primary purpose is not sediment control, though it does provide some sediment removal.
- # Is a relatively new soil stabilization technology. Effectiveness and capabilities in the field are not completely known.

**Standards and Specifications**

- # Fiber Roll Materials
  - Fiber rolls shall be either:
    - (1) prefabricated rolls; or,
    - (2) rolled tubes of erosion control blanket.

## # Assembly of Field Rolled Fiber Roll

- Roll length of erosion control blanket into a tube of minimum 200 mm (8 in) diameter.
- Bind roll at each end and every 1.8 m (6 ft) along length of roll with jute-type twine.

## # Installation

- Locate fiber rolls on level contours spaced 2.4 to 3.0 m (8 to 10 ft) along the face of slope.
- Stake fiber rolls into a 50 to 100 mm (2 to 4 in) trench.
- Drive stakes at the end of each fiber roll and spaced 1.2 m (4 ft) maximum on center.
- Use wood stakes with minimum 19 by 19 mm (3/4 by 3/4 in) cross section, and minimum length of 600mm (24 in).
- If more than one fiber roll is placed in a row, the rolls shall be butted; not overlapped.

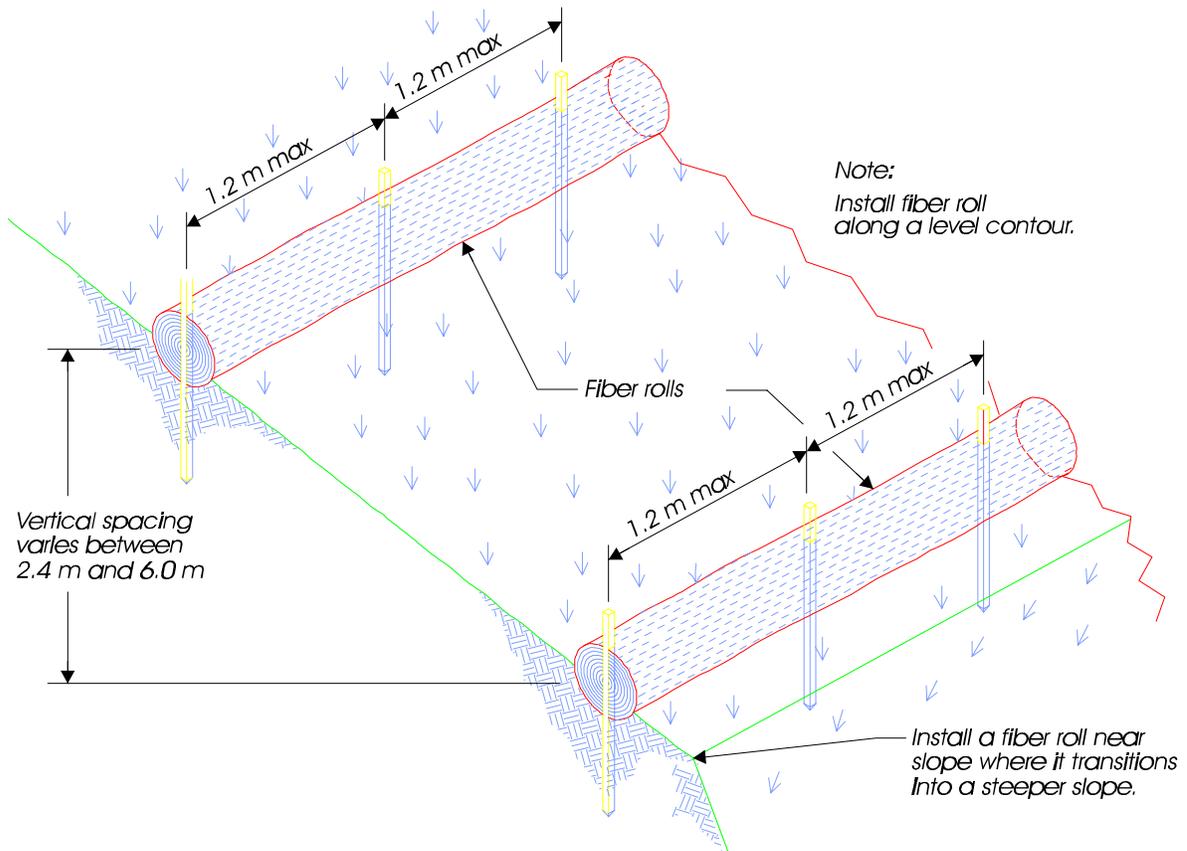
## # Removal

- Fiber rolls are typically left in place.
- If fiber rolls are removed, collect and dispose of sediment accumulation, and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

## Maintenance and Inspection

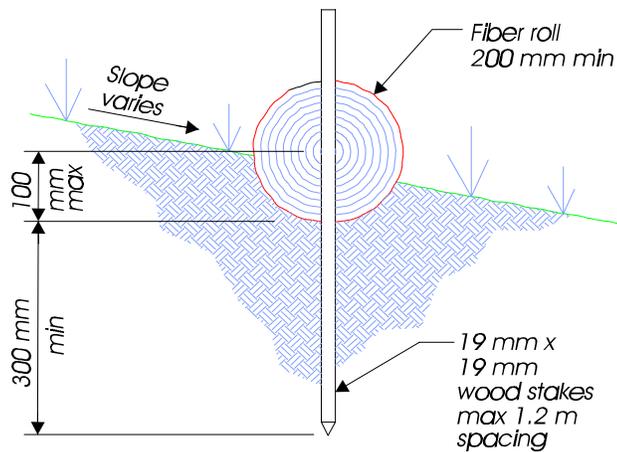
- # Repair or replace split, torn, unraveling, or slumping fiber rolls.
- # Inspect fiber rolls when rain is forecast. Perform required maintenance.
- # Inspect fiber rolls following rainfall events and a least daily during prolonged rainfall. Perform required maintenance.

# CD43(2) Fiber Rolls



**TYPICAL FIBER ROLL INSTALLATION**

N.T.S.



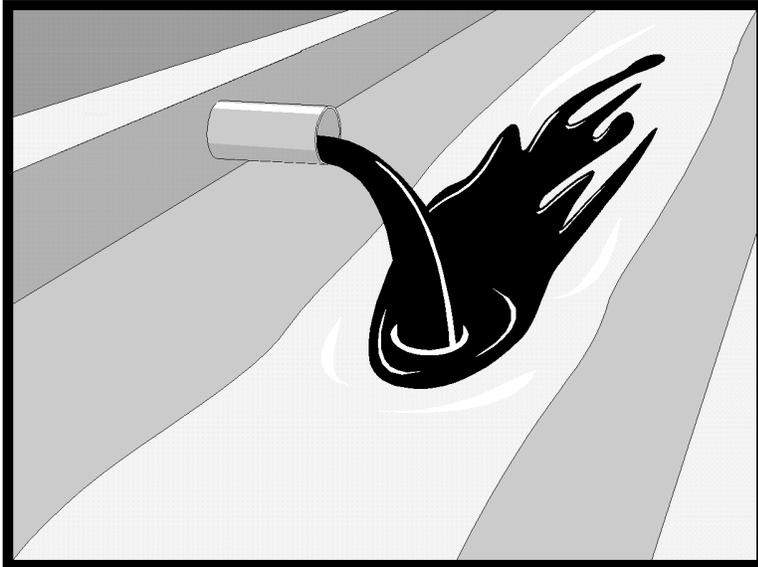
**ENTRENCHMENT DETAIL**

N.T.S.

Sheet 1



# CD44(2) Illicit Discharge/Illegal Dumping Reporting



## BMP Objectives

- F Soil Stabilization
- F Sediment Control
- F Tracking Control
- F Wind Erosion Control
- M Non-Storm Water

### Definition and Purpose

Procedures and practices for construction contractors to recognize illicit discharges or illegally dumped material on a construction site and report incidents to the Resident Engineer.

### Appropriate Applications

Illicit discharge and illegal dumping reporting is applicable anytime an illicit discharge is discovered or illegally dumped material is found on the construction site. Sites located near natural watercourses, canals, and reservoirs need to be especially aware of illicitly discharged or dumped material.

Illicit discharges covers continuous, recurring discharges from a pipe, or run-on from adjacent property. Illegal dumping covers single-incident episodes of dumping or spills.

Illicitly discharged or illegally dumped material can be solid or liquid material including, but not limited to:

- # Dry weather flows
- # Debris and rubbish
- # Suspected hazardous material
- # Unlabeled material in containers
- # Motor oil and paint

# CD44(2) Illicit Discharge/Illegal Dumping Reporting

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- Limitations
- # Unlabeled or non-identifiable material should be assumed to be hazardous.
  - # Illicit discharges and illegal dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor.
  - # Procedures and practices presented in this BMP are general. Contractor shall use extreme caution, immediately notify the Resident Engineer when illicit discharges or illegal dumping are discovered, and take no further action unless directed by the Resident Engineer.
  - # If pre-existing hazardous materials or wastes are known to exist on site, the contractor's responsibility will be detailed in separate special provisions.

## Standards and Specifications

### *Planning*

- # Inspect site before beginning the job for evidence of illicit discharges or illegal dumping.
- # Inspect site regularly during project execution for evidence of illicit discharges or illegal dumping.
- # Observe site perimeter for evidence or potential of illicitly discharged or illegally dumped material which may enter the job site.

### *Identification of illicit discharges and illegal dumping*

- # Solids - Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.
- # Liquids - signs of illegal liquid dumping can include:
  - Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils
  - Pungent odors coming from the drainage systems.
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes.
  - Abnormal water flow during the dry weather season.



# CD44(2) Illicit Discharge/Illegal Dumping Reporting

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# Urban Areas - Evidence of illicit discharges is typically detected at storm drain outfall locations or at manholes - Signs of an illicit discharge can include:

- Abnormal water flow during the dry weather season.
- Unusual flows in subdrain systems used for dewatering.
- Pungent odors coming from the drainage systems.
- Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes.
- Excessive sediment deposits, particularly adjacent to or near active off-site construction projects.

# Rural Areas - Illicit discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:

- Abnormal water flow during the dry weather season.
- Non-standard junction structures.
- Broken concrete or other disturbances at or near junction structures.

## *Reporting*

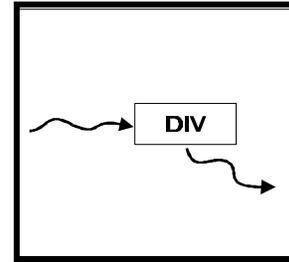
# Notify the Resident Engineer promptly of any illicit discharges or illegal dumping incidents. The Resident Engineer shall respond in accordance with MD/CD8 Illegal Dumping Control, or MD/CD9 Illicit Connection Detection, Reporting & Removal.

## Cleanup and Removal

# The contractor is not responsible for investigation and clean up of illicit discharges or illegal dumping not generated by the contractor. Caltrans may direct contractor to clean up non-hazardous dumped or discharged material on the construction site.



# Clear Water Diversion and Encroachment



**BMP Objectives**

- F Soil Stabilization
- F Sediment Control
- F Tracking Control
- F Wind Erosion Control
- M Non-Storm Water

<b>Definition and Purpose</b>	Procedures to prevent degradation of surface waters when working in areas which encroach into live streams or other perennial receiving waters.
<b>Appropriate Applications</b>	<ul style="list-style-type: none"> <li># Construction in live stream areas where the stream bed must be encroached.</li> <li># Construction in live stream areas where the stream bed must be diverted.</li> <li># Construction within a water body, such as a lake, bay, or harbor, where temporary dry construction areas must be created.</li> </ul>
<b>Limitations</b>	<ul style="list-style-type: none"> <li># Diversion/encroachment activities will usually disturb the waterway during installation and removal of diversion structures.</li> <li># Specific permit requirements or mitigation measures (e.g., U.S. Army Corps of Engineers, California Department of Fish and Game, FEMA, RWQCB, etc.) may be included in contract documents because of clear water diversion/encroachment activities.</li> <li># Diversion/encroachment activities may constrict the waterway, which can obstruct flood flows and cause flooding or washouts.</li> </ul>

# Clear Water Diversion and Encroachment

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## 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 tides, storms, flash floods, etc.
- # Where possible, avoid or minimize diversion/encroachment impacts by scheduling construction during periods of low flow or when the stream is dry. See also CD22(2) - Scheduling. Scheduling should also consider seasonal releases of water from dams, fish migration and spawning seasons, 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 sand bags are used, they shall be filled with clean materials free of silt, clay, and organic substances.

### *Temporary Diversions/Encroachments*

- # Construct diversion channels in accordance with CD31(2) - Earth Dikes, Drainage Swales, and Lined Ditches.
- # In high flow velocity areas, stabilize slopes of embankments and diversion ditches using an appropriate liner, in accordance with CD26B(2) - Geotextiles, Mats/Plastic Covers and Erosion Control Blankets, or, use rock slope protection, as described in Standard Specifications Section 72-2 - Rock Slope Protection.
- # Where appropriate, use natural stream bed materials such as large cobbles and boulders for temporary embankment/slope protection.
- # 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 CD33A(2) - Outlet Protection/Velocity Dissipation.

# Clear Water Diversion and Encroachment

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## *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 CD7(2) - Dewatering.
- # 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 Standard Specifications Section 5-1.116 - Differing Site Conditions.
- # 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.

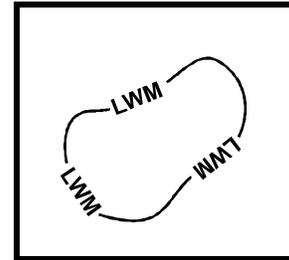
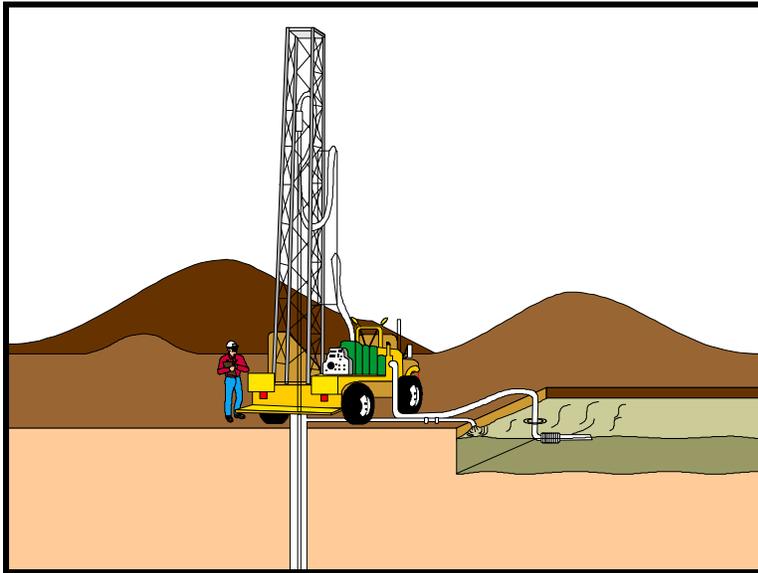
## Maintenance and Inspection

- # Inspect diversion/encroachment structures before and after significant storms, and at least once per week while in service.
- # Inspect embankments and diversion channels before and after significant storms, and at least once per week while in service for damage to the linings, accumulating debris, sediment build up, and weakening of the slope protection. Remove debris and repair linings and slope protection as required.

# CD46(2)

## Liquid Waste Management

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### BMP Objectives

- F Erosion and Sediment Control
- F Sediment Treatment Control
- F Tracking Control
- F Wind Erosion Control
- Z Non-Storm Water

### 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:

- # Drilling slurries and drilling fluids
- # Grease-free and oil-free wash water and rinse water
- # Dredgings
- # Other non-storm water liquid discharges not permitted by pertinent Caltrans District NPDES permit

### 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 (e.g., NPDES permits, Army Corps permits, Coastal Commission permits, etc.).
- # Does not apply to dewatering operations (see CD7(2)), solid waste management (see CD13(2)), hazardous wastes (see CD14(2)), or concrete slurry residue (see CD16(2)).

# CD46(2)

## Liquid Waste Management

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- # Does not apply to non-stormwater discharges permitted by any NPDES permit held by the pertinent Caltrans District, unless the discharge is determined by Caltrans to be a source of pollutants. Typical permitted non-stormwater discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated pumped ground water; discharges from potable water sources; foundation drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and, discharges or flows from emergency fire fighting activities.

### Standards and Specifications

#### *General Practices*

- # Designate a foreman or supervisor to 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).
- # Do not allow liquid wastes to enter any storm drain inlets. Use CD32B(2) - Top and Toe of Slope Diversion Ditches/Berms, CD38(2) - Sand Bag Barrier, or CD40(2) - Storm Drain Inlet Protection, to stop flows of liquid waste from entering storm drain inlets.
- # Verify which non-stormwater discharges are permitted by the pertinent Caltrans District NPDES permit. Some listed discharges may be prohibited if Caltrans determines the discharge to be a source of pollutants.
- # Apply CD18(2) - Vehicle and Equipment Cleaning for managing wash water and rinse water from vehicle and equipment cleaning operations.



# CD46(2)

## Liquid Waste Management

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### *Containing Liquid Wastes*

- # 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 CD12(2) - 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 have 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 (CD31(2) and CD32B(2)) to intercept flows and direct them to a containment area or device for capture.
- # If the liquid waste is sediment laden, use CD41(2) - 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 CD7(2) - Dewatering and CD42(2) - Sediment Basin, and dispose of resulting solids per CD13(2) - Solid Waste Management, or per Standard Specifications Section 7-1.13-Disposal of Material Outside the Highway Right-of-Way for off-site disposal.
- # Method of disposal for some liquid wastes may be prescribed in

# CD46(2)

## Liquid Waste Management

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Water Quality Reports, NPDES 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 CD14(2) - 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.

### Maintenance and Inspection

- # 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 CD13(2) - Solid Waste Management.
- # Inspect containment areas and capturing devices frequently for damage, and repair as needed.

