FINAL

Construction Site Best Management Practices (BMP) Manual

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List of Abbreviations

AC	Asphalt Concrete
ATS	Active Treatment System
BMP	Best Management Practice
Caltrans	State of California, Department of Transportation
CCS	Cellular Confinement System
CFR	Code of Federal Regulations
CGP	Construction General Permit
COI	Change of Information
CSBMP	Construction Site Best Management Practices
CWA	Clean Water Act
DSA	Disturbed Soil Area
DWQ	Division of Water Quality
EA	Expenditure Authorization
EPA	Environmental Protection Agency
H:V	horizontal versus vertical
lb/ac	pound(s) per acre
LTCGP	Lake Tahoe Hydrologic Unit Construction General Permit
MMBN	Middle-Mile Broadband Network
MS4	Municipal Separate Storm Sewer System
NONA	Notice of Non-Applicability
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
PID	Project Initiation Document
PPDG	Project Planning and Design Guide
PSE	Plans, Specifications, and Estimate
QPE	Qualifying Precipitation Event
QSD	Qualified SWPPP Developer
QSP	Qualified SWPPP Practitioner
RE	Resident Engineer
REAP	Rain Event Action Plan
RECP	Rolled Erosion Control Products
RUSLE2	Revised Universal Soil Loss Equation v2
RW	Receiving Water
RWQCB	Regional Water Quality Control Board
SMARTS	Storm Water Multiple Application Reporting and Tracking System
SS	Settleable Solids
SWMP	Stormwater Management Program
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TBMP	Treatment Best Management Practice
TMDL	Total Maximum Daily Load
WLA	Waste Load Allocation
WPC	Water Pollution Control
WPCD	Water Pollution Control Drawing
WPCP	Water Pollution Control Program

Section 1
Introduction

1.1 Overview

This Construction Site Best Management Practices (CSBMP) Manual (Manual) provides guidance on the selection and implementation of Best Management Practices (BMP) into construction projects within the State of California, Department of Transportation (Caltrans) right-of-way.

The primary objective of this CSBMP Manual is to provide the overall process for selecting, installing, and maintaining temporary BMPs in Caltrans construction projects. The CSBMP Manual provides a general background of stormwater documents and references to other stormwater manuals, includes a flowchart showing applicable BMP triggers for each of the six Construction Site BMP categories, and detailed guidance for the selection, installation, and required maintenance for individual BMPs. The Manual ties into the Caltrans 2023 Standard Specifications applicable to BMP installation and maintenance frequency. If there is a conflict between this Manual and a Caltrans Standard Specification, either due to a Specification revision or modification, the Caltrans Standard Specifications will control.

This Manual is organized as follows:

- **Section 1 – Introduction** provides a background on regulations and stormwater permits, and relevant stormwater guidance documents and websites.
- **Section 2 – Caltrans Construction Stormwater Program Requirements** describes general documents prepared for or related to the construction phase of the project, instructions for selecting and implementing Construction Site BMPs, and details of the minimum BMP inspections required for construction sites.
- **Section 3 – Temporary Soil Stabilization BMPs** provides an overview of the Soil Stabilization BMP category and a listing and working details for Caltrans Construction Site BMPs for Temporary Soil Stabilization.
- **Section 4 – Temporary Sediment Control BMPs** provides an overview of the Sediment Control BMP category and a listing and working details for Caltrans Construction Site BMPs for Temporary Sediment Control.
- **Section 5 – Wind Erosion Control BMPs** provides an overview of the Wind Erosion BMP category and a listing and working details for Caltrans Construction Site BMPs for Wind Erosion Control.
- **Section 6 – Tracking Control BMPs** provides an overview of the Tracking Control BMP category and a listing and working details for Caltrans Construction Site BMPs for Temporary Tracking Control.
- **Section 7 – Non-stormwater Management BMPs** provides an overview of the Non-stormwater Management BMP category and a listing and working details for Caltrans Construction Site BMPs for Non-stormwater Management.
- **Section 8 – Waste Management and Material Pollution Control BMPs** provides an overview of the Waste Management and Materials Pollution Control BMP category and a listing and working details for Caltrans Construction Site BMPs for Waste Management and Materials Pollution Control.

- **Appendix A –** provides definitions of terms used throughout this Manual.
- **Appendix B –** provides guidance on the selection of temporary soil stabilization controls.
- **Appendix C –** provides guidance on the requirements for implementing an Active Treatment System (ATS) to comply with the Construction General Permit (CGP) or the Lake Tahoe Hydrologic Unit Construction General Permit (LTCGP).

1.2 Regulations and Stormwater Permits

1.2.1 Federal Regulations

The Clean Water Act (CWA) is a federal regulation that deals in part with controlling discharges of pollutants from Municipal Separate Storm Sewer Systems (MS4), construction sites, and industrial activities as part of the National Pollutant Discharge Elimination System (NPDES) permit process. In 1990, the Environmental Protection Agency (EPA) promulgated federal stormwater regulations requiring municipal, construction, and industrial stormwater discharges to comply with an NPDES permit.

In California, the EPA delegated its authority to issue NPDES permits to the State Water Resources Control Board (SWRCB). The SWRCB has nine regional water quality control boards across the State. Figure 1-1 presents a depiction of the nine regional board boundaries in relation to the Caltrans Districts.

1.2.2 Caltrans NPDES Statewide Permit and NPDES Construction General Permit

On July 15, 1999, the SWRCB issued the first NPDES Permit, Statewide Stormwater Permit and Waste Discharge Requirements for the State of California, Department of Transportation (NPDES No. CAS000003) hereby called Caltrans Permit. The Caltrans Permit requires the preparation and implementation of the Caltrans Statewide Stormwater Management Plan (SWMP). The SWMP describes how Caltrans plans to implement the Caltrans Permit requirements and describes Caltrans' program that addresses stormwater pollution control related to various activities, including planning, design, construction, maintenance, and operation of roadways and facilities.

The Caltrans Permit regulates stormwater discharges from Caltrans properties, facilities, and activities, and requires that the Caltrans' construction program comply with the requirements of the NPDES General Permit, waste discharge requirements for Discharges of Stormwater Runoff Associated with Construction Activity (NPDES No. CAS000002) issued by the SWRCB and hereby called Construction General Permit or CGP.

Both the Caltrans Permit and the CGP have been reissued since 2009. The current Caltrans Permit Order 2022-0033-DWQ became effective January 1, 2023, and requires construction projects with 1 acre or more of soil disturbance to comply with the CGP Order WQ 2022-0057-DWQ and amendments thereto. There are a small number of Caltrans projects that are situated in the Lahontan Regional Board area (Lake Tahoe specifically); those projects are subject to the LTCGP Order No.R6T-2016-0010. The CGP and the LTCGP require that the authorized Stormwater Pollution Prevention Plan (SWPPP) and all other relevant documents and data for SWPPP projects be uploaded to the SWRCB's Stormwater Multiple Application and Report Tracking System (SMARTS).

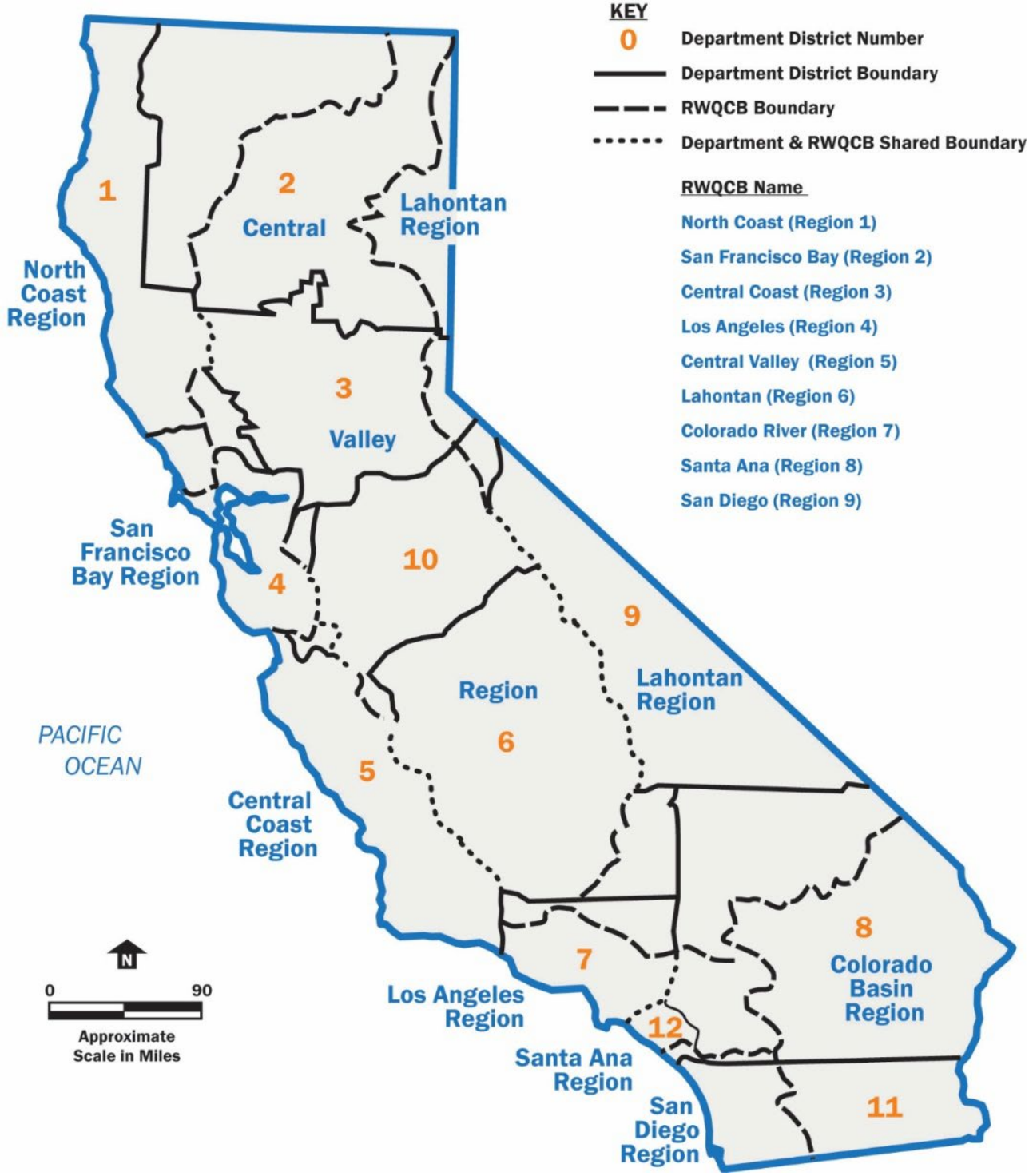


Figure 1-1. Map of California with Regional Water Quality Control Boards and Caltrans Districts

1.2.3 Other NPDES Permits

There are other permits that might be applicable to Caltrans construction projects depending on the specific activities or regional requirements. Any construction project might trigger the Statewide Industrial Permit coverage if the project involves a proposed batch plant or other industrial activities, as outlined below. In addition, there are specific regional permits that might be applicable for projects that propose dewatering operations.

1.2.3.1 Industrial Permit

Industrial activities are not covered under the Caltrans Permit. The Statewide Permit for Stormwater Discharges Associated with Industrial Activities (i.e., the Industrial General Permit [IGP]) (Order 2014-0057-DWQ) as amended in 2015 and 2018 regulates nine broad categories of industrial activities. There are activities that might occur ancillary to construction projects; for those operations, the industrial permit is triggered. Caltrans contracts include language requiring the Contractor to implement BMPs and seek coverage as required under the IGP.

1.2.3.2 Dewatering Permit

Dewatering discharge requirements vary among the nine regional boards. Caltrans has developed a Dewatering Manual that should be referred to in order to determine appropriate requirements for the individual construction site. The Dewatering Manual can be accessed via the website link included in Table 1-2.

This Manual reflects permit language up to its publication date. Any permit renewals subsequent to the publish date of this Manual, will dictate the latest requirements.

1.3 Caltrans Stormwater Manuals and Websites

Caltrans has devised a comprehensive stormwater program to comply with Caltrans Permit requirements. In addition to the SWMP, Caltrans has developed several stormwater guidance manuals that are available on their website for staff, consultants, and anyone in the public to use to implement appropriate BMPs.

Table 1-1 presents a list of the primary reference material to be used for determining applicable permit requirements and specific compliance mechanisms developed by Caltrans. This Manual is intended to be used in conjunction with the SWPPP/Water Pollution Control Program (WPCP) Preparation Manual as both are directly related to water pollution control when performing construction operations within Caltrans projects and rights of way.

Table 1-1. Relevant Caltrans Stormwater Documents, Manuals, and their Purpose [1]

Document	Purpose
Caltrans Stormwater Management Plan (SWMP)	Describes how Caltrans plans to implement the Caltrans Permit requirements. The SWMP describes the Caltrans' program and addresses stormwater pollution control related to various activities, including planning, design, construction, maintenance, and operation of roadways and facilities.
Stormwater Quality Handbooks: Project Planning and Design Guide (PPDG)	Guides project planning staff in preparing and selecting appropriate Best Management Practices, BMPs, for inclusion into Contract Plans. Includes step-by-step guidance for documenting the selection and implementation of BMPs.
Appendix E - Stormwater Data Report (SWDR)	Document prepared by the Project Engineer or Landscape Architect that forms the basis for ensuring compliance with the Caltrans Permit requirements for the Design Division. Determination of SWPPP/WPCP applicability based on disturbed soil area and BMP line items included as part of the Contract Plans.
Stormwater Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual	Guides Contractors and Caltrans staff through the process of preparing a SWPPP and WPCP. This manual provides detailed step-by-step procedures, instructions, sample text, and a template that Contractors must use to prepare the SWPPP/WPCP. Templates conform to CGP requirements based on risk level; LTCGP requirements, including deviations from CGP language; and Caltrans requirements for preparing WPCPs.
Construction Site Monitoring Program Guidance Manual	This manual presents guidance for Caltrans staff and Contractors to use in planning and implementation of stormwater monitoring programs at construction sites. Describes and provides guidance on developing sampling and analysis plans, standard operating procedures for pH and turbidity sampling, and other requirements of the CGP and LTCGP.
Guidance for Temporary Soil Stabilization	This document guides the planning, selection, and implementation of Caltrans temporary soil stabilization BMPs.
Field Guide to Construction Site Dewatering	This dewatering guide informs and guides intended users in selecting, implementing, and monitoring construction site dewatering operations.
Erosion Prediction Procedure (RUSLE2) Manual	Describes the method established by headquarters Office of Hydraulics and Stormwater Design for the prediction of erosion rates before, during, and after construction of Caltrans projects to meet the erosion and sediment control and TMDL requirements identified in the Caltrans Permit, the CGP, and/or the LTCGP.

1. *There may be other relevant manuals that pertain to specific enforcement or general criteria; see Table 1-2 for additional manuals and links.*

Table 1-2 presents website links for Caltrans manuals, procedures, and other documents. This Manual is intended as guidance for Construction Operations within Caltrans ROW. Any users should follow the NPDES Permit, the Caltrans SWMP, the Caltrans Standard Specifications, and then lastly any stormwater guidance documents.

Table 1-2. Stormwater-Related Websites

	Description	Websites
EPA	U.S. Environmental Protection Agency	http://www.epa.gov
Laws/ Regulations	Code of Federal Regulations (CFR)	http://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR
NPDES Permit	Caltrans NPDES Statewide Stormwater Permit (Caltrans Permit)	https://www.waterboards.ca.gov/water_issues/programs/stormwater/caltrans.html
NPDES Permit	Construction General Permit (CGP)	https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html
NPDES Permit	Lake Tahoe Construction General Permit (LTCGP)	https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html
NPDES Permit	Industrial General Permit (IGP)	https://www.waterboards.ca.gov/water_issues/programs/stormwater/industrial.html
Caltrans Stormwater Program	Caltrans Statewide Stormwater Program – Headquarters Division of Environmental Analysis	https://dot.ca.gov/programs/environmental-analysis/stormwater-management-program
State Water Resources Control Board	SWRCB SMARTS	https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.xhtml
Caltrans Stormwater Manual	Division of Construction - Stormwater Quality Link. Contains links to resources for developing SWPPP, WPCP, field guide to construction site dewatering and other manuals and resources.	https://dot.ca.gov/programs/construction/storm-water-and-water-pollution-control
Caltrans Stormwater Manual	Caltrans Construction Stormwater Quality manuals and handbooks	https://dot.ca.gov/programs/construction/storm-water-and-water-pollution-control/manuals-and-handbooks
Caltrans SSPs	Caltrans Construction Contract Standards Specifications, Plans, Standard Special Provisions (SSPs) [1]	https://dot.ca.gov/programs/design/ccs-standard-plans-and-standard-specifications
Caltrans Stormwater Costs Estimating Guidance	Caltrans cost-estimating guidance	https://dot.ca.gov/programs/design/cost-estimating-improvements

1. *Contract Documents could include specific project requirements such as monitoring requirements under Clean Water Act 401 WQC or 404 Permit, or others included as part of the Informational Handout.*

Section 2

Caltrans Construction Stormwater Management Program Requirements

2.1 Stormwater Pollution Prevention Plan and Water Pollution Control Program

Caltrans requires Contractors to prepare and implement a program to effectively control water pollution during the construction of all projects (see Standard Specification Section 13 Water Pollution Control). Projects resulting in 1 acre or more of disturbed soil area (DSA) are subject to the CGP or the LTCGP depending on the project location. Caltrans Standard Specifications require that for these projects, Contractors prepare and submit a SWPPP.

If two or more small construction projects (less than 1 acre of soil disturbance) in the same corridor (typically set up by Caltrans under the same Expenditure Authorization (EA) or parent EA) are part of a larger common plan of development (1 acre or more), these small projects are also subject to the CGP or LTCGP requirement to develop and implement a SWPPP. For construction projects within a larger common plan of development, located at least one-quarter mile apart and the area between the projects is not being disturbed, each individual project may be regulated as a separate construction project. This determination is done by the Project Engineer and is further discussed in the PPDG. This does not apply for Middle-Mile Broadband Network (MMBN) Projects; see specific MMBN guidance.

There also may be instances where a SWPPP is required even when there is less than 1 acre of DSA if it is determined that the construction project poses a significant water quality risk; this determination will be made by the District/Regional NPDES Coordinator if mandated by the Regional Water Quality Control Board (RWQCB), SWRCB, or another regulatory agency. Potential examples of when this might occur could be work over a 303d waterbody and water implosions. The Contract Documents will specify whether the construction project is to be implemented as a SWPPP or a WCPP.

If a construction project exceeds 1 acre of DSA and is not hydrologically connected to Waters of the United States, it can be exempted from CGP coverage as it meets the Notice of Non-applicability (NONA) requirements. The project must be certified in SMARTS and a Technical Report must be submitted, see PPDG Section 1.4.4.

Caltrans requires that a WPCP addressing control measures be prepared and implemented by the construction Contractor for construction projects resulting in soil disturbance of less than 1 acre. The specific requirements and detailed instructions are included in Section 4 of the SWPPP/WPCP Preparation Manual. These general requirements are included in the Construction BMP Applicability Flowchart, Figure 2-1.

Construction projects that have a DSA between 1 and less than 5 acres and have a duration of less than 1 year may qualify for a rainfall erosivity waiver under the CGP if the rainfall erosivity factor (R factor) is less than a value of five. The R factor considers project location, length of construction, and time of year, so projects that begin and complete construction within a short period are likely to qualify for a rainfall erosivity waiver. To calculate the R value, refer to Section 1.4.2.1 of no SWPPP/WPCP Preparation Manual; a link to the manual is provided in Table 1-2.

Construction projects that qualify for a rainfall erosivity waiver do not need to prepare a SWPPP but are required to submit proper documentation via SMARTS (to be exempted from the CGP) as well as prepare and implement a site-specific WPCP.

2.2 Construction BMP Applicability

The flowchart presented in Figure 2-1 guides the user as to whether the project triggers a SWPPP or a WPCP and where to find additional information, if needed. The determination for a SWPPP or a WPCP applicability will be made by the Project Engineer, but it is included here for completeness. The flowchart also includes general questions to determine applicability of BMP categories that are described in Sections 3 through 8 of this Manual.

The steps described below correspond to the steps shown in Figure 2-1.

Step 1 - Start

The Contractor, the Water Pollution Control (WPC) Manager, the Qualified SWPPP Developer (QSD) or the Qualified SWPPP Practitioner (QSP) must use Figure 2-1, the guidance provided in this section, and the SWPPP/WPCP Preparation Manual to determine the project's entire BMP selection and applicability for the duration of the construction phase.

Step 2 - Is a Construction project being proposed?

A construction project is defined as any activity, including but not limited to, clearing, grading, grubbing, or excavation. Routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility is not deemed a construction activity that requires a SWPPP or a WPCP.

If the project qualifies as a construction project, proceed to step 3.

If the project does not meet the definition of construction, then the project is subject to Maintenance BMPs; refer to the Caltrans July 2016 SWMP or the Caltrans Maintenance Staff Guide.

Step 3 - Will the project create 1 acre or more of DSA?

If the construction project will disturb more than 1 acre of soil it is subject to either the CGP or the LTCGP depending on its location and an up-to-date SWPPP must be prepared and maintained during the entire project duration.

If the construction project disturbs less than 1 acre of soil, the project must have a WPCP prepared and implemented; see Section 4 of the SWPPP/WPCP Preparation Manual for specific instructions.

Step 4- Can the construction project qualify for a Notice of Non-applicability (NONA)?

If the construction project exceeds 1 acre of DSA and is not hydrologically connected to waters of the United States, the project can qualify for a NONA.

If you answered yes, the project does not need coverage under the CGP but it still requires certification in SMARTS and a No Discharge Technical Report must be uploaded. In addition, a WPCP must be prepared and implemented.

If the project does not qualify for a NONA, proceed to step 5.

Step 5 - Can the construction project qualify for a Rainfall Erosivity Waiver?

If a project will be of short duration and is more than 1 acre but less than 5 acres of soil disturbance, it might qualify for an EPA rainfall erosivity waiver as discussed in Section 1.4.2 of the SWPPP/WPCP Preparation Manual.

If you answered yes, the project does not need coverage under the CGP but it still requires some paperwork to be filed via SMARTS. In addition, a WPCP must be prepared and implemented.

If you answered no, then project is subject to SWPPP requirements. See Section 3 of the SWPPP/WPCP Preparation Manual for further guidance on SWPPP preparation.

Step 6- Are any soil areas expected to be exposed and need stabilization as part of the project or is there a need to stabilize concentrated flow conveyances?

Projects are required to implement appropriate controls year-round. If the project has exposed soil areas or unlined conveyances, the WPC Manager or QSP must be diligent in ensuring appropriate BMPs are implemented. See Section 3 of this Manual for specific BMP factsheets and proceed to Step 6. For further guidance on proper selection and costs, see Appendix B of this Manual.

If there are no soil areas needing stabilization and no unstable conveyances, then proceed to Step 6.

Step 7 - Will the project require temporary controls to intercept/slowdown on-site or off-site flows?

If the project has areas where offsite flows are coming onto the project area, flows should be prevented from commingling with materials, operations or contaminants, including soil, to prevent them from being carried by the offsite flows. Onsite flows must be conveyed in accordance with HDM Section 800 to reduce potential for turbid flows. See Section 4 of this Manual for specific BMP factsheets to control sediment-laden runoff.

Step 8 - Will the project require a dust control plan or is there a potential for dust control BMPs to be applicable?

Use Section 5 of this Manual for specific BMP factsheets if the contract documents require the preparation and implementation of a Dust Control Plan or if there is a potential for dust to be generated at any time during the duration of the construction project.

Step 9 - Will the project require tracking controls in any area within project limits?

Any areas where construction vehicles are entering or exiting the project must be stabilized to prevent tracking of sediment or other materials. See Section 6 of this Manual for specific BMP factsheets for tracking control. Additionally, SC-7, Street Sweeping should be evaluated and implemented either on its own or in combination with other BMPs to ensure compliance with all permits and contract documents.

Step 10 - Will the project day-to-day operations require good housekeeping practices or have a need for non-stormwater BMPs?

Section 7 of this Manual includes a list of source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with stormwater.

Step 11 - Will the project include material storage, spill prevention needs, waste management, or other housekeeping practices?

All materials or wastes either stored or generated during the construction phase must be properly stored and disposed. Section 8 of this Manual includes lists of BMPs that must be used at the Contractor's yard, where the materials are stored, or where construction activities are being conducted to ensure proper usage, containment, and disposal of materials and waste products.

END - Specific BMP factsheets must be reviewed, and the Project's SWPPP or WPCP text and tables, along with the Water Pollution Control Drawings and the Water Pollution Control Schedule must be modified to ensure appropriate controls are implemented year-round.

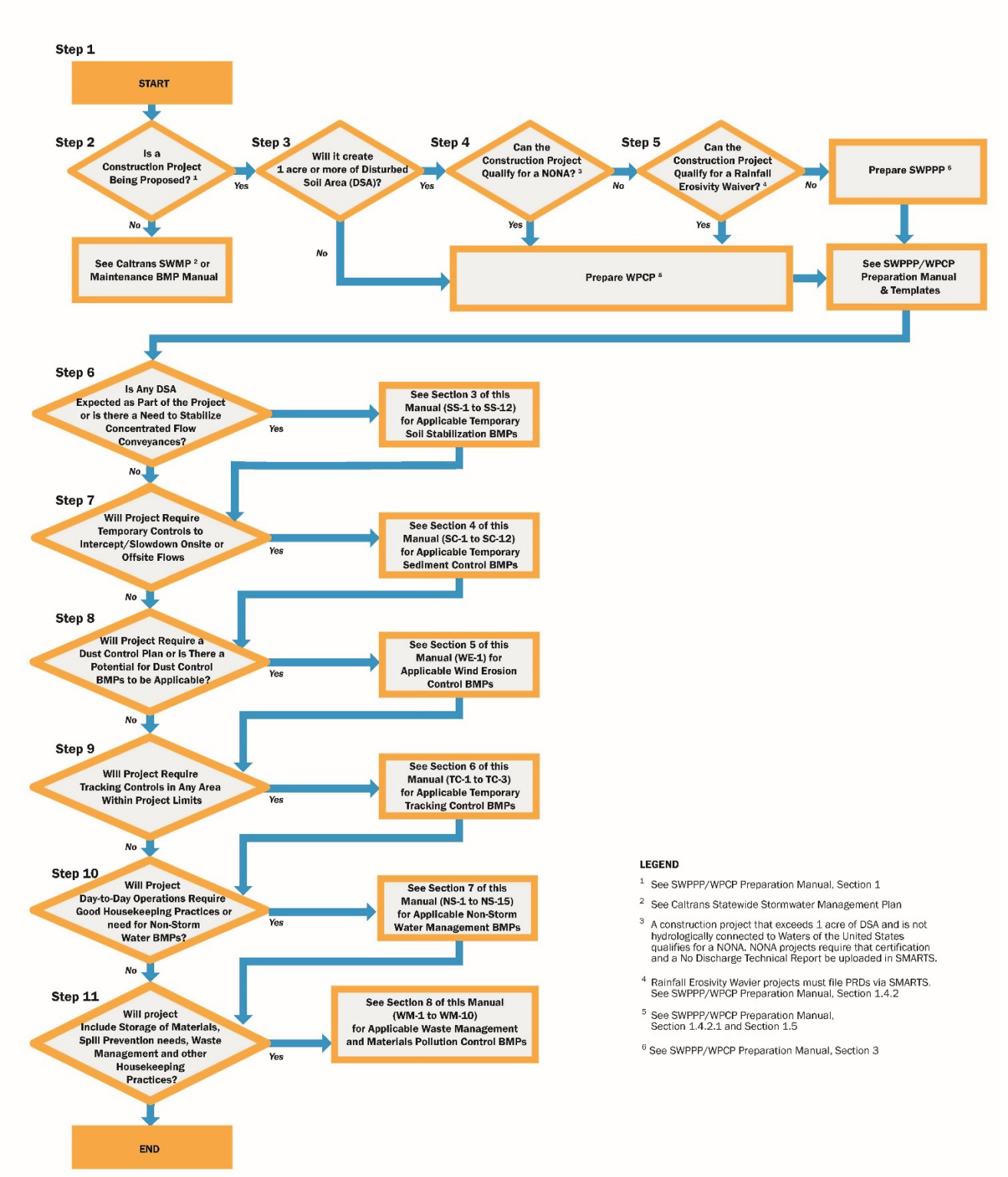


Figure 2-1. Construction Site BMP Applicability Flowchart

2.3 Minimum Construction BMPs

This section provides the minimum construction BMPs required for a project subject to the CGP or the LTCGP or one that requires WPCP preparation and implementation. It is important to note that the requirements of this Section are minimum requirements, and that Caltrans contracts may impose more-stringent requirements. Working details of Construction Site BMPs are presented in Sections 3 through 8 of this Manual.

Construction Site BMPs (also sometimes called temporary control practices or BMPs) are best conventional technology/best available technology (BCT/BAT)-based BMPs that are consistent with the BMPs and control practices required under the CGP and the LTCGP. Caltrans Construction Site BMPs are divided into six categories, as shown in Table 2-1.

Stormwater pollution control requirements are intended to be implemented on a year-round basis at an appropriate level. The requirements must be implemented in a proactive manner during all seasons while construction is ongoing. Appropriate water pollution control includes the implementation of an effective combination of both soil stabilization and sediment controls, implementation of wind erosion measures, tracking controls, non-stormwater and waste management, and material pollution BMPs. Some BMPs can be implemented as a standalone device while others can be combined to improve effectiveness and compliance.

Section 2 of the SWPPP/WPCP Preparation Manual describes in detail specific requirements under the applicable CGP. The CGP and LTCGP both require minimum controls and require BMPs based on the projects' calculated risk level to apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths.

Table 2-1. Construction Site BMPs

ID	BMP Name	Minimum Requirement[4] CGP	Minimum Requirement[4] LTCGP
Temporary Soil Stabilization			
SS-1	Scheduling	X	X
SS-2	Preservation of Existing Vegetation	X	X
SS-3	Temporary Hydraulic Mulch	X[1]	X[1]
SS-4	Temporary Hydroseed	X[1]	X[1]
SS-5	Temporary Soil Binder	X[1]	X[1]
SS-6	Temporary Tacked Straw	X[1]	X[1]
SS-7	Temporary Cover and Rolled Erosion Control Products (RECP)	X[1]	X[1]
SS-8	Temporary Mulch	X[1]	X[1]
SS-9	Earth Dikes/Drainage Swales & Lined Ditches	-	-
SS-10	Outlet Protection/Velocity Dissipation Devices[2]	X	X
SS-11	Slope Drains	-	-
SS-12	Streambank Stabilization	-	-

Table 2-1. Construction Site BMPs			
ID	BMP Name	Minimum Requirement[4] CGP	Minimum Requirement[4] LTCGP
Temporary Sediment Control			
SC-1	Temporary Silt Fence	X[1]	X[1]
SC-2	Sediment/Desilting Basin	-	-
SC-3	Sediment Trap/Curb Cutback	-	-
SC-4	Temporary Check Dam	-	-
SC-5	Temporary Fiber Rolls	X[1]	X[1]
SC-6	Temporary Gravel Bag/Earthen Berm	X[1]	X[1]
SC-7	Street Sweeping	X	-
SC-8	Sandbag Barrier	-	X
SC-9	Temporary Straw Bale Barrier	X[1]	X[1]
SC-10	Temporary Drainage Inlet Protection	X	X
SC-11	Temporary Compost Sock	X[1]	X[1]
SC-12	Flexible Sediment (Temporary Foam) Barrier	X[1]	X[1]
Wind Erosion Control			
WE-1	Wind Erosion Control	X	X
Tracking Control			
TC-1	Temporary Construction Entrance	X	X
TC-2	Temporary Construction Roadway	-	-
TC-3	Temporary Entrance/Outlet Tire Wash	-	-
Non-Stormwater Management			
NS-1	Water Conservation Practices	-	-
NS-2	Dewatering	-	X[3]
NS-3	Paving, Sealing, Saw Cutting, Grooving, and Grinding Activities	X	X
NS-4	Temporary Stream Crossing	-	-
NS-5	Clear Water Diversion	-	-
NS-6	Illegal Connection and Illicit Discharge Detection and Reporting	X	X
NS-7	Potable Water/Irrigation	-	-
NS-8	Vehicle and Equipment Cleaning	X	X
NS-9	Vehicle and Equipment Fueling	X	X
NS-10	Vehicle and Equipment Maintenance	X	X
NS-11	Pile Driving	-	-
NS-12	Concrete Curing	-	-
NS-13	Material and Equipment Use Over Water	-	-
NS-14	Concrete Finishing	-	-
NS-15	Structure Removal Over or Adjacent to Water	-	-

Table 2-1. Construction Site BMPs			
ID	BMP Name	Minimum Requirement[4] CGP	Minimum Requirement[4] LTCGP
Waste Management and Materials Pollution Control			
WM-1	Material Delivery and Storage	X	X
WM-2	Material Management	X	X
WM-3	Stockpile Management	X	X
WM-4	Spill Prevention and Control	X	X
WM-5	Solid Waste Management	X	X
WM-6	Hazardous Waste Management	-	X
WM-7	Contaminated Soil Management	-	X
WM-8	Concrete Waste Management	X	X
WM-9	Sanitary and Septic Waste Management	X	X
WM-10	Liquid Waste Management	-	X

1. *Can be selected as a standalone BMP or a combination of temporary soil stabilization BMPs depending on site conditions; minimum requirement is met when the individual BMP or the combination is properly implemented.*
2. *Only applicable when outlet protection/velocity dissipation is required.*
3. *When dewatering is expected, must have a dewatering and/or diversion plan as required under LTCGP Section N, or CGP Attachment J if no specific dewatering permit is applicable.*
4. *Minimum requirements are based on CGP Attachment D and LTCGP.*

2.3.1 Surface Water Buffers

A surface water buffer is a 50-foot undisturbed natural buffer from the edge of DSAs to any receiving water's top of bank. Where surface water buffers cannot be maintained, The CGP requires the project to provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by erosion and sediment controls that achieve, in combination, the sediment load reduction equivalent to a 50-foot undisturbed natural buffer. The equivalent sediment load may be calculated using the Revised Universal Soil Loss Equation, version 2 (RUSLE2) or another method approved by the Regional Water Board.

2.4 BMP Inspection Frequency

The SWPPP or WPCP implemented on Caltrans construction projects includes specific visual monitoring requirements to comply with the CGP, LTCGP, and/or Caltrans Permit. All BMPs deployed on construction sites must be inspected on a frequency as described below. Improperly installed or damaged BMPs must be corrected immediately, unless a later date is approved by the Resident Engineer (RE). Corrections must be made before the onset of forecasted rain event, qualifying precipitation event (QPE), or qualifying rain event as used by the Caltrans standard specifications, the CGP, and/or the LTCGP. Routine inspections of Construction Site BMPs are to be conducted at a minimum as follows:

- Daily for LTCGP projects
- Daily for certain activities for SWPPPs or WPCPs
- Within 72 hours prior to a QPE

- Within 2 days after a QPE if 0.5 inches or more precipitation is measured during the duration of the QPE using the on-site rain gauge
- At 24-hour intervals during extended rain events
- Weekly throughout the duration of the construction project

Some visual inspections are required to be performed by specific personnel under the CGP, while all other routine inspections may be performed by a trained delegate.

The following inspections must be performed by a QSD:

- Once within 30 days of construction activities starting
- Once within 30 days of a change in site QSD
- Once between August 1 and October 31 of each year
- Once between January 1 and March 31 of each year
- Within 14 calendar days after a numeric action level exceedance
- Within 14 calendar days of an inactive project status
- As requested by Water Board staff

The following inspections must be performed by a QSP:

- Once every calendar month
- Once within 72 hours of each forecasted QPE
- Within 14 days after a numeric action level exceedance
- Before the final Notice Of Termination (NOT) or Change Of Information (COI) of all or part of the site

Table 2-2 shows the monitoring requirements for projects subject to CGP. The SWPPP/WPCP Preparation Manual includes more details on what each inspection should include.

Table 2-2. Monitoring Requirements for CGP

Risk Level	Visual Inspections *Pre-storm* Weekly/Daily [1] (if applicable)	Visual Inspections *Post-storm* Daily Storm BMP [2]	Visual Inspections *Post-Storm*	Sampling [3] *Non-visible Pollutant*	Sampling [3] *Stormwater Discharge*	Sampling [3] Receiving Water
CGP 1	X	X	X	X	-	-
CGP 2	X	X	X	X	X	-
CGP 3	X	X	X	X	X	X

1. *A pre-, during, or post-QPE inspection also satisfies the daily visual inspection requirement.*
2. *Visual inspections are not required during dangerous weather conditions or when access to the site is infeasible (e.g., due to snow accumulation) or unsafe.*
3. *Other sampling, such as ATS, might be required but it is based on site operations and not risk level.*

Under the LTCGP, inspections of Construction Site BMPs are to be conducted at a minimum as follows:

- Prior to a forecasted storm event
- After a qualified rain event that causes runoff from the construction site
- At 24-hour intervals during extended rain events
- Daily throughout the duration of the construction project

Table 2-3 shows the monitoring requirements for projects subject to the LTCGP. The SWPPP/WPCP Preparation Manual and Construction Site Monitoring Guidance Manual includes more details on what each inspection should include.

Table 2-3. Monitoring Requirements for LTCGP

	Visual Inspections Daily, including Non-stormwater Discharges	Visual Inspections *Pre-storm* Baseline	Visual Inspections *Pre-storm* REAP	Visual Inspections Post-storm Post-storm	Sampling *Non-visible Pollutant*	Sampling *Stormwater Discharge*	Sampling Receiving Water
LTCGP	X	X	X	X	X	X	X

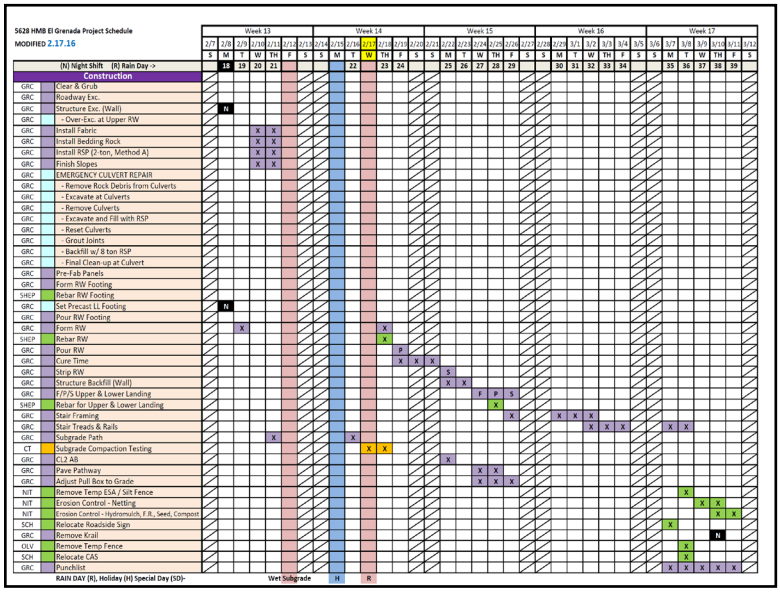
Section 3

Temporary Soil Stabilization BMP

3.1 Temporary Soil Stabilization

Temporary soil stabilization consists of preparing the soil surface and applying one of the BMPs shown in Table 3-1, or a combination thereof, to DSAs. Temporary soil stabilization must be applied to DSAs of construction projects in conformance with Contract Documents and this Manual. Refer to Appendix B for additional guidance on the selection of temporary soil stabilization controls.

Scheduling



Standard Symbol

BMP Objectives

Soil Stabilization	☑
Sediment Control	☑
Tracking Control	☑
Wind Erosion Control	☑
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

This BMP involves developing, for every project, a schedule that includes construction activity sequencing with implementation of construction site BMPs such as temporary soil stabilization and temporary sediment control measures. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Appropriate Applications

Construction sequencing should be scheduled to minimize land disturbance during the wetter months for all projects. In addition, any construction windows required by regulatory permits, and any winter suspension work, should be described in the schedule. Appropriate BMPs must be implemented year-round.

Limitations

Environmental constraints such as nesting season prohibitions reduce the full capabilities of this BMP.

Standards and Specifications

General Requirements

- Developing a schedule and planning the project operations to minimize erosion and the potential to discharge pollutants to stormwater are the critical first steps in an effective stormwater program. The construction schedule must be incorporated into the Stormwater Pollution Prevention Plan (SWPPP) or Water Pollution Control Program (WPCP). Refer to

Section 8 and 13 of the Standard Specifications for specific requirements of what the schedule must include for water pollution control.

- The schedule should clearly show when work activities that could pollute stormwater with sediment or other contaminants (e.g., grading, move-in, move-out, stockpiling, pile driving) would occur and when soil stabilization, sediment control, and other BMPs associated with each phase of construction would be implemented.
- The schedule should include details on the implementation and deployment of BMPs related to:
  - Temporary and permanent soil stabilization
  - Temporary sediment control
  - Tracking control
  - Wind erosion control
  - Non-stormwater
  - Waste management and materials pollution control
- The schedule needs to be updated as part of the SWPPP annual winterization plan.
- The schedule should also include dates for significant long-term operations or activities that may have planned non-stormwater discharges, such as dewatering, saw cutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, bridge cleaning, etc.
- The construction schedule should reflect requirements for in-water work and other construction activities with potential to disturb water and biological resources specified in regulatory agency permits and approvals (RWQCB 401 Water Quality Certification, U.S. Army Corps of Engineers 404 permit, 1602 permit, etc.).
- The construction schedule should also include dates when an active or passive treatment system is expected to be used. There are specific notification requirements in SMARTS that need to be processed prior to the commencement of these systems.

Recommendations

- Schedule work to minimize soil-disturbing activities during predicted rain events. Consider rescheduling activities for dry periods to minimize maintenance requirements.
- Develop the sequencing and timetable for the start and completion of each item, such as site clearing and grubbing, grading, excavation, paving, pouring foundations, installing utilities, etc., to minimize the active construction area.
- Schedule major grading operations during dryer months when practical.
- Stabilize inactive areas within 15 days from the cessation of soil-disturbing activities or 1 day prior to the onset of precipitation, whichever occurs first. It is important to consider manufacturer's recommendations for the selected soil stabilization BMP to ensure they meet the minimum dry time required. See Appendix B of this Manual for additional guidance.
- Monitor the weather forecast for storm events, which are storms that produce or are forecast to produce at least 0.1 inch of precipitation within a 24-hour period. There is a qualifying precipitation event per CGP that begins with the 24-hour period when 0.5 inches has been forecast and continues on subsequent 24-hour periods when 0.25 inches of precipitation or more is forecast. When a rain event is predicted, adjust the construction schedule to allow the

implementation of soil stabilization, sediment controls, and, if applicable, sediment treatment controls on all disturbed areas prior to the onset of rain.

- Ensure an ample supply of BMP materials are on site in order to quickly mobilize and implement required BMPs, particularly ahead of rain events when materials may be in short supply or back ordered.
- Be prepared year-round to deploy soil stabilization and sediment 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 sediment trapping devices in operational condition.
- Sequence trenching activities so that most open portions are closed before new trenching begins. Trenched material should be stored on the upstream side of the trenches.
- Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
- Consider the early planting and establishment of permanent vegetation in the schedule to maximize plant establishment success and minimize irrigation and continuous maintenance needs.
- Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window

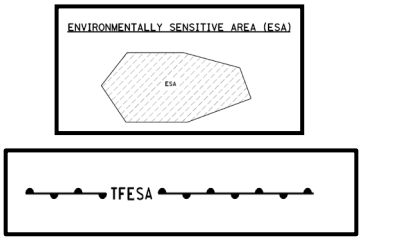
Maintenance and Inspection

- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Keep the schedule up to date and ensure it is consistent with the Contractor's 3-week look-ahead or other routine schedule submitted to the RE under the contract.
- Amend the schedule when changes are warranted or when directed by the RE.

SWPPP or WPCP

- A Water Pollution Control Schedule (WPCS) must include construction operations and BMP implementation for the entire duration of the project. The WPCS is to be included as an attachment (Attachment I) and discussed in Sections 600.1.1 and 600.1.2 of the SWPPP and Section 30.2.1 of the WPCP.

Preservation of Existing Vegetation



Standard Symbol

BMP Objectives

Soil Stabilization	☑
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Preservation of existing vegetation is the identification and protection of desirable vegetation that provides erosion and sediment control benefits.

Appropriate Applications

- To preserve existing vegetation at areas on a site where no construction activity is planned or will occur at a later date. This BMP is very applicable for multi-year or multiple location projects, for which existing vegetation can be preserved until the area becomes active.
- On a year-round basis, temporary fencing shall be provided prior to the start of clearing and grubbing operations or other soil-disturbing activities in areas.
- Clearing and grubbing operations should be staged to preserve existing vegetation.
- Areas where natural vegetation exists and is designated for preservation. Such areas often include steep slopes, a watercourse, and building sites in wooded areas.
- Areas where local, state, and federal government require preservation, such as vernal pools, wetlands, marshes, certain oak trees, etc. Clearly marking and leaving a buffer area around these unique areas during construction will help to preserve these areas as well as take advantage of natural erosion prevention and sediment trapping.
- For any trenching or tunneling. Trenching shall be as far away from tree trunks as possible, usually outside of the tree drip line or canopy. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them.

- When trenching and/or tunneling near or under trees are to be retained, tunnels shall be at least 8 inches 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.

Limitations

- Protection of existing vegetation requires planning and may limit the area available for construction activities.
- For sites with diverse topography, it is often difficult and expensive to save existing trees while grading the site satisfactorily for the construction project.

Standards and Specifications

General Requirements

- Specifications for preservation of existing vegetation can be found in Standard Specifications Section 5-1.36A.
- Section 14 “Environmental Stewardship” of the Standard Specifications specifies the requirements related to environmental compliance and resource management, including requirements related to Environmentally Sensitive Areas (ESA).
- Refer to Section 16-2.03 of the Standard Specifications for “Temporary High-Visibility Fences” used to delineate ESAs.
- Refer to 16-2.04 of the Standard Specifications for “Temporary Construction Mats” used to protect wetlands and other areas.

Schedule

- Preservation of existing vegetation must be provided prior to the start of clearing and grubbing operations or other soil-disturbing activities in areas identified on the plans to be preserved, including areas designated as ESAs.
- Preservation of existing vegetation should conform to scheduling requirements set forth in the special provisions.

Design and Layout

- Mark areas to be preserved with temporary fencing (Temporary High-Visibility Fence). The temporary fencing must be made of high-visibility fabric secured with 6-foot (minimum) posts. Refer to Section 16-2.03B of the Standard Specifications for more information on temporary high-visibility fence materials.
- Fence posts can be either wood or steel, at the Contractor’s discretion, as appropriate for the intended purpose. The post spacing must be 8 feet center-to-center (maximum) and embedded at least 16 inches into the ground to completely support the fence in an upright position.
- See Standard Plan T65 for “Temporary Water Pollution Control Details (temporary high-visibility fence).”

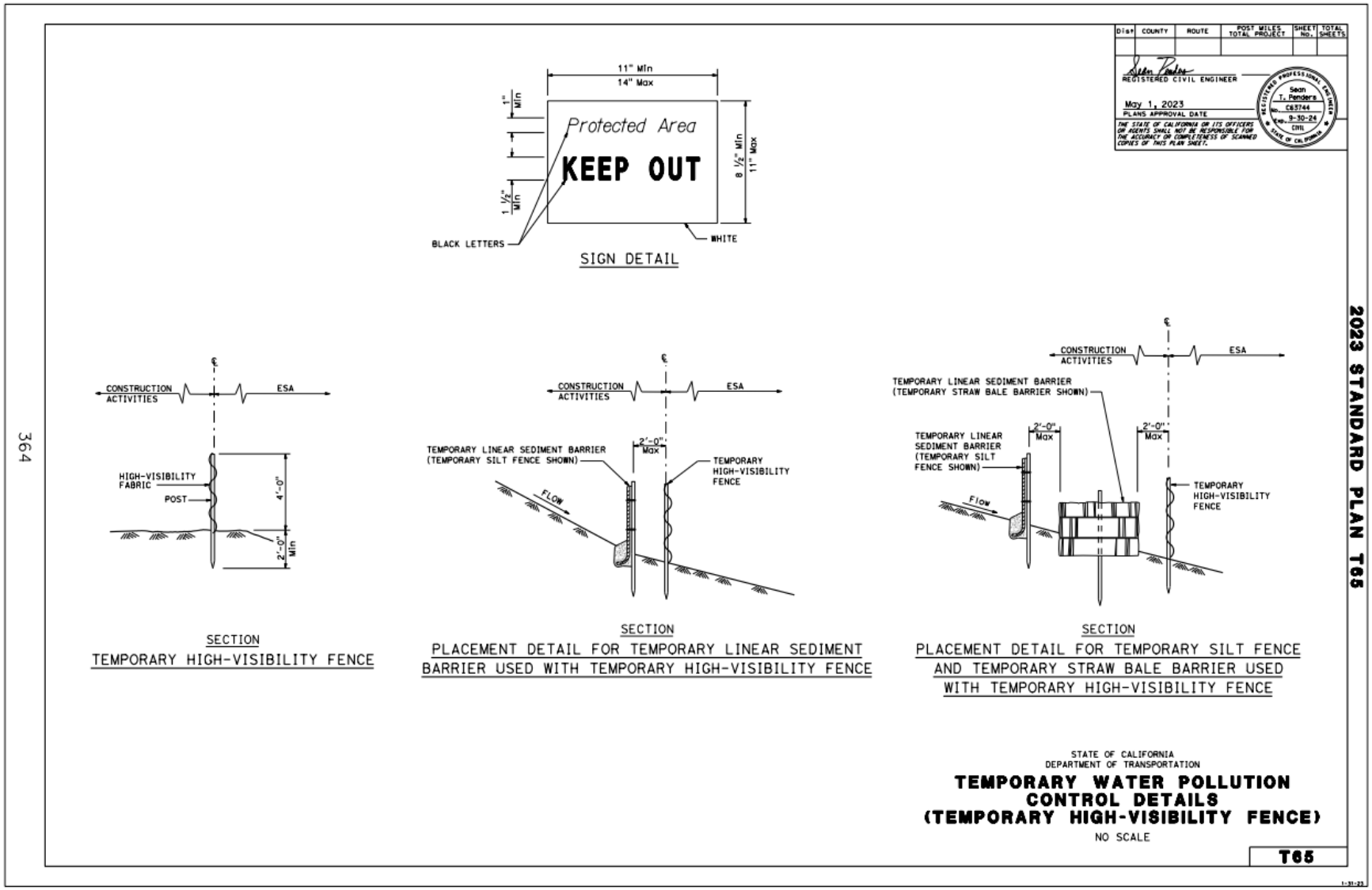
Preservation of Existing Vegetation SS-2

Installation

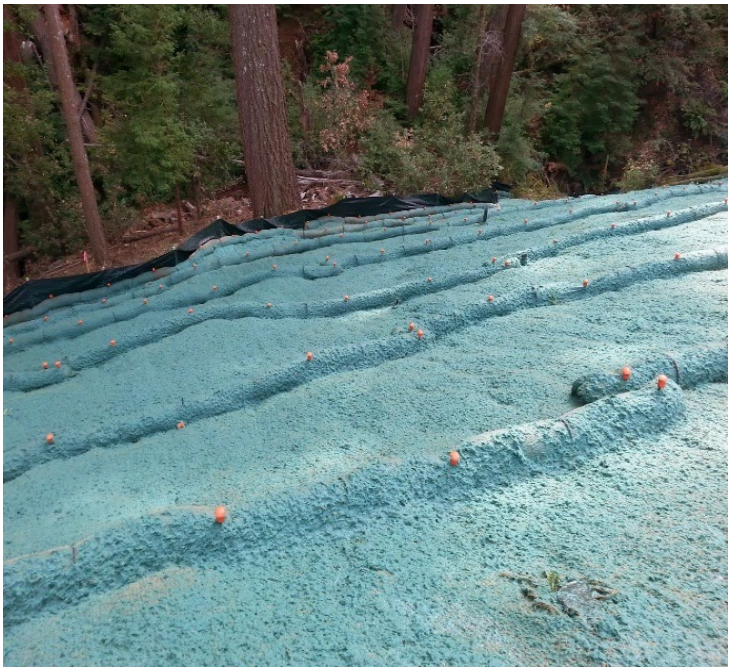
- Construction materials, equipment storage, and parking areas should be located where they will not cause damage to vegetation designated for preservation. This could include keeping equipment away from trees to prevent trunk and root damage, considering the impact of grade changes to existing vegetation and the root zone, and minimizing disturbed areas by avoiding stands of trees and shrubs and following existing contours to reduce cutting and filling for temporary roads.
- Maintain existing irrigation systems.
- Employees and subcontractors must be instructed to honor protective devices. No heavy equipment, vehicular traffic, or storage piles of any construction materials is permitted within the drip line of any tree to be retained. Removed trees should not be felled, pushed, or pulled into any retained trees. Fires should not be permitted within 100 feet of the drip line of any retained trees. Any fires must be of limited size and must be kept under continual surveillance. No toxic or construction materials (including paint, acid, nails, gypsum board, chemicals, fuels, and lubricants) should be stored within 50 feet of the drip line of any retained trees, nor disposed of in any way that would injure vegetation.
- The last activity after all other work is complete is to remove fences and barriers. This is to help protected trees that may otherwise be destroyed by carelessness during the final cleanup and landscaping.

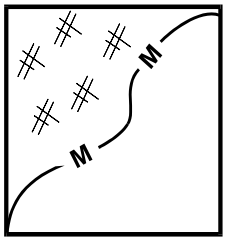
Preservation of Existing Vegetation

SS-2



Temporary Hydraulic Mulch





Standard Symbol

BMP Objectives	
Soil Stabilization	☑
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☑
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Temporary hydraulic mulch consists of using hydroseeding equipment to apply a mixture of natural fibers and a stabilizing compound to temporarily protect exposed soil from erosion caused by raindrop impact or wind. This is one of five temporary soil stabilization alternatives to consider.

Appropriate Applications

- Temporary hydraulic mulch is applied to disturbed areas that require temporary protection until permanent vegetation is established, or disturbed areas that must be re-disturbed following an extended period of inactivity.

Limitations

- Wood fiber hydraulic mulches are generally short-lived (only last a part of a growing season) and require time (24 hours or more) to dry before rainfall occurs to be effective.
- Paper mulches are not permitted.
- Avoid use in areas where the mulch would be incompatible with immediate future earthwork activities and would have to be removed.
- Cellulose fiber mulches alone may not perform well on steep slopes or in coarse soils.

Temporary Hydraulic Mulch

SS-3

Standards and Specifications

General Requirements

- See Standard Specifications Section 13-5.03D to 13-5.03G for placing various types of hydraulic mulch.
- Standard Specifications Section 21-2.02D and 21-2.02E contain material specifications for fiber and tackifier, respectively.
- A certificate of compliance, as required under Standard Specifications Section 21-2.01C(4), is required for tackifier and bonded fiber matrix (BFM).
- Hydraulic matrices require time to dry before rainfall occurs to be effective. Refer to the manufacturer's specifications for drying times.
- Avoid mulch over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation.
- Selection of hydraulic mulches by the Contractor must be approved by a licensed professional.
- Prior to application, roughen embankment and fill areas by rolling with a crimping or punching-type roller or by track walking. Track walking should only be used where other methods are impractical.

Temporary Hydraulic Mulch

- Temporary hydraulic mulch contains mixtures of fiber and tackifier that is applied to soil with hydraulic spray equipment.
- Fiber for temporary hydraulic mulch must be at least 50 percent wood fiber. The remaining percentage must be cellulose fiber, alternate fiber, or a combination of these fibers.
- Temporary hydraulic mulch application rates must follow the manufacturer's recommendations. If not provided, apply at a rate of 2,000 pounds per acre (lb/ac).
- Tackifier should be applied per the manufacturer's instructions for the slope, soil, and wind conditions

Temporary BFM Hydraulic Mulch

- BFM contains 100 percent wood fiber and tackifier, sometimes combined with seed and fertilizer that is applied to soil hydraulically.
- BFM application rates must follow the manufacturer's recommendations. If not provided, apply at a rate of 3,500 lb/ac.
- Tackifier used for BFM must be:
  - Bonded to the fiber or prepackaged with the fiber by the manufacturer
  - Contain a minimum of 10 percent of the combined weight of the dry fiber, activating agents, and additives
  - Organic, high-viscosity colloidal polysaccharide with activating agents or a blended hydrocolloid-based binder

Temporary Hydraulic Mulch

SS-3

Temporary Cementitious Binder Hydraulic Mulch

- Temporary cementitious binder hydraulic mulch is a mixture of fiber and a cementitious binder that is applied to soil with hydraulic spray equipment.
- Application rates of temporary cementitious binder hydraulic mulch must be according to the manufacturer's specifications. If not provided, apply at a rate of 2,000 lb/ac; apply cementitious binder at a rate of 4,000 lb/ac.
- Additional standards for cementitious binder are provided in Standard Specifications Section 13 5.03G.
- Additional guidance on the selection of soil stabilization BMPs can be found in Appendix B of this Manual.

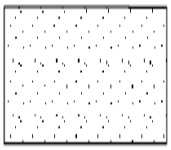
Maintenance and Inspections

- A certificate of compliance under Standard Specifications Section 21-2.01C(4) for the applicable BMP must be submitted to the Resident Engineer prior to application to ensure proper mix is being used.
- It is recommended that a small test area/mock-up occur prior to large-area application to verify sufficient cover for the approved mix.
- Maintain unbroken, temporary mulched ground cover throughout construction when the soils are not being reworked. Inspect before expected rainstorms, and repair any damaged ground cover and re mulch exposed areas of bare soil.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.
- Areas where temporary hydraulic mulch Temporary will be implemented must be shown in the WPCDs and match site conditions.

SWPPP or WPCP

- Temporary hydraulic mulch, temporary BFM hydraulic mulch or temporary cementitious hydraulic mulch must be discussed in Section 600.1.2 of the SWPPP, or Section 30.2.1 of the WPCP.

Temporary Hydroseed



Standard Symbol

BMP Objectives

Soil Stabilization	☑
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☑
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Temporary hydroseed typically consists of applying a mixture of wood, fiber, seed, fertilizer, and stabilizing emulsion with hydromulch equipment, which temporarily protects exposed soils from erosion by water and wind.

Appropriate Applications

- Hydroseeding is applied on disturbed soil areas that require temporary protection until permanent vegetation is established, or on disturbed soil areas that must be re-disturbed following an extended period of inactivity.
- Can be used in conjunction with other rolled erosion control products.

Limitations

- Hydroseeding may be used alone only when there is sufficient time in the season to ensure adequate vegetation establishment and erosion control. Otherwise, hydroseeding must be used in conjunction with a soil binder or mulch, such as temporary soil binders (see SS-5) and temporary tacked straw (see SS-6).” Temporary Tacked Straw
- Steep slopes are difficult to protect with temporary seeding.
- Temporary seeding may not be appropriate in dry periods without supplemental irrigation.
- Temporary vegetation may have to be removed before permanent vegetation is applied.
- Temporary vegetation is not appropriate for short-term inactivity.
- Hydroseeding should not be used in areas subject to heavy traffic.
- Hydroseeding could trigger non-visible sampling if the appropriate application timeframe (before a rain event) and manufacturer recommendations are not followed.

Temporary Hydroseed

SS-4

Standards and Specifications

General Requirements

- Refer to Standard Specifications Section 13-5.03I “Temporary Hydroseed.”
- To select appropriate hydroseeding mixtures, an evaluation of site conditions shall be performed with respect to:
  - Soil conditions
  - Site topography
  - Season and climate
  - Vegetation types
  - Maintenance requirements
  - Sensitive adjacent areas
  - Water availability
  - Plans for permanent vegetation
- Selected hydroseeding mixtures must be approved by the licensed professional.
- Seed mix must comply with Standard Specifications Section 21-2.02F “Seed” and the project’s special provisions.
- Seed may be dry applied to small areas not accessible by hydroseeding equipment if authorized.
- Seeds must not contain seeds of prohibited noxious weeds and must not contain more than 1.0 percent total weed seed by weight. Seeds must be delivered to the project site with each species in separate, unopened containers with the seed tag attached. Measure individual seed species and mix in the presence of the RE.
- Fiber must be at least 50 percent wood fiber. The remaining percentage must be cellulose fiber, alternate fiber, or a combination of these fibers.
- Commercial fertilizer must conform to the requirements of the California Food and Agricultural Code. Fertilizer can be pelleted or granular form.

Application Procedures

- Prior to application, roughen the slope, fill area, or area to be seeded with the furrows trending along the contours. Rolling with a crimping or punching-type roller, or track walking, is required on all slopes prior to hydroseeding. Track walking should only be used where other methods are impractical.
- Add water to hydroseed materials as recommended by the manufacturer and mix sufficiently to ensure an even application. A dispersing agent may be added to the mixture if authorized.
- Equipment must have a built-in continuous agitation and discharge system capable of producing a homogeneous mixture and a uniform application rate. The tank must have a minimum capacity of 1,000 gallons. A smaller tank can be used if authorized by the RE.
- Apply temporary hydroseed at the following rates:
  - Apply seed at rates specified in the project’s erosion control plans.
  - Apply fiber at 2,000 pounds per acre.
  - Apply tackifier according to manufacturer’s recommendations for the slope, soil, and wind conditions.

  - Apply materials in locations, rates, and number of applications shown and as follows:
  - Start application within 60 minutes after adding seed to the tank.
  - Apply in successive passes as necessary to achieve the specified application rate.
  - Apply all hydroseed materials shown for a single area within 72 hours.
- If hydroseed materials are applied to areas covered by rolled erosion control products (RECP), apply hydroseed materials to the RECP as follows:
  - Verify the RECP is in uniform contact with the slope surface.
  - Spray materials into the RECP perpendicular to the slope and integrate well.
  - Do not displace or damage the RECP.
  - After the final application, do not allow pedestrians or equipment on the treated areas.
  - Follow-up applications shall be made as needed to cover weak spots and to maintain adequate soil protection.
  - Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation.
- Additional guidance on the selection of soil stabilization BMPs can be found in Appendix B of this Manual.

Maintenance and Inspection

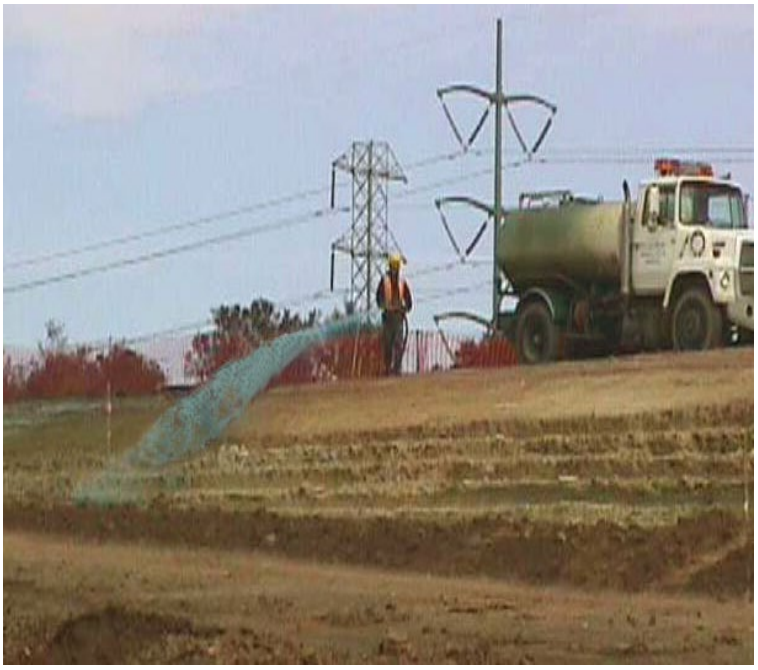
All seeded areas must be inspected for failures and re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates. Any temporary revegetation efforts that do not provide adequate cover must be reapplied at a scheduled recommended by the licensed professional.

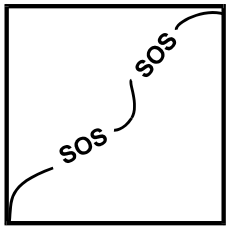
- A certificate of compliance under Standard Specifications Section 21-2.01C(4) for the applicable BMP must be submitted to the RE prior to application to ensure proper mix is being used.
- It is recommended that a small test area/mock-up occur prior to large-area application to verify sufficient cover for the approved mix.
- After any rain event, the Contractor is responsible for maintaining all slopes to prevent erosion.
- Areas where hydroseeding will be implemented must be shown in the WPCDs. Application timeframes (dates) must be included in the WPCS.
- Must ensure correct application rates and passes (different directions) take place to ensure adequate coverage.

SWPPP or WPCP

- Hydroseeding must be discussed in Section 600.1.2 of SWPPP, or in Section 30.2.1 of the WPCP

Temporary Soil Binder





Standard Symbol

BMP Objectives	
Soil Stabilization	☑
Sediment Control	☐
Tracking Control	☑
Wind Erosion Control	☑
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Temporary soil binder consists of applying and maintaining a soil stabilizer to exposed soil surfaces. Soil binders are materials applied to the soil surface to temporarily prevent water-induced erosion of exposed soils on construction sites. Soil binders also provide temporary dust, wind, and soil stabilization (erosion control) benefits. This is one of five temporary soil stabilization alternatives to consider.

Appropriate Applications

Temporary soil binder is typically applied to disturbed areas requiring short-term temporary protection. Because soil binder can often be incorporated into the work, it may be a good choice for areas where grading activities will soon resume. It can be applied on stockpiles to prevent water and wind erosion.

Limitations

- Soil binders are temporary in nature and may need reapplication.
- Soil binders require a minimum curing time until fully effective, as prescribed by the manufacturer. Soil binders may need reapplication after a storm event.
- Soil binders will generally experience spot failures during heavy rainfall events. If runoff penetrates the soil at the top of a slope treated with a soil binder, it is likely that the runoff will undercut the stabilized soil layer and discharge at a point further down slope.
- Soil binders do not hold up to pedestrian or vehicular traffic across treated areas.

- Soil binders may not penetrate soil surfaces made up primarily of silt and clay, particularly when compacted.
- Some soil binders may not perform well with low relative humidity. Under rainy conditions, some agents may become slippery or leach out of the soil.
- Soil binders may not cure if low temperatures occur within 24 hours of application.

Standards and Specifications

General Considerations

- Site-specific soil types will dictate appropriate soil binders to be used.
- A soil binder must be environmentally benign (non-toxic to plant and animal life), easy to apply, easy to maintain, and economical, and shall not stain paved or painted surfaces. Refer to Standard Specifications Section 13,18 and 21.
- Some soil binders are compatible with existing vegetation.
- Performance of soil binder performance depends on temperature, humidity, and traffic across treated areas.
- Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation.
- Storm water quality runoff sampling is required for many soil binders. Refer to the Construction Site Monitoring Program Guidance Manual to determine if the applicable copolymers/polymers require non-visible sampling. The following binders have been found as not discharging pollutants, and therefore water quality sampling and analysis is not required for them: Super Tak, M-binder, Fish Stik, Pro40dc, Fisch-Bond, Soil Master WR, and EarthGuard.

Soil Binder Applications

- After selecting an appropriate soil binder, the untreated soil surface must be prepared before application. The untreated soil surface must contain sufficient moisture to assist the agent in achieving uniform distribution. In general, the following steps shall be followed:
  - Follow manufacturer's recommendations for application rates, pre-wetting of application area, and cleaning of equipment after use.
  - Prior to application, roughen embankment and fill areas by rolling with a crimping or punching-type roller or by track walking. Track walking shall only be used where rolling is impractical.
  - Consider the drying time for the selected soil binder and apply with sufficient time before anticipated rainfall. Soil binders shall not be applied during or immediately before rainfall.
  - Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
  - Soil binders shall not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the air temperature is below 4°C (40°F) during the curing period.
  - More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate.

- Generally, soil binders require a minimum curing time of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure times.

■ For liquid agents:

- Crown or slope ground to avoid ponding.
- Uniformly pre-wet ground at 0.03 to 0.3 gallons per square yard (gal/yd2) or according to manufacturer's recommendations.
- Apply solution under pressure. Overlap solution 6 to 12 inches.
- Allow treated area to cure for the time recommended by the manufacturer, typically at least 24 hours.
- In low humidities, reactivate chemicals by re-wetting with water at 0.1 to 0.2 gal/yd^2.

Selecting a Soil Binder

Properties of common soil binders used for erosion control are provided in Table 1 and Appendix B. Use Table 1 to select an appropriate soil binder.

Table 1
Properties of Soil Binders for Erosion Control

Chemicals	Plant Material Based (Short Lived)	Plant Material Based (Long Lived)	Polymeric Emulsion Blends	Cementitious-based Binders
Relative Cost	Low	Low	Low	Low
Resistance to Leaching	High	High	Low to Moderate	Moderate
Resistance to Abrasion	Moderate	Low	Moderate to High	Moderate to High
Longevity	Short to Medium	Medium	Medium to Long	Medium
Minimum Curing Time before Rain	9 to 18 hours	19 to 24 hours	0 to 24 hours	4 to 8 hours
Compatibility with Existing Vegetation	Good	Poor	Poor	Poor
Mode of Degradation	Biodegradable	Biodegradable	Photodegradable/ Chemically Degradable	Photodegradable/ Chemically Degradable
Labor Intensive	No	No	No	No
Specialized Application Equipment	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher
Liquid/Powder	Powder	Liquid	Liquid/Powder	Powder
Surface Crusting	Yes, but dissolves on rewetting	Yes	Yes, but dissolves on rewetting	Yes
Cleanup	Water	Water	Water	Water
Erosion Control Application Rate	Varies (1)	Varies (1)	Varies (1)	4,500 to 13,500 kg/ha

(1) Dependent on product, soil type, and slope inclination

Factors to consider when selecting a soil binder:

- **Suitability to situation** – Consider where the soil binder will be applied; determine if it needs a high resistance to leaching or abrasion and whether it needs to be compatible with any existing vegetation. Determine the length of time soil stabilization will be needed and if the soil binder will be placed in an area where it will degrade rapidly. In general, slope steepness is not a discriminating factor for the listed soil binders.
- **Soil types and surface materials** – Fines and moisture content are key properties of surface materials. Consider a soil binder's ability to penetrate, likelihood of leaching, and ability to form a surface crust on the surface materials.
- **Frequency of application** – The frequency of application can be affected by subgrade conditions, surface type, climate, and maintenance schedule. Frequent applications could lead to high costs. Application frequency may be minimized if the soil binder has good penetration, low evaporation, and good longevity. Consider also that frequent application will require frequent equipment cleanup.

After considering the above factors, the soil binders in Table 1 will be generally appropriate as follows:

Plant-material Based (Short Lived)

- ***Guar*:** Guar-gum-based tackifier must be derived from the ground endosperm of the guar plant, *Cyanmopsis tetragonolobus*. It must be treated with dispersing agents for easy mixing. It shall be diluted at the rate of 1 to 5 lb per 100 gallons of water, depending on application machine capacity. Recommended minimum application rates are as follows:

Slope (V:H):	Flat	1:4	1:3	1:2	1:1
Kilograms per hectare (kg/ha)	45	50	56	67	78
Pounds per acre (lb/ac)	40	45	50	60	70

- ***Psyllium*:** Psyllium is composed of the finely ground muciloid coating of plantago seeds that is applied as a dry powder or in a wet slurry to the surface of the soil. It dries to form a firm but rewettable membrane that binds soil particles but permits seed germination and growth. Psyllium requires 12 to 18 hours of drying time. Psyllium shall be applied at a rate of 80 to 200 lb/ac, with enough water in solution to create a uniform slurry flow.
- ***Starch***: Starch is non-ionic, water soluble granular cornstarch. The material is mixed with water and applied at the rate of 150 lb/ac. Approximate drying time is 9 to 12 hours.

Plant-material Based (Long Lived)

- ***Pitch and Rosin Emulsion:*** Generally, a non-ionic pitch and rosin emulsion has a minimum solids content of 48 percent. The rosin shall be a minimum of 26 percent of the total solids content. The soil stabilizer shall be non-corrosive, water-dilutable emulsion that upon application cures to a water-insoluble binding and cementing agent. For soil erosion control applications, the emulsion is diluted and shall be applied as follows:

  For clayey soil: 5 parts water to 1 part emulsion

  For sandy soil: 10 parts water to 1 part emulsion

  Application can be by water truck or hydraulic seeder with the emulsion/ product mixture applied at the rate specified by the manufacturer. Approximate drying time is 19 to 24 hours.

Polymeric Emulsion Blends

- ***Acrylic Copolymers and Polymers:*** Polymeric soil stabilizers shall consist of a liquid or solid polymer or copolymer with an acrylic base that contains a minimum of 55 percent solids. The polymeric compound shall be handled and mixed in a manner that will not cause foaming or shall contain an anti-foaming agent. The polymeric emulsion shall not exceed its shelf life or expiration date; manufacturers shall provide the expiration date. Polymeric soil stabilizer shall be readily miscible in water, non-injurious to seed or animal life, non-flammable, shall provide surface soil stabilization for various soil types without totally inhibiting water infiltration, and shall not re-emulsify when cured. The applied compound shall air cure within a maximum of 36 to 48 hours. Liquid copolymer shall be diluted at a rate of 10 parts water to 1 part polymer and applied to soil at a rate of 1,175 gallons per acre (gal/ac).
- ***Liquid Polymers of Methacrylates and Acrylates:*** This material consists of a tackifier/sealer that is a liquid polymer of methacrylates and acrylates. It is an aqueous 100 percent acrylic emulsion blend of 40 percent solids by volume that is free from styrene, acetate, vinyl, ethoxylated surfactants, or silicates. For soil stabilization applications, it is diluted with water in accordance with manufacturer's recommendations and applied with a hydraulic seeder at the rate of 20 gal/ac. Drying time is 12 to 18 hours after application.
- ***Copolymers of Sodium Acrylates and Acrylamides:*** These materials are non-toxic, dry powders that are copolymers of sodium acrylate and acrylamide. They are mixed with water and applied to the soil surface for erosion control at rates that are determined by slope gradient

Slope Gradient (V:H)	kg/ha (lb/ac)
Flat to 1:5	3 to 5
1:5 to 1:3	5 to 10
1:2 to 1:1	10 to 20

- ***Polyacrylamide and Copolymer of Acrylamide:*** Linear copolymer polyacrylamide is packaged as a dry-flowable solid. When used as a stand-alone stabilizer, it is diluted at a rate of 1 lb/100 gal of water and applied at the rate of 5 lb/ac.

- ***Hydro-Colloid Polymers:*** Hydro-colloid polymers are various combinations of dry-flowable polyacrylamides, copolymers and hydro-colloid polymers that are mixed with water and applied to the soil surface at rates of 53 to 62 lb/ac. Drying times are 0 to 4 hours.

Cementitious-based Binders

- ***Gypsum:*** This is a formulated gypsum-based product that readily mixes with water and mulch to form a thin protective crust on the soil surface. It is composed of high-purity gypsum that is ground, calcined, and processed into calcium sulfate hemihydrate with a minimum purity of 86 percent. It is mixed in a hydraulic seeder and applied at rates of 4,000 to 12,000 lb/ac. Drying time is 4 to 8 hours.

Additional guidance on the selection of soil stabilization BMPs can be found in Appendix B of this Manual.

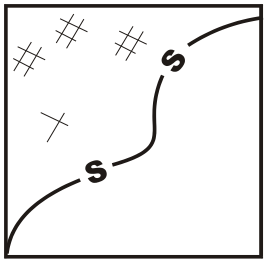
Maintenance and Inspection

- Reapplying the selected soil binder may be needed for proper maintenance. High-traffic areas shall be inspected daily, and lower-traffic areas shall be inspected weekly.
- A certificate of compliance under Standard Specifications Section 21-2.01C(4) must be submitted to the RE prior to application.
- It is recommended that a small test area/mock-up occur prior to large-area application to verify sufficient cover for the approved mix.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.
- Maintain an unbroken, temporary stabilized area while DSAs are inactive. Repair any damaged stabilized area and re-apply soil binder to exposed areas.
- Cleaning of equipment must be done in a designated area that can collect the water to prevent triggering of non-visible and non-stormwater requirements.

SWPPP or WPCP

- Soil Binders must be discussed in Section 600.1.2 of the SWPPP, or Section 30.2.1 of the WPCP. If non-visible sampling is required, Section 1100 of the SWPPP is also applicable.

Temporary Tacked Straw



Standard Svmbol

BMP Objectives	
Soil Stabilization	☑
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☑
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Temporary tacked straw mulch consists of placing and then incorporating a uniform layer of straw into the soil with a studded roller or anchoring it with a tackifier or rolled erosion control product (RECP). This is one of several temporary soil stabilization alternatives available for consideration.

Appropriate Applications

- Temporary tacked straw is typically used for soil stabilization and temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetation is established.
- Typically used in combination with temporary and/or permanent seeding strategies to enhance plant establishment.

Limitations

Availability of erosion control contractors and straw may be limited prior to rain events due to high demand.

- The introduction of weed-seed and unwanted plant material is a possibility.
- Temporary tacked straw applied by hand is more time-intensive and potentially costly.
- May have to be removed prior to permanent seeding or soil stabilization.
- “Punching” of straw does not work in sandy soils; a tackifier must be used

Temporary Tacked Straw

SS-6

Standards and Specifications

General Requirements

- Straw and tackifier must conform to Standard Specifications Sections 21-2.02H, 21.2-03G, and 21-2.02E.
- A certificate of compliance for straw must be submitted before application. If weed-free straw is used, the certificate of compliance must include the certificate of quarantine compliance.
- Straw must be derived from wheat, rice, or barley.
- A tackifier is the preferred method for anchoring straw mulch to the soil on slopes.
- Selected tackifier must be environmentally benign (non-toxic to plants and animal life) and not pose a threat to water quality.
- Crimping, “punch” roller-type rollers, or track-walking may be used to incorporate straw mulch into the soil on slopes. Track-walking shall only be used where other methods are impractical.
- Avoid placing straw onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- Temporary tacked straw should not be applied during or immediately before a rain event.

Application Procedures

- Apply loose straw either by machine or by hand distribution at the rate indicated.
- Distribute the straw mulch evenly on the soil surface.
- Straw may be anchored in place by incorporating it into soil or using a tackifier. Additionally, in small areas and/or steep slopes, straw can also be held in place using RECP. Refer to BMP SS-7, “Temporary Cover and Rolled Erosion Control Products.”
- If a tackifier will be used to anchor the straw in lieu of incorporation, roughen embankment or fill areas by rolling with a crimping or punching-type roller. Track-walking should only be used where rolling is impractical.
- A tackifier acts to glue the straw fibers together and to the soil surface. Factors influencing tackifier selection include longevity and ability to hold the fibers in place.
- Apply tackifier according to the manufacturer’s instructed rate for the slope, soil, and wind conditions.
- If incorporation of straw into soil is the selected method for anchoring, then do as follows:
  - Use a spade or shovel to incorporate straw into soil in small areas.
  - On slopes with soils that are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be “punched” into the ground using a knife-blade roller or a straight bladed coulter, known commercially as a “crimper” under Section 21-2.03J of the Standard Specifications.

Temporary Tacked Straw

SS-6

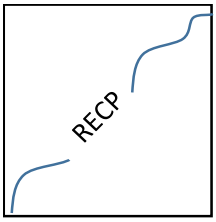
Maintenance and Inspections

- Straw needs to last long enough to achieve erosion control objectives.
- Maintain an unbroken, temporary mulched ground cover while disturbed soils areas are inactive. Repair any damaged ground cover and re-mulch exposed areas.
- Reapplication of straw mulch and tackifier may be required by the RE to maintain effective soil stabilization over disturbed areas and slopes.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

SWPPP or WPCP

- Temporary tacked straw must be discussed in Section 600.1.2 of the SWPPP or Section 30.2.1 of the WPCP.

Temporary Cover and Rolled Erosion Control Products



Standard Symbol

BMP Objectives

Soil Stabilization	☑
Sediment Control	☑
Tracking Control	☐
Wind Erosion Control	☑
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

This BMP involves the placement of geosynthetics, turf reinforcement mats, plastic covers, or rolled erosion control products (RECPs), including erosion control blankets, to stabilize disturbed soil areas and protect soils from erosion by wind or water. This is one of several temporary soil stabilization alternatives for consideration.

Appropriate Applications

- These measures are used when disturbed soils may be particularly difficult to stabilize, including the following situations:
  - Steep slopes, generally steeper than 3:1 (H:V).
  - Slopes with high erosion potential.
  - Slopes and disturbed soils where mulch must be anchored.
  - Disturbed areas where plants are slow to develop.
  - Channels with flows exceeding 3 ft/s.
  - Channels to be vegetated.
  - Slopes adjacent to receiving waters or ESAs.
- Standards for plastic sheeting used for stockpile covers are provided in Section 14-11.05A of the Standard Specifications.

Temporary Cover and Rolled Erosion Control Products

SS-7

Limitations

- Blankets and mats are typically more expensive than other erosion control measures due to labor and material costs. This usually limits their application to areas inaccessible to hydraulic equipment or where other measures are not applicable, such as channels.
- May delay seed germination due to reduction in soil temperature.
- Plastic netting should not be used when regulatory permits prohibit their use or if there is a potential for plastic netting to endanger wildlife.
- 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).
- Blankets and mats should be removed and disposed prior to application of permanent soil stabilization measures as required by the contract plans. Long-term erosion control blankets must be Class 8 Rock Slope Protection fabric.
- Plastic sheeting is easily vandalized, easily torn, and photodegradable, and must be disposed at a landfill; it requires extensive inspection and maintenance.
- Plastic results in 100 percent runoff, which may cause serious erosion problems in the downstream areas receiving the increased flow.
- The use of plastic should be limited to covering stockpiles or very small, graded areas for short periods (e.g., through one imminent storm event) until alternative measures, such as seeding and mulching, can be installed.
- Geosynthetics, mats, plastic covers, and RECPs have maximum flow rate limitations; consult the manufacturer for proper selection.
- Additional guidance for soil stabilization BMP selection is provided in Appendix B of this Manual.

Standards and Specification

Material Selection

- There are many types of temporary cover material and RECPs, and selection of the appropriate type is based on the specific form of application and site conditions. Selection(s) made by the Contractor must be approved by the Resident Engineer; certification of compliance must be in accordance with Standard Specifications Sections 6-2 and 21-2.01C and 21-2.02O.

Temporary Cover – Geosynthetics

- Material shall be a woven polypropylene fabric with minimum thickness of 0.06 inches, minimum width of 12 feet, and meet all requirements of Standard Specification Section 96-1 Temporary Cover. Material shall have a minimum tensile strength of 150 lb (warp) and 80 lb (fill) in conformance with the requirements in ASTM Designation D4632. The permittivity of the fabric must be approximately 0.07 sec –1 in conformance with the requirements in ASTM Designation D4491. The fabric must have an ultraviolet stability of 70 percent in conformance with the requirements in ASTM Designation D4355. Geotextile blankets should be secured in place with wire staples or sandbags and by keying into tops of slopes and edges to prevent surface water infiltration. Staples should be made of minimum 16 gauge steel wire and be U-shaped with 8-inch legs and 2-inch crown.

- Geotextiles may be reused if, in the opinion of the Resident Engineer, they are suitable for the use intended.
- Submit a certificate of compliance for each type of geosynthetic material used.

Temporary Cover – Plastic Sheeting

- Plastic sheeting shall comply with Standard Specification Section 13-5 and 96-1, which require 10-mil-thick, single-ply geomembrane material complying with ASTM Designation D2103 and be keyed in at the top of slope and firmly held in place with one of the following:
  - Gravel-filled bags roped together and placed no more than 6 feet apart
  - Wooden board and steel restrainer. Wood board must be 2 by 4 inches, 8 feet long, and made from fir or pine. Steel reinforcing bars must be spaced not more than 4 feet apart along the wooden board.
  - Other weights as authorized by the RE. Seams are typically taped or weighted down their entire length, and there should be at least a 24-inch overlap of all seams. Edges must be embedded a minimum of 6 inches in soil.
- All sheeting must be inspected periodically after installation and after rain events to check for erosion, undermining, and anchorage failure. Any failures must be repaired immediately. If washout or breakages occur, the material should be re-installed after repairing the damage to the slope or area.

Rolled Erosion Control Products

- RECPs are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. For a RECP to be considered 100 percent biodegradable, the netting, sewing, or adhesive system that holds the biodegradable mulch fibers together must also be biodegradable.
  - **Jute mesh** is made from a natural fiber that is spun into a yarn then loosely woven into a biodegradable mesh. It is designed to be used in conjunction with vegetation and has longevity of approximately 1 year. The material is supplied in rolled strips that are secured to the soil with steel U-shaped staples. Jute mesh shall comply with all requirements of the jute mesh table included in Standard Specifications Section 21-2.
  - **Erosion control blanket** is a machine-produced mat made of processed natural fibers that are bound together to form a continuous matrix surrounded by two natural nets. The processed natural fibers comprising the matrix of the blanket may be a mixture of straw (70 percent) and coconut (30 percent), woven coir (100 percent), or excelsior (curled wood fiber) (80 percent). Erosion control blankets must be furnished in rolled strips a minimum of 72 inches wide and secured in place with steel U-shaped staples. Erosion control blankets must also comply with Section 13-5.02B and 21-2.02O(4) of the Standard Specifications.
  - **Netting** consists of pure coconut fibers, or coir, woven into a matrix. Coir netting must be furnished in rolled strips a minimum of 72 to 158 inches wide and 0.3 inches thick. There are three classes of coir netting: Type A, Type B, and Type C. See Section 21-2.02O(3) of the Standard Specifications for the minimum requirements for each type of netting.

- Non-biodegradable RECPs are typically composed of polypropylene, polyethylene, nylon, or other synthetic fibers. In some cases, a combination of biodegradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically non-biodegradable as well. Check contract special provisions to determine whether non-biodegradable products are prohibited based on regulatory requirements.
  - **Turf reinforcement mat** is a nondegradable, open-weave textile made of synthetic fibers, filaments, nets, wire mesh, or other elements processed into a permanent three-dimensional matrix. Turf reinforcement mats must be a minimum of 72 inches wide and 0.25 inches thick. There are three classes of turf reinforcement mat: Type A, Type B, and Type C. See section 21-2.02O(5) of the Standard Specifications for the minimum requirements for each type of netting.

Preparation

- Proper site preparation is essential to ensure that the products and covers will have complete, direct soil contact. To achieve this, crews must:
  - Grade and shape the area of installation.
  - Remove all rocks, clods, vegetation or other obstructions larger than 1 inch in size. Fill voids or depressions.

Seeding

- If applicable, seed the area before RECP installation for erosion control and revegetation.
- Check all lots and other areas disturbed during installation must be re-seeded.
- For turf reinforcement mats, seeding is often specified to occur after installation.

Anchoring

- U-shaped wire staples, metal stake pins, triangular wooden stakes, or fasteners recommended by manufacturers can be used to anchor mats and blankets to the ground surface in conformance with Standard Specifications Section 13-5, 13-6, or 21-2.02R.
- Staples should be made of minimum 11 gauge steel wire and be U-shaped with 6-inch legs and 1-inch crown.
- Metal stake pins should be 0.188-inch-diameter steel with a 1.5-inch steel washer at the head of the pin, and 8 inches in length.
- Wire staples and metal stakes should be driven flush to the soil surface.
- All anchors should be 6 to 18 inches long and have sufficient ground penetration to resist pullout. Longer anchors may be required for loose soils.

Installation on Slopes

- Refer to Standard Plans T53 and T54 for details regarding installation on slopes for temporary uses, and H52 for permanent uses.

Installation in Channels

- Refer to Standard Plan T55 for details regarding installation in channels.
- Installation shall be in accordance with the manufacturer's recommendations.

Soil Filling (if specified for turf reinforcement)

- Always consult the manufacturer's recommendations for installation.
- 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, exposing just the top netting of the mat.

Temporary Soil Stabilization Removal

- When no longer required for the work, temporary soil stabilization becomes the property of the Contractor.
- Temporary soil stabilization removed from the work site must be disposed outside the highway right-of-way in conformance with the provisions in Standard Specifications Section 14-10. If approved by the RE, the Contractor may leave the temporary soil stabilizer in place.
- Caltrans must ensure that only environmentally friendly erosion control BMPs are implemented in the project.

Maintenance and Inspection

Areas treated with temporary soil stabilization must be inspected as specified in the Standard Specifications and special provisions. Areas treated with temporary soil stabilization must be maintained to provide adequate erosion control. Temporary soil stabilization should be reapplied or replaced on exposed soils when an area becomes exposed or exhibits visible erosion.

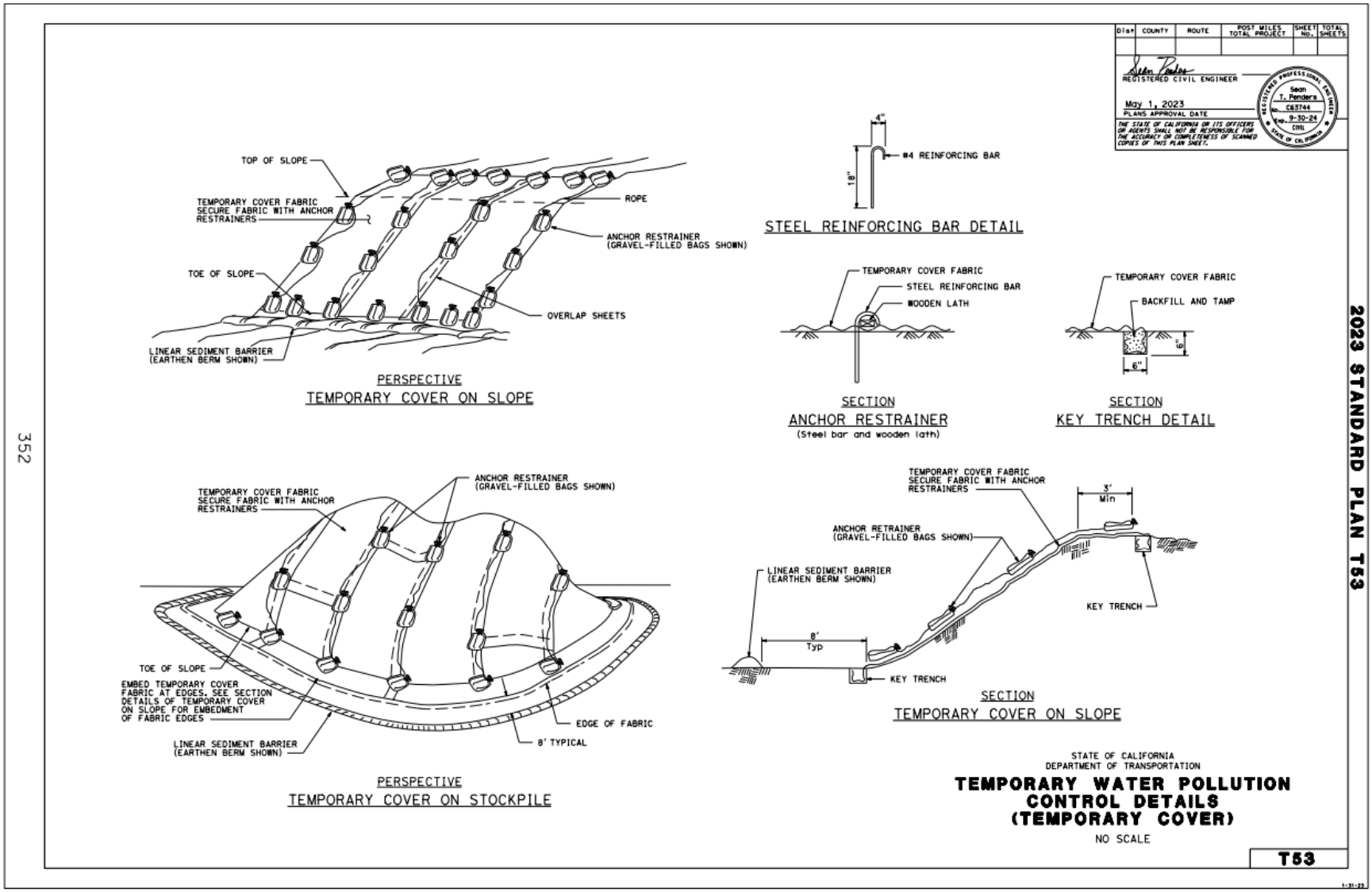
- All blankets and mats must be inspected periodically after installation.
- Installation should be inspected after significant rain events to check for erosion and undermining. Any failures must be repaired immediately.
- If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.

SWPPP or WPCP

- RECP must be discussed in Section 600.1.2 of the SWPPP or Section 30.2.1 of the WPCP.

Temporary Cover and Rolled Erosion Control Products

SS-7



Temporary Cover and Rolled Erosion Control Products

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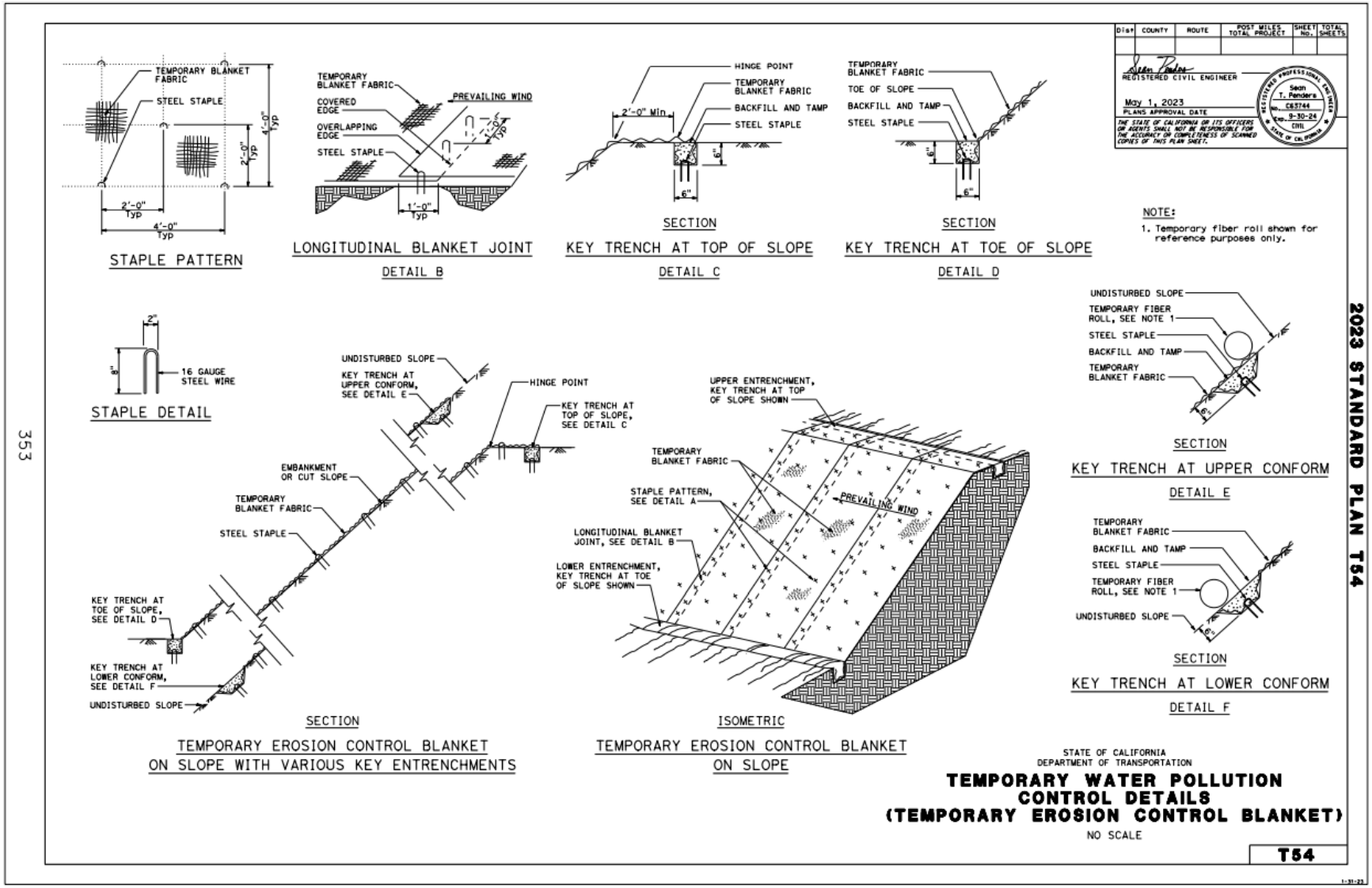

Temporary Cover and Rolled Erosion Control Products

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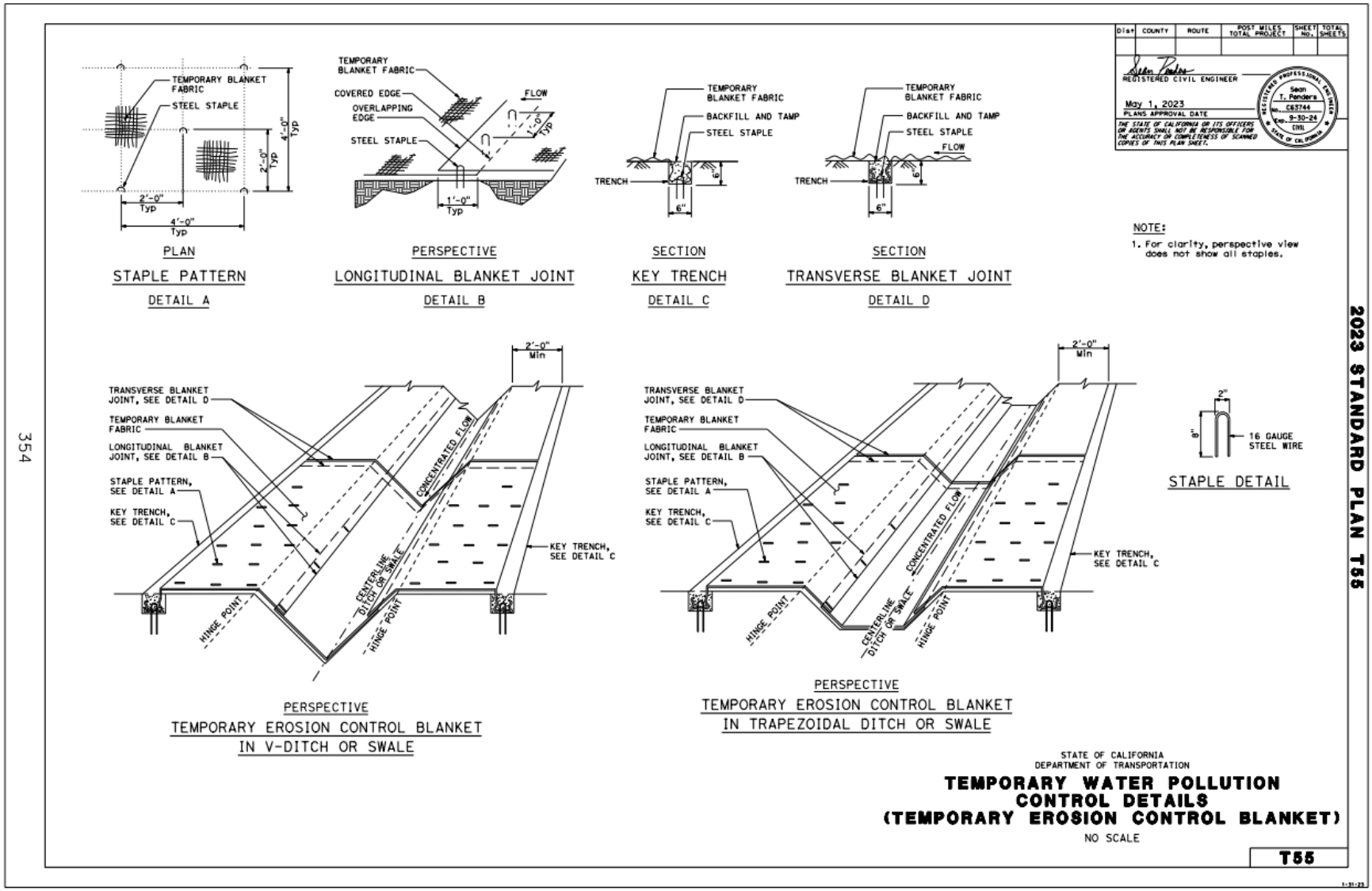

Temporary Cover and Rolled Erosion Control Products

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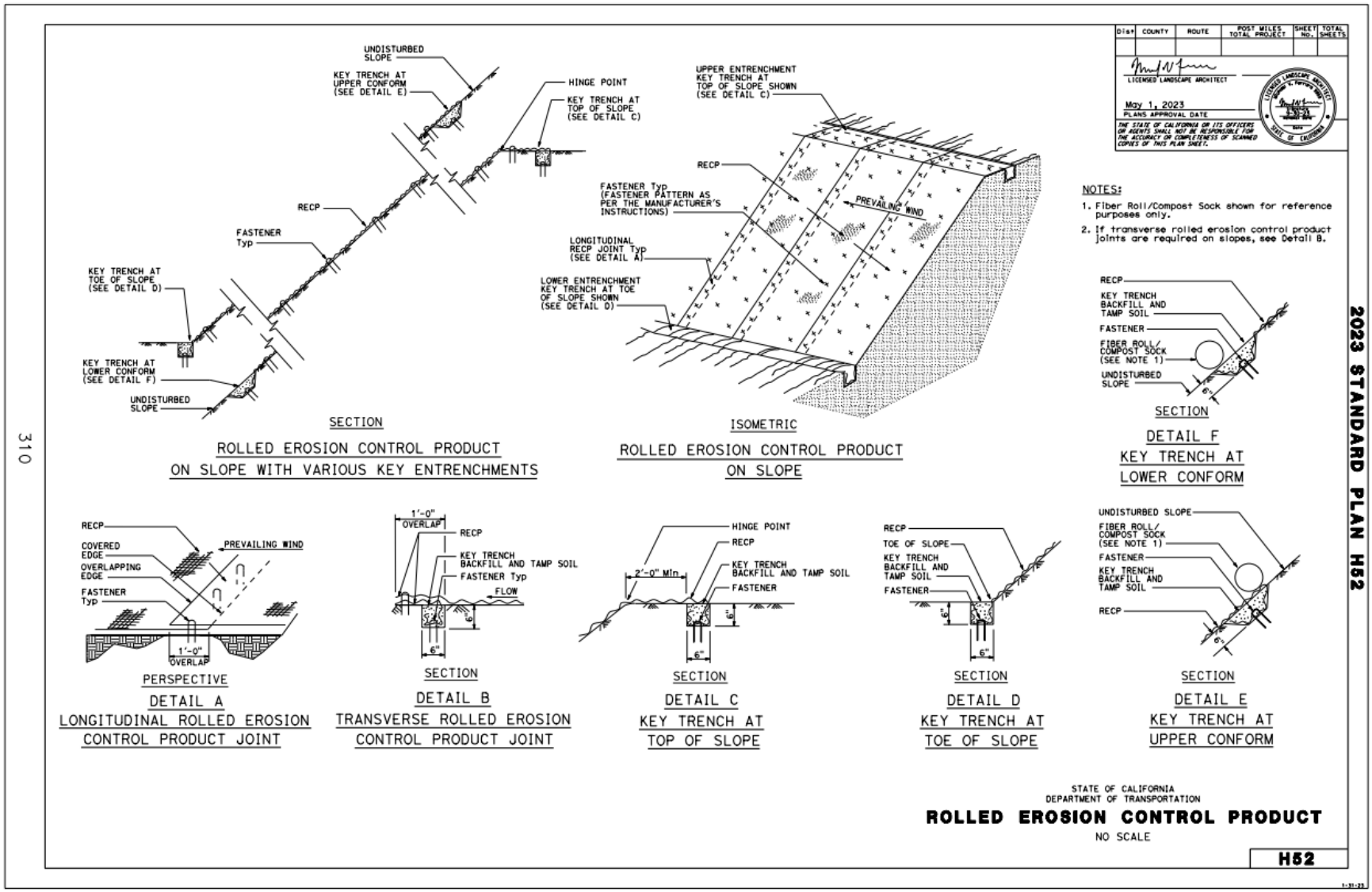
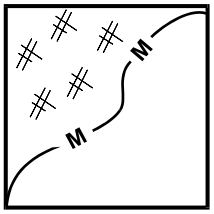


Temporary Mulch



Standard Symbol

BMP Objectives	
Soil Stabilization	☑
Sediment Control	☑
Tracking Control	☐
Wind Erosion Control	☑
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Temporary mulch consist of applying a mixture of shredded bark, wood chips, or tree trimmings on top of soil. Temporary mulch is mostly applicable to landscape projects.

The primary function of temporary mulch is to reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff.

Appropriate Applications

- Temporary mulch is considered a temporary soil stabilization alternative in the following situations:
  - As a stand-alone temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetative cover can be established.
  - As short-term, non-vegetative ground cover on slopes to reduce rainfall impact, decrease sheet flow velocity, settle out sediment, and reduce wind erosion.
  - In combination with other BMPs to stabilize roadway embankment slopes and control wind erosion.

Limitations

- Wood mulch may introduce unwanted vegetation species.
- Shredded wood does not withstand concentrated flows and is prone to sheet erosion.
- Green material has the potential for the presence of unwanted weeds and other plant materials. Delivery system is primarily by manual labor, although pneumatic application equipment is available.
- Mulch may need to be removed prior to further earthwork.

- Mulch should not be used alone to stabilize embankments or sides of swales where concentrated flows could mobilize the material.

Standards and Specifications

Mulch Selection

There are many types of mulches, including tree bark, wood chip, shredded bark, and tree trimming. Selecting the appropriate type should be based on the type of application and site conditions. Before using wood mulches, obtain concurrence with the District Landscape Architect because some mulch used on construction projects may not be compatible with planned or future projects.

Selected wood mulches must comply with Standard Specifications Section 20-5.04 and must be approved by the RE.

Tree Bark Mulch

- Tree bark mulch must be derived from cedar, Douglas fir, or redwood tree species.
- Tree bark mulch must be ground such that at least 95 percent of the material by volume is less than 2 inches long in any direction, and no more than 30 percent by volume is less than 1 inch in any direction.

Wood Chip Mulch

- Wood chip mulch must be derived from clean wood; it may not contain leaves or small twigs.
- Wood chip mulch must contain at least 95 percent wood chips by volume with a width and thickness from 1/16 to 3/8 inches in any direction and 1/2 to 3 inches in length.

Shredded Bark Mulch

- Shredded bark mulch must be derived from trees. The mulch must be a blend or loose, long, thin wood or bark pieces.
- Shredded bark mulch must contain at least 95 percent wood strands by volume with a width and thickness of 1/8 to 1.5 inches in any direction and 2 to 8 inches in length

Tree Trimming Mulch

- Tree trimming mulch is derived from chipped trees and may contain leaves, small twigs, and green material.
- Tree trimming mulch must contain at least 95 percent material by volume less than 3 inches and no more than 30 percent by volume less than 1 inch.

Application Procedures

- Do not use soil sterilant or filter fabric.
- Mulch should be placed uniformly from the outside edge of area designated for mulch. Permanent landscape mulch should be placed after vegetation has been installed.
- Mulch may be installed by manual application or with pneumatic devices.

- Do not place mulch within 4 feet of drainage ditch flow lines or other channels or the edge of paved roads.
- All material must be removed before re-starting work on the slopes.

Maintenance and Inspection

- Wood mulch needs to last long enough to achieve erosion-control objectives. If the mulch is applied as a stand-alone erosion control method over disturbed areas (without seed), it should last the length of time the site will remain barren or until final re-grading and revegetation. Additional information is provided in Appendix B of this Manual.
- Where vegetation is not the ultimate cover, such as ornamental and landscape applications of bark or wood chips, inspection and maintenance should focus on mulch longevity and integrity.
- May require reapplication when bare soil becomes visible.

SWPPP or WPCP

- Wood mulch must be discussed in Section 600.1.2 of the SWPPP or Section 30.2.1 of the WPCP.

3.2 Temporary Concentrated Flow Conveyance Controls

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

- Earth Dikes/Drainage Swales & Lined Ditches
- Outlet Protection/Velocity Dissipation Devices
- Slope Drains

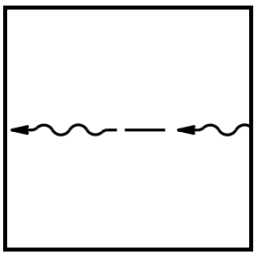
The QSD should evaluate the site conditions and determine if and when diversions are necessary. Any diversion or additional BMPs for flow conveyance must be described in the SWPPP and shown in in the Water Pollution Control Drawings (WPCDs).

Table 3-1. Temporary Soil Stabilization BMPs

ID	BMP Name
SS-1	Scheduling
SS-2	Preservation of Existing Vegetation
SS-3	Temporary Hydraulic Mulch
SS-4	Temporary Hydroseed
SS-5	Temporary Soil Binders
SS-6	Temporary Tacked Straw
SS-7	Temporary Cover and Rolled Erosion Control Products (RECP)
SS-8	Temporary Mulch
	Temporary Concentrated Flow Conveyance Controls
SS-9	Earth Dikes/Drainage Swales & Lined Ditches
SS-10	Outlet Protection/Velocity Dissipation Devices
SS-11	Slope Drains
SS-12	Streambank Stabilization

The remainder of this section shows the working details for each of the BMPs.

Earth Dikes/Drainage Swales and Lined Ditches



Standard Symbol

BMP Objectives	
Soil Stabilization	☑
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

These are structures that intercept, divert, and convey surface run-on, generally sheet flow, to prevent erosion.

Appropriate Applications

- Earth dikes/drainage swales and lined ditches may be used to:
  - Convey surface runoff down sloping land.
  - Intercept and divert runoff to avoid sheet flow over sloped surfaces.
  - Divert and direct runoff toward a stabilized watercourse, drainage pipe, or channel.
  - Intercept runoff from paved surfaces.
- Earth dikes/drainage swales and lined ditches also may be used:
  - Below steep grades where runoff begins to concentrate.
  - Along roadways and facility improvements subject to flood drainage.
  - At the top of slopes to divert run-on from adjacent or undisturbed slopes.
  - At bottom and mid-slope locations to intercept sheet flow and convey concentrated flows.

Limitations

- Earth dikes/drainage swales and lined ditches are not suitable as sediment trapping devices.
- May be necessary to use other soil stabilization and sediment controls, such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales and ditches.

- Temporary swales and ditches, nor any other runoff diversion device, should not adversely impact upstream or downstream properties.

Standards and Specifications

- Standard Specification Section 19-6 “Embankment Construction,” which covers allowable materials and construction procedures for dikes.
- Standard Specification Section 72-5 “Concrete Slope Protection, Gutter, Ditch and Channel Lining” covers ditch and channel lining materials and construction procedures.
- Care must be applied to correctly size and locate earth dikes, drainage swales, and lined ditches. Excessively steep, unlined dikes and swales are subject to erosion and gully formation.
- Must complete a careful evaluation of the risks due to erosion of the selected measure based on flow velocity, soil types, potential for over topping, flow backups, washouts, and drainage patterns for each BMP location.
- Conveyances shall be stabilized. Consider using a lined ditch for high flow velocities to prevent scour. Compact any fills or backfills to prevent unequal settlement.
- Do not divert runoff from the highway right-of-way onto other property.
- When possible, install and use permanent dikes, swales, and ditches early in the construction process.
- Earthen berms should be 8 inches tall and 36 inches wide at a minimum. Earthen berms must be compacted either by hand or mechanical methods.
- Provide stabilized outlets. Refer to SS-10, “Outlet Protection/Velocity/ Dissipation Devices.”

Maintenance and Inspections

At a minimum, perform inspections weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events

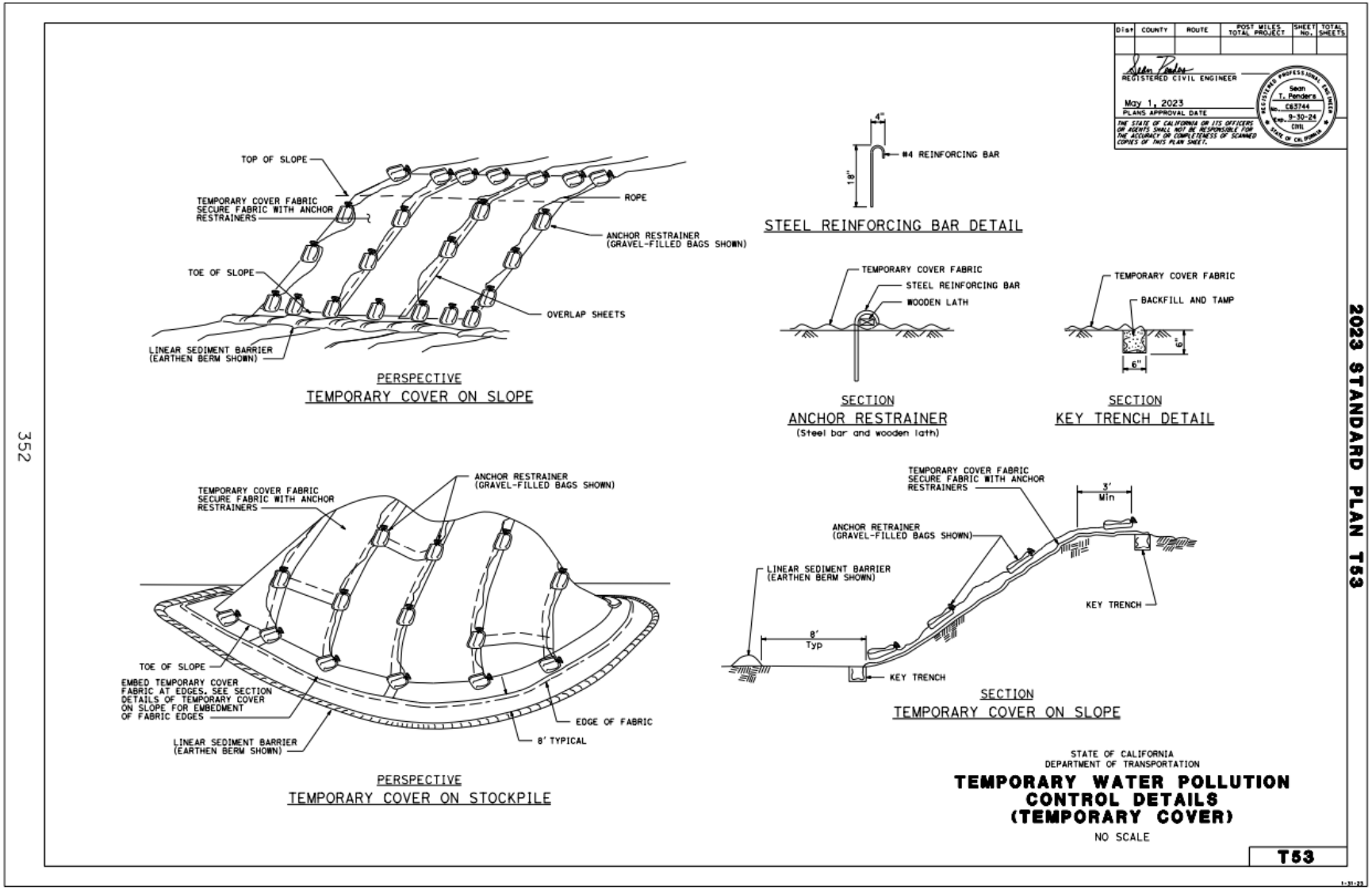
- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings, or soil stabilizers as needed.
- Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment.
- Remove debris and sediment, and repair linings and embankments to ensure they function as intended.
- Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction.

SWPPP or WPCP

- Earth Dikes/Drainage Swales and Lined Ditches must be discussed in Section 600.1.1 and 600.1.2 of SWPPP or Section 30.2.1 of the WPCP

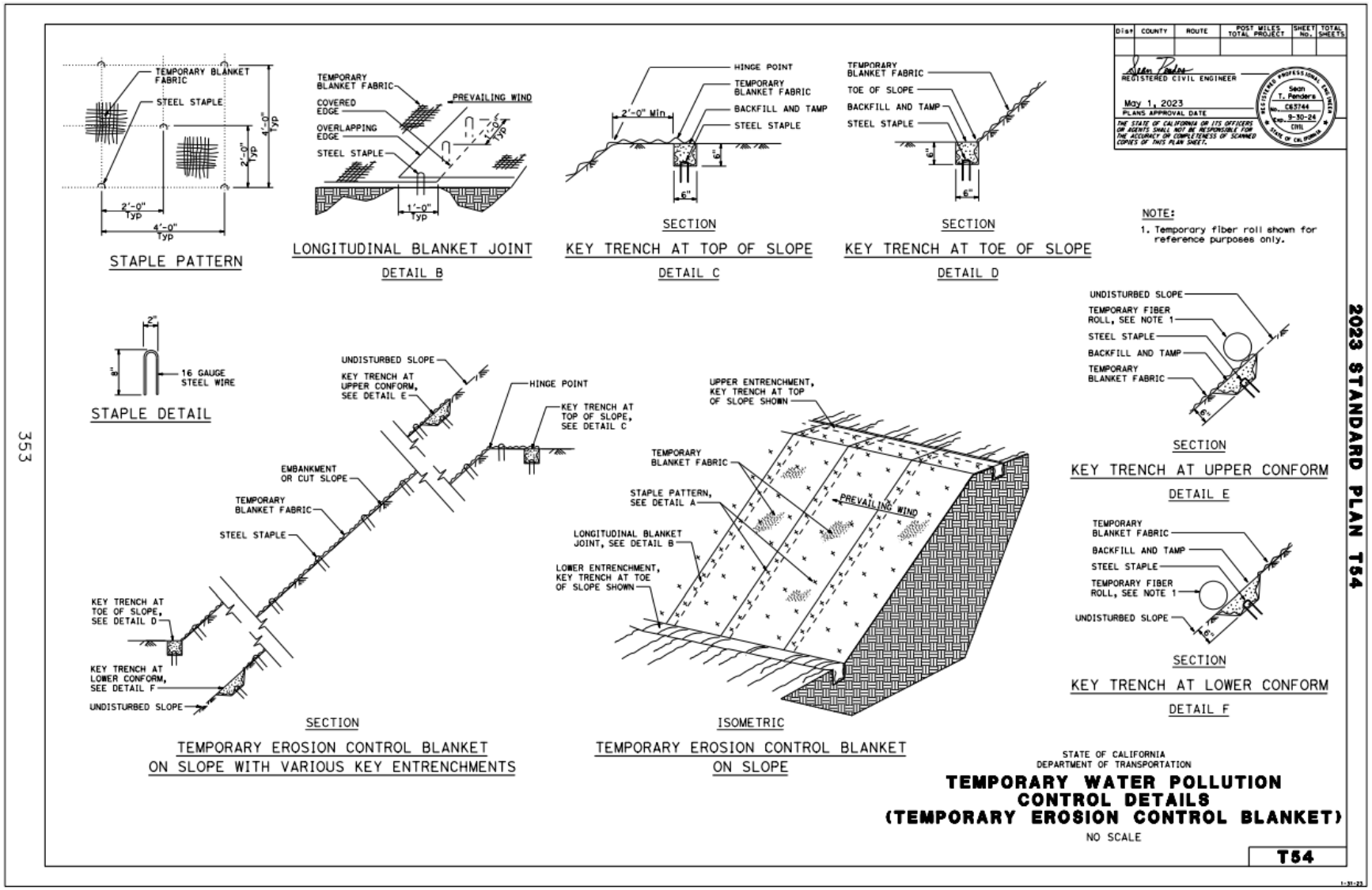
Earth Dikes/Drainage Swales and Lined Ditches

SS-9



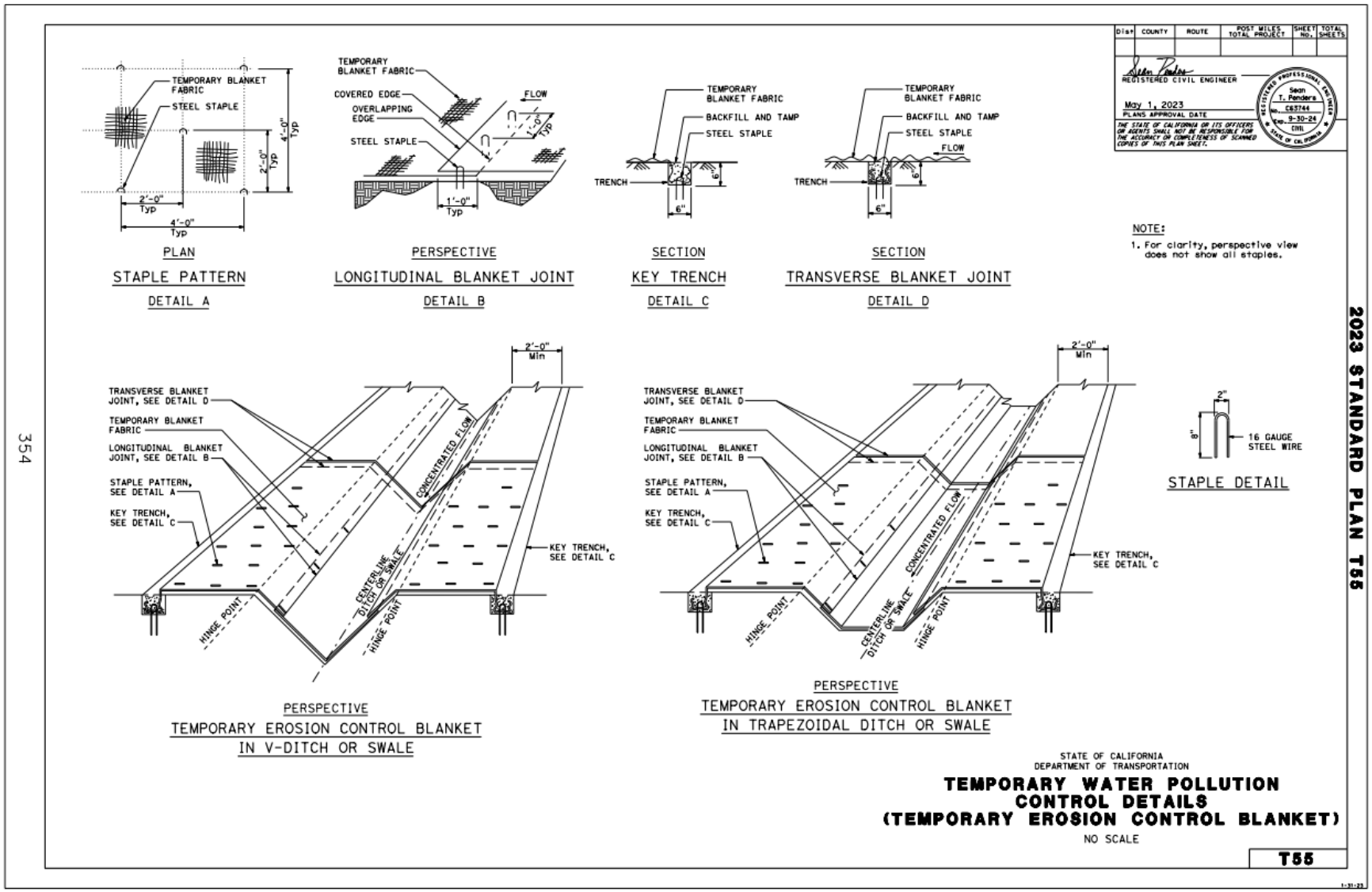
Earth Dikes/Drainage Swales and Lined Ditches

SS-9

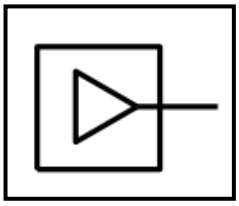


Earth Dikes/Drainage Swales and Lined Ditches

SS-9



Outlet Protection/Velocity Dissipation Devices



Standard Symbol

BMP Objectives	
Soil Stabilization	☑
Sediment Control	☑
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

These devices are placed at pipe outlets to prevent scour and reduce the velocity and/or energy of stormwater flows.

Appropriate Applications

These devices may be used at the following locations:

- Outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits, or channels.
  - Outlets located at the bottom of mild to steep slopes.
  - Discharge outlets that carry continuous flows of water.
  - Outlets subject to short, intense flows of water, such as flash floods.
  - Points where lined conveyances discharge to unlined conveyances.

Limitations

- Loose rock may have stones washed away during high flows.
- Grouted rock slope protection may break up in areas of freeze and thaw.
- If there is not adequate drainage and water builds up behind grouted rock slope protection, it may cause the grouted rock slope protection to break up due to the resulting hydrostatic pressure.
- Outlet protection may negatively impact the channel habitat.

Outlet Protection/Velocity Dissipation Devices

SS-10

Standards and Specifications

- There are many types of energy dissipaters; a flared end section and rock slope protection is shown in the photo on the previous page. Please note that this is only one example, and the RE may approve other types of devices proposed by the Contractor.
- Flared end sections must comply with Standard Specifications Section 70-5.02.
- Rock slope protection must comply with Standard Specifications Section 72.
- Install rock slope protection, grouted rock slope protection, or concrete apron at selected outlet. Rock slope protection aprons are best suited for temporary use during construction.
- Carefully place rock slope protection to avoid damaging the filter fabric.
- For proper operation of the apron:
  - Align apron with receiving stream and keep it straight throughout its length. If a curve is needed to fit site conditions, consider placing it in the upper section of the apron.
  - If the apron rock slope protection area is large, consider protecting underlying filter fabric with a gravel blanket.
- Outlets on slopes steeper than 10% should have additional protection.

Maintenance and Inspection

- At a minimum, perform inspections weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Minimize areas of standing water by removing sediment blockages and filling scour depressions. If persistent, it might be necessary to have a licensed professional re-evaluate the size and type of device implemented.
- Inspect apron for displacement of the rock slope protection and/or damage to the underlying fabric. Repair fabric and replace rock slope protection that has washed away.
- Inspect for scour beneath the rock slope protection 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.

SWPPP or WPCP

- Outlet protection/Velocity dissipation devices must be discussed in Section 600.1.1 and 600.1.2 of SWPPP or Section 30.2.1 of the WPCP.

Slope Drains

Standard Symbol

BMP Objectives	
Soil Stabilization	☑
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A slope drain is a pipe used to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device, or stabilized area. Slope drains are used with lined ditches to intercept and direct surface flow away from slope areas to protect cut or fill slopes.

Appropriate Applications

- On construction sites where slopes may be eroded by surface runoff.
- As drainage for top of slope dikes or swales.
- As drainage for top of cut-and-fill slopes where water can accumulate.
- As an emergency spillway for a sediment basin.

Limitations

- Severe erosion may result when slope drains fail by overtopping, piping, or pipe separation.
- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges in energy dissipaters associated with slope drain outlets can result in suitable areas for vector production.

Standards and Specifications

- Maximum slope generally limited to 2:1 (H:V), as energy dissipation below steeper slopes is difficult.
- Direct surface runoff to slope drains with interceptor dikes. See BMP SS 8, “Earth Dikes/Drainage Swales, and Lined Ditches.”

Slope Drains

SS-11

- Slope drains can be placed on or buried underneath the slope surface.
- Recommended materials are plastic or corrugated metal, or comparable pipe.
- When installing slope drains:
  - Install slope drains perpendicular to slope contours.
  - Compact soil around and under entrance, outlet, and along length of pipe.
  - Securely anchor and stabilize pipe and appurtenances into soil.
  - Check to ensure that pipe connections are watertight.
  - Protect area around inlet with filter cloth. Protect outlet with rock slope protection or other energy-dissipation device. For high-energy discharges, reinforce rock slope protection with concrete or use reinforced concrete device.
  - Protect inlet and outlet of slope drains; use standard flared-end section at entrance and exit for pipe slope drains 12 inches and larger.

Maintenance and Inspection

- Inspect weekly during construction duration, and prior to forecasted rain events, daily during extended rain events, and after the conclusion of qualifying precipitation events. Inspect outlet for erosion and downstream scour.
- If eroded, repair damage and install additional energy-dissipating measures. If downstream scour is occurring, it may be necessary to reduce flows being discharged into the channel.
- Inspect slope drainage for accumulations of debris and sediment.
- Remove built-up sediment from entrances, outlets, and within drains as required.
- Make sure stormwater is not ponding onto inappropriate areas (e.g., active traffic lanes, material storage areas, etc.).

SWPPP or WPCP

- Slope drains must be discussed in Sections 600.1.1 and 600.1.2 of SWPPP or Section 30.2.1 of the WPCP.

Streambank Stabilization

Standard Symbol

BMP Objectives	
Soil Stabilization	☑
Sediment Control	☑
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Drainage systems, including the stream channel, streambank, and associated riparian areas, are dynamic and sensitive ecosystems that respond to changes in land use activity. Streambank and channel disturbance resulting from construction activities can increase the stream's sediment load, which can cause channel erosion or sedimentation and have adverse affects on the biotic system. BMPs can reduce the discharge of sediment and other pollutants and minimize the impact of construction activities on watercourses. Streams included on the 303(d) list by the State Water Resources Control Board (SWRCB) may require careful evaluation to prevent any increases in sedimentation, siltation, and/or turbidity to the stream.

Appropriate Applications

These procedures typically apply to all construction projects that disturb or occur within stream channels and their associated riparian areas. Streambank stabilization typically consists of a combination of several BMPs to prevent destabilization and enhance stability of eroding streambanks.

Limitations

Specific permit requirements or mitigation measures such as Regional Water Quality Control Board 401 Certification, U.S. Army Corps of Engineers 404 Permit, and approval by California Department of Fish and Wildlife Service may be included in Contract Documents. Specific requirements could include in-water work windows, vegetation species, seed mixes, stabilization measures, water quality monitoring protocols and specific reporting requirements. If numerical-based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required. Streams included on the 303(d) list by the SWRCB because of sediment, silt, or turbidity impairment are required to conduct sampling to verify that there is no net increase in sediment load due to construction activities.

Standards and Specifications

PLANNING

- Proper planning, design, and construction techniques can minimize impacts normally associated with in-stream construction activities. Poor planning can adversely affect soil, fish, and wildlife resources, land uses, or land users. Planning should take into account scheduling, avoidance of in-stream construction, minimizing disturbance area and construction time period, using pre-disturbed areas, selecting crossing location, and selecting equipment and proper stabilization techniques once the activity is completed.

Scheduling (SS-1)

- Construction activities should be scheduled according to the relative sensitivity of the environmental concerns and in accordance with SS-1, “Scheduling.” Scheduling considerations will be different when working near perennial streams vs. ephemeral streams and are as follows:
  - Construction work near perennial streams should optimally be performed during the dry season (see below).
  - When working in or near ephemeral, intermittent, or perennial streams, construction should be performed during the dry season and in accordance with regulatory agency permits and approvals. By their very nature, ephemeral and intermittent streams are usually dry in the summer, and therefore in-stream construction activities will not cause significant water quality problems. For perennial streams, clear water diversion (see NS-5 for “Clear Water Diversion”), dewatering (see NS-2 for “Dewatering Operations”) and water quality monitoring may be required.
  - When closing the site at the end of the job, wash any fines that were formed in situ back into the channel bed material to decrease pollution from the first rainstorm (first flush) of the season. When working near stream channels, erosion and sediment controls (e.g., silt fences, straw bale barriers, etc.) should be implemented on the banks to keep sediment out of the stream channel.
  - Regulatory permits might require or allow for the stockpiling of native bed material to be backfilled during stabilization.

Minimize Disturbance

- Minimize disturbance by selecting the narrowest crossing location, limiting the number of equipment trips across a stream during construction, and minimizing the number and size of work areas (e.g., equipment staging areas and spoil storage areas). Provide stabilized access to the stream when in-stream work is required. Field reconnaissance should be conducted during the planning stage to identify work areas.
- Comply with regulatory permit requirements, if none are applicable, place work areas (e.g., stage area, active construction) at least 50 feet from the stream channel. Perform each of the following activities at least 100 feet from a drainage course if it is performed within the floodplain, or at least 50 feet outside the floodplain: stockpiling materials, storing pile-driving equipment and liquid waste containers, washing vehicles and equipment, and fueling and maintaining vehicles and equipment.

- Locate access and staging areas in paved or pre-disturbed areas when possible. If not possible, select access and staging areas that minimize disturbance to aquatic species, riparian vegetation, and habitat.
- Avoid steep and unstable banks, highly erodible or saturated soils, or highly fractured rock, wherever possible.
- Select equipment that reduces the amount of pressure exerted on the ground surface and therefore reduces erosion potential, and/or use overhead or aerial access for transporting equipment across drainage channels. Use equipment that exerts ground pressures of less than 5 or 6 pounds per square inch where possible. Low ground pressure equipment includes wide or high flotation tires (34 to 72 inches wide), dual tires, bogie axle systems, tracked machines, lightweight equipment, and central tire inflation systems.

STREAMBANK STABILIZATION

Preservation of Existing Vegetation (SS-2)

- Preserve existing vegetation in accordance with SS-2, “Preservation of Existing Vegetation.” In a streambank environment, preservation of existing vegetation provides the following benefits:

  Water Quality Protection

  Vegetated buffers on slopes trap sediment and promote groundwater recharge. The buffer width needed to maintain water quality ranges from 15 to 100 feet. On gradual slopes, most of the filtering occurs within the first 30 feet of the buffer. Steeper slopes require a greater width of vegetative buffer to provide water quality benefits.

  Streambank Stabilization

  The root system of riparian vegetation stabilizes streambanks by increasing tensile strength in the soil. The presence of vegetation modifies the moisture condition of slopes (e.g., infiltration, evapotranspiration, interception) and increases bank stability.

  Riparian Habitat

  Buffers of diverse riparian vegetation provide food, shelter, and shade for riparian and aquatic organisms. Minimizing impacts to fisheries habitat is a major concern when working near streams and rivers. Riparian vegetation provides shade, shelter, organic matter (leaf detritus and large woody debris), and other nutrients that are necessary for fish and other aquatic organisms. Buffer widths for habitat concerns are typically wider (100 to 1,500 feet) than those recommended for water quality concerns.

  When working near watercourses, it is important to understand the work site’s placement in the watershed. Riparian vegetation in the headwater streams has a greater impact on overall water quality than vegetation in downstream reaches. Preserving existing vegetation in upstream areas is necessary to maintain water quality, minimize bank failure, and maximize riparian habitat downstream of the work site.
- Local county and municipal ordinances regarding width, extent, and type of vegetative buffer required may exceed the specifications provided here; these ordinances should be investigated prior to construction.
- As a general rule, the width of a buffer strip between a road and the stream is recommended to be 50 feet plus four times the percent slope of the land, measured between the road and the top of stream bank.

Temporary Hydraulic Mulch (SS-3), Temporary Hydroseed (SS-4), and Temporary Soil Binder (SS-5)

- Apply hydraulic mulch, hydroseed, or soil binders on disturbed streambanks above the mean high water level to provide temporary soil stabilization.
- Do not place hydraulic mulch, tackifiers, fertilizers, or soil binders below the mean high water level, as these materials could wash into the channel and impact water quality or possibly cause eutrophication.

Straw Mulch (SS-6)

- Apply straw mulch to disturbed streambanks in accordance with SS-6, “Temporary Tacked Straw.”
- Do not place straw mulch or tackifiers below the mean high water level, as this material could wash into the channel and impact water quality.

Temporary Cover and Rolled Erosion Control Products (SS-7)

- Install geosynthetics, rolled erosion control product, and plastic as described in SS-7, “Temporary Cover and Rolled Erosion Control Products” to stabilize disturbed channels and streambanks.
- Not all applications of SS-7 should be installed in a channel. For example, certain geotextile netting may snag fish gills and are not appropriate in fish-bearing streams. Geotextile fabrics that are not biodegradable are not appropriate for in-stream use. Additionally, geotextile fabric or blankets placed in channels must be adequate to sustain anticipated hydraulic forces.

Earth Dikes/Drainage Swales, and Lined Ditches (SS-9)

- Convey, intercept, or divert runoff from disturbed streambanks using SS-9, “Earth Dikes/Drainage Swales, and Lined Ditches.”
- Do not place earth dikes in watercourses, as these structures are only suited for intercepting sheet flow and should not be used to intercept concentrated flow.

Outlet Protection/Velocity Dissipation Devices (SS-10)

- Place outlet protection or velocity dissipation devices at outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits, or channels in accordance with SS-10.

Slope Drains (SS-11)

- Use slope drains to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device, or stabilized area in accordance with SS-11, “Slope Drains.” The use of slope drains minimizes potential streambank erosion from overland flows.

STREAMBANK SEDIMENT CONTROL

Temporary Silt Fences (SC-1)

- Install silt fences in accordance with SC-1, “Temporary Silt Fence” to control sediment. Silt fences should only be installed where sediment-laden water can pond, thus allowing the sediment to settle out.

Temporary Fiber Rolls (SC-5)

- Install fiber rolls in accordance with SC-5, “Temporary Fiber Rolls” along slope contour above the high water level to intercept runoff, reduce flow velocity, release the runoff as sheet flow, and remove sediment from the runoff. In a stream environment, fiber rolls should be used in conjunction with other sediment control methods such as SC-1, “Silt Fence” or SC-9, “Straw Bale Barrier.” Install silt fence, straw bale barrier, or other erosion control methods along the toe of slope above the high water level.

Temporary Gravel Bag Berm (SC-6)

- A gravel bag berm or barrier can be used to intercept and slow the flow of sediment-laden sheet flow runoff in accordance with SC-6, “Temporary Gravel Bag Berm.” In a stream environment, gravel bag barriers can allow sediment to settle from runoff before water leaves the construction site and can be used to isolate the work area from the stream. Gravel bag barriers are not recommended as a perimeter sediment control practice around streams.

Temporary Straw Bale Barrier (SC-9)

- Install straw bale barriers in accordance with SC-9, “Temporary Straw Bale Barrier” to control sediment. Straw bale barriers should only be installed where sediment-laden water can pond, thus allowing the sediment to settle out. Install a silt fence in accordance with SC-1, “Silt Fence” on the down-slope side of the straw bale barrier closest to the stream channel to provide added sediment control.

Temporary Compost Sock (SC-08)

- Compost socks are a mesh sock containing compost that acts as three-dimensional, biodegradable structures that intercept and filter sheet flow. Compost socks can filter runoff, retain sediment, and reduce sheet flow velocities. Compost may be pre-seeded to assist in vegetation establishment. Compost socks may be used as either a temporary or permanent sediment control measure.

Inspection and Maintenance

- Inspect BMPs daily during construction.
- Maintain and repair BMPs.
- Remove accumulated sediment as necessary.

SWPPP or WPCP

- Streambank stabilization must be discussed in Section 600.1.1 and 600.1.2 of the SWPPP or Section 30.2.1 of the WPCP.

Section 4

Temporary Sediment Control BMP

4.1 Temporary Sediment Controls

Temporary sediment controls include those practices that intercept and slow or detain the flow of stormwater to allow sediment to settle and be trapped. These practices can consist of installing temporary linear sediment barriers (such as temporary silt fences, sandbag barriers, and temporary straw bale barriers); providing temporary fiber rolls, temporary gravel bag berms, or temporary check dams to break up slope length or flow; or constructing a temporary sediment/desilting basin on sediment trap. Linear sediment barriers are typically placed below the toe of exposed and erodible slopes, downslope of exposed soil areas, around temporary stockpiles, and at other appropriate locations along the site perimeter.

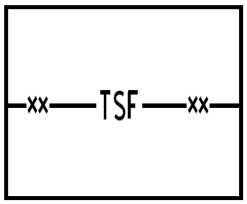
Temporary sediment control practices must be implemented in conformance with the criteria presented in Section 2 of this Manual and the SWPPP/WPCP Preparation Manual. Temporary sediment control practices include the BMPs listed in Table 4-1.

Table 4-1. Temporary Sediment Control BMPs

ID	BMP Name
SC-1	Temporary Silt Fence
SC-2	Sediment/Desilting Basin
SC-3	Sediment Trap/Curb Cutback
SC-4	Temporary Check Dam
SC-5	Temporary Fiber Rolls
SC-6	Temporary Gravel Bag Berm/Earthen Berm
SC-7	Street Sweeping
SC-8	Sandbag Barrier
SC-9	Temporary Straw Bale Barrier
SC-10	Temporary Drainage Inlet Protection
SC-11	Temporary Compost Sock
SC-12	Flexible Sediment Barrier

The remainder of this section describes the working details for each of the temporary sediment control BMPs.

Temporary Silt Fence



Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☑
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A silt fence is a temporary linear sediment barrier of permeable fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff. Silt fences allow sediment to settle from runoff before water leaves the construction site.

Appropriate Applications

- Below the toe of exposed and erodible slopes.
- Down-slope of exposed soil areas.
- Around temporary stockpiles.
- Along streams and channels.
- Along the perimeter of a project.

Limitations

- Not effective unless trenched and keyed in.
- Not intended for use as mid-slope protection on slopes greater than 4:1 (H:V).
- Must be maintained.
- Must be removed and disposed.
- Do not use below slopes subject to creep, slumping, or landslides.
- Do not use in streams, channels, drain inlets, or anywhere flow is concentrated.
- Do not use silt fences to divert flow.
- Do not use in locations where ponded water may cause a flooding hazard.

Temporary Silt Fence

SC-1

Standards and Specifications

Design and Layout

- The drainage area above any fence should not exceed a quarter of an acre, (100 feet of silt fence per 10,000 square feet of DSA).
- Slope of area draining to silt fence should be less than 1:1 (H:V).
- Silt fences must be placed parallel to the slope contour.
- Silt fences rely on temporary ponding to encourage sediment deposition and achieve water quality benefits. Limit application to areas where ponding and deposition may occur on the uphill side of the silt fence.
- Temporary silt fence fabrics generally have life spans ranging between 5 and 8 months. Projects with longer durations may require replacing silt fence fabric.
- Silt fences constructed across concentrated flows are susceptible to washout. Silt fences shall not be installed across concentrated flows.
- For slopes adjacent to water bodies or environmentally sensitive areas (ESA), additional temporary soil stabilization BMPs should be used.
- For any 50-foot section of silt fence, the elevation of the base of the fence may not vary by more than 1/3 of the fence height.
- Install along a level contour to prevent water ponding more than 1.5 feet at any point along the silt fence.
- Join separate sections to form reaches not more than 500 feet without openings. Ensure there are no gaps between posts.

Reinforced Silt Fence

- Temporary reinforced silt fence is typically used in areas affected by high winds. They are also often used on slopes steeper than 2:1 (H:V) that contain a high number of rocks or large dirt clods that tend to dislodge, or where area draining fence contains moderate sediment loads.
- Temporary reinforced silt fence (type 2) may also be used to provide sediment control and delineate ESAs.

Materials

- Silt fence fabric should be a woven or unwoven geosynthetic textile that complies with Section 96-1.02E of the Standard Specifications. The Contractor must submit a certificate of compliance for silt fence fabric in accordance with Standard Specifications Section 6-2.03C.
- Wood posts should be untreated fir, redwood, cedar, or pine lumber. Each silt fence post should be at least 4 feet long, except reinforced silt fence posts, which should be at least 6 feet for Type 1 and 5 feet for Type 2 installations. Posts should be free from decay, splits, or cracks longer than the thickness of the post or other defects that would weaken the posts and cause the posts to be structurally unsuitable. Steel posts may be used as well. Posts should comply with the requirements in Standard Specifications sections 16-2.03B and 13-10.02C.
- Anchors may be used. Anchors consist of a number 4 steel reinforcing bar. End protection shall be provided for any exposed bar reinforcement.

- Staples used to fasten the fence fabric to the posts and to join adjacent silt fence sections shall be U-shaped and have 1/2-inch legs and a 1-inch crown. Staples should be 1/16-inches in diameter. At least four staples should be installed on each silt fence post for adequate fastening, with a maximum of 8 inches between each staple.

Installation

- Install in accordance with pages 5 and 6 of Standard Plans T51 “Temporary Silt Fence” and T60 “Temporary Reinforced Silt Fence”.
- Generally, silt fences should be used in conjunction with soil stabilization source controls up slope to provide effective erosion and sediment control.
- Excavate a trench that is 6 inches deep and 6 inches wide with a length consistent with the project design plans. Place the bottom of the silt fence fabric in the trench. Backfill the trench with soil over the base of the silt fence fabric. Compact the backfill soil by hand or mechanical methods.
- Construct the length of each reach so that the change in base elevation along any 50-foot reach does not exceed 1/3 the height of the barrier; in no case should any reach of temporary silt fence exceed 500 feet in length.
- Construct silt fences with a set-back of at least 3 feet from the toe of a slope. Where a silt fence is determined to be not practical with a 3-foot set-back from the toe due to specific site conditions, the silt fence may be constructed at the toe of the slope, but as far from the toe of the slope as practical.

Maintenance and Inspection

- Repair undercut silt fences.
- Repair or replace split, torn, slumping, or weathered fabric.
- Inspect silt fence when rain is forecasted. Perform necessary maintenance, or maintenance required by the Engineer.
- Inspect silt fence following rain events. Perform maintenance as necessary, or as required by the Engineer.
- Maintain silt fences to provide an adequate sediment-holding capacity. Sediment should be removed when the sediment accumulation reaches 1/3 of the barrier height.
- Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed outside the highway right of way in conformance with the Standard Specifications, and replaced with new silt fence barriers.
- Holes, depressions, or other ground disturbance caused by the removal of the temporary silt fences should be backfilled and repaired in conformance with the Standard Specifications.
- 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.
- Silt fence placement is to be shown in the WPCDs along with other BMPs.

Temporary Silt Fence

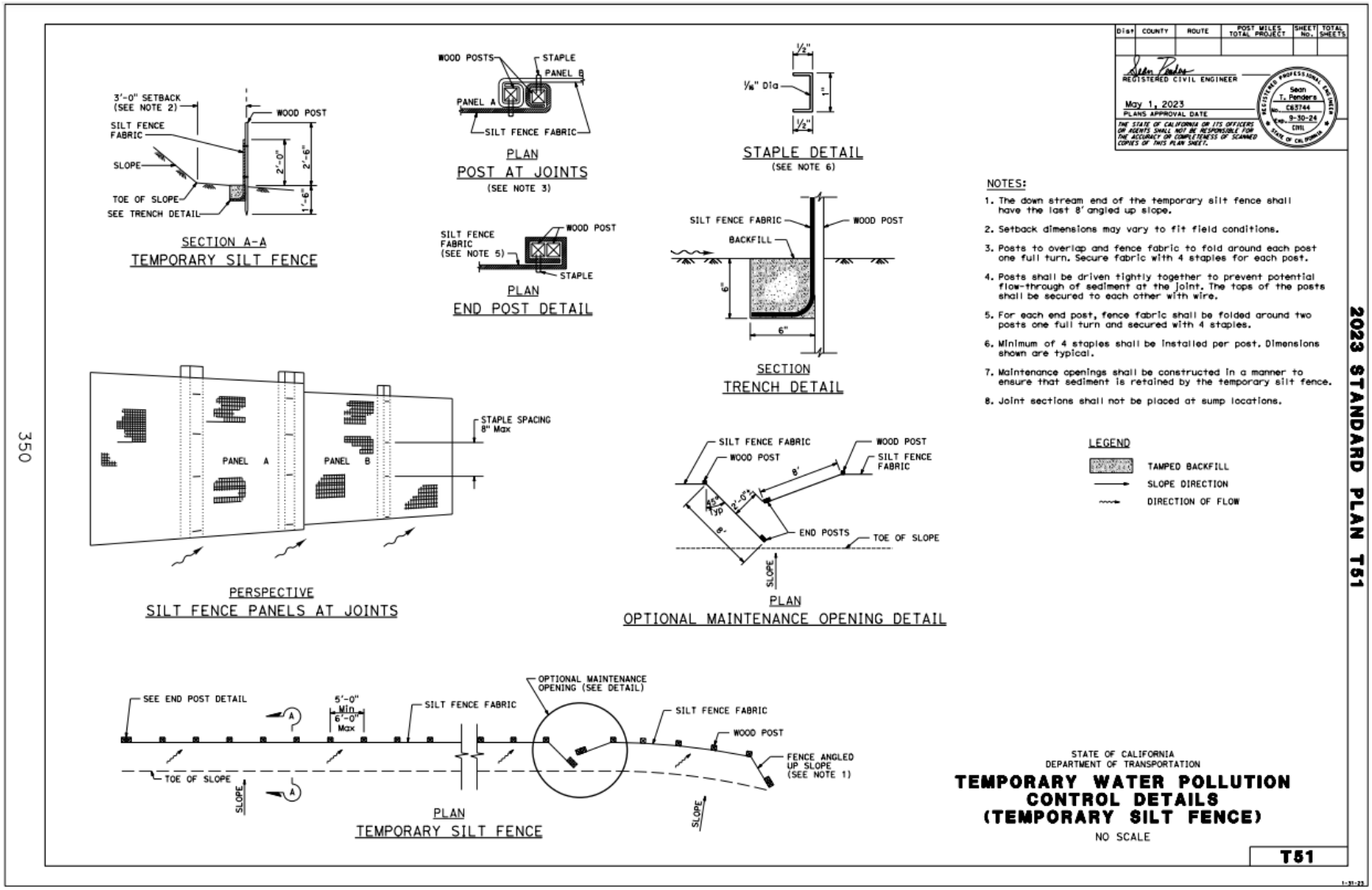
SC-1

SWPPP or WPCP

- Temporary silt fence or reinforced silt fence must be discussed in Section 600.1.3 of the SWPPP or Section 30.2.2 of the WPCP.

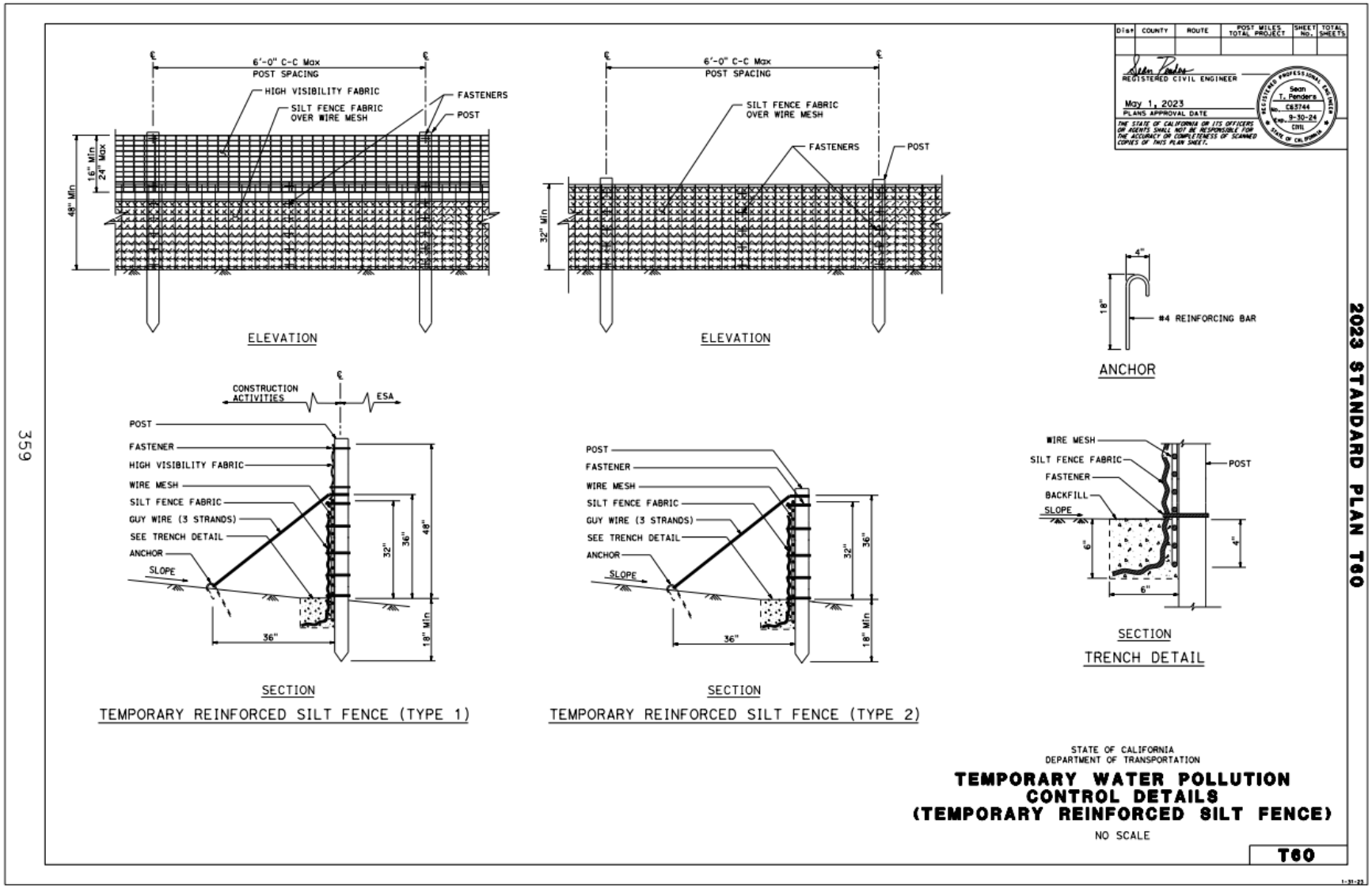
Temporary Silt Fence

SC-1

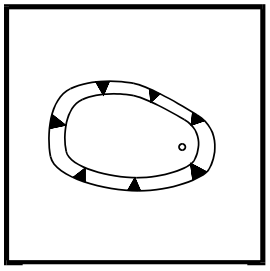


Temporary Silt Fence

SC-1



Sediment/Desilting Basin



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☑
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A sediment/desilting basin is a temporary basin formed by excavating and/or constructing an embankment so that sediment-laden runoff is temporarily detained under quiescent conditions, which allows sediment to settle out before the runoff is discharged (refer to Figures 1 through 4).

Appropriate Applications

Sediment basins shall be designed in accordance with the State of California NPDES General Permit for Storm Water Discharges Associated with Construction Activities (CGP). If there is insufficient area to construct a sediment basin in accordance with the CGP requirements, then the alternate desilting design standards specified herein may be used as approved by the RE.

Sediment/Desilting basins should be considered for use:

- On construction projects with disturbed soil areas (DSA) during the wetter months, typically October through May.
- Where sediment-laden water may enter the drainage system or watercourses.
- At drainage outlets of DSAs (with areas between 5 and 10 acres (ac)).

Limitations

- Alternative BMPs must be thoroughly investigated for erosion control before selecting temporary sediment/desilting basins.
- Requires large surface areas to permit sediment settling.
- Size may be limited by availability of right-of-way.
- Not appropriate for drainage areas greater than 75 ac.

- Not to be located in live streams.
- For safety reasons, basins should have protective fencing.
- Not to be used as a standalone BMP; it requires proper BMP implementation upstream and downstream of its location.

Standards and Specifications

General Requirements

- Sediment basins should be designed in accordance with the methods referenced in the CGP.
- Areas under embankments, structural works, and sediment basin must be cleared and stripped of vegetation in accordance with Standard Specifications Section 16 – "Temporary Facilities."
- Earthwork should be in accordance with Standard Specifications Section 19 – "Earthwork." Contractor is specifically directed to Standard Specifications Sections 19-5, "Compaction," and 19-6, "Embankment Construction."
- Chain-link fencing should be provided around each sediment basin to prevent unauthorized entry to the basin or if safety is a concern. Fencing should be in accordance with Standard Specifications Section 80 – "Fences."
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the RE.
- The outflow from the basins must have outlet protection to prevent erosion and scouring of the embankment and channel. See BMP SS-10, "Outlet Protection/Velocity Dissipation Devices."
- Avoid dewatering of groundwater to the sediment basin during the wetter months. Insignificant quantities of accumulated precipitation may be dewatered to the sediment basin unless precipitation is forecasted within 24 hours. Refer to NS-2, "Dewatering."

Other Considerations

- Basin should 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, (4) where the basins can be maintained on a year-round basis to provide maintenance access for sediment removal and stockpiling in a protected area, and to maintain required capacity.
- Construct sediment basins prior to the rainy season and construction activities.
- Sediment basins, regardless of size and storage volume, should include features to accommodate overflow or bypass flows that exceed the design storm event. The calculated basin volume and proposed location should be submitted to the RE for approval at least 3 days prior to basin construction.
- Construct an emergency spillway to accommodate flows not carried by the principal spillway. Spillway should consist of an open channel (earthen or vegetated) over undisturbed material (not fill) or constructed of a non-erodible rock slope protection.
- The spillway control section, which is a level portion of the spillway channel at the highest elevation in the channel, should be a minimum of 20 feet (ft) long.

- Limit the contributing area to the sediment basin to only the runoff from DSAs. Use temporary concentrated flow conveyance controls to divert runoff from undisturbed areas away from the sediment basin.
- A forebay constructed upstream of the basin may be provided to allow debris and larger particles to settle out of suspension before entering the basin.
- Basin inlets should be located to maximize travel distance to the basin outlet and resulting sediment deposition benefits.
- Rock or vegetation should be used to protect the basin inlet and slopes against erosion.
- The outlet structure should be placed on a firm, smooth foundation with the base securely anchored with concrete or other means to prevent floatation.
- Discharge from the basin should be accomplished through a water quality outlet. An example is shown in Figure 3. The principal outlet should consist of a corrugated metal, high-density polyethylene (HDPE), or reinforced concrete riser pipe. The outlet should have 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.
- A rock pile or rock-filled gabions can serve as alternatives to the debris screen, although the designer should be aware of the potential for extra maintenance involved should the pore spaces in the rock pile clog.
- Proper hydraulic design of the outlet is critical to achieving the desired basin performance. The water quality outlet should be designed to drain the basin within 24 to 96 hours (also referred to as drawdown time; the 24-hour limit is specified to provide adequate settling time; the 96-hour limit is specified to avoid vector control concerns). Local agencies may have more stringent drawdown time requirements.
- The two most common outlet problems that occur are: (1) the capacity of the outlet is too great and results in only partial basin filling and drawdown time that is less than designed for; and (2) the outlet clogs because it is not adequately protected against trash and debris. To avoid these problems, the following outlet types are recommended: (1) a single orifice outlet with or without the protection of a riser pipe, and (2) a perforated riser. Design guidance for single orifice and perforated riser outlets are:
- **Flow Control Using a Single Orifice At The Bottom Of The Basin (see Figure 1). The outlet control orifice should be sized using the following equation:**
- $$a = \frac{2A(H-Ho)^{0.5}}{3600CT(2g)^{0.5}} = \frac{(7x10^{-5})A(H-Ho)^{0.5}}{CT}$$ (Eq. 2)

  Where:

  a = area of orifice (ft^2) (1 ft^2 =0.0929m^2)

  A = surface area of the basin at mid elevation (ft^2)

  C = orifice coefficient

  T = drawdown time of full basin (hrs)

  G = gravity (32.2 ft/s^2)

H = elevation when the basin is full (ft)

Ho = final elevation when basin is empty (ft)

With a drawdown time of 40 hours, the equation becomes:

$$a = \frac{(1.75x10^{-6})A(H - Ho)^{0.5}}{C} \quad \text{(Eq. 3)}$$

- **Flow Control Using Multiple Orifices (see Figure2):**

$$a_t = \frac{2A(h_{max})}{CT(2g[h_{max} - h_{centroid\ of\ orifices}])^{0.5}} \quad \text{(Eq. 4)}$$

With terms as described above except:

a_t = total area of orifices

h_{max} = maximum height from lowest orifice to the maximum water surface (ft)

$h_{centroid\ of\ orifices}$ =height from the lowest orifice to the centroid of the orifice configuration (ft)

Allocate the orifices evenly on two rows; separate the holes by 3x hole diameter vertically, and by 120 degrees horizontally (refer to Figure 3).

Because basins are not maintained for infiltration, water loss by infiltration should be disregarded when designing the hydraulic capacity of the outlet structure.

Care must be taken in the selection of “C”; 0.60 is most often recommended and used; however, based on actual tests, (GKY, 1989), "Outlet Hydraulics of Extended Detention Facilities for Northern Virginia Planning District Commission,” recommends either of the following:

C = 0.66 for thin materials, where the thickness is equal to or less than the orifice diameter

C = 0.80 when the material is thicker than the orifice diameter

- The Contractor should verify that the outlet is properly designed to handle the design and peak flows.
- If rock is used for energy dissipation or to prevent erosion it must comply with Highway Design Manual Chapter 860.
- Attach riser pipe (watertight connection) to a horizontal pipe (barrel) that extends through the embankment to toe of fill. Provide anti-seep collars on the barrel.
- Cleanout level should be clearly marked on the riser pipe.
- Basins with an impounding levee greater than 5 ft tall measured from the lowest point to the impounding area to the highest point of the levee, and basins capable of impounding more than 35,300 cubic ft, should be designed by a professional Civil Engineer registered with the state of California. The design must be submitted to the RE for approval at least 7 days prior to the basin construction. The design should include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the basin outlet and bypass structures.

Maintenance and Inspection

- Inspect sediment basins before and after rainfall events and weekly year-round. During extended rainfall events, inspect at least every 24 hours.
- Examine basin banks for seepage and structural soundness.
- Check inlet and outlet structures and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Remove standing water from the basin within 72 hours after accumulation.
- Check inlet and outlet area for erosion and stabilize if required.
- Remove accumulated sediment when its volume reaches one-third the volume of the sediment storage. Properly dispose sediment and debris removed from the basin.
- Check fencing for damage and repair.

SWPPP or WPCP

- Sediment/Desilting basin must be discussed in Section 600.1.3 of the SWPPP or Section 30.2.2 of the WPCP.

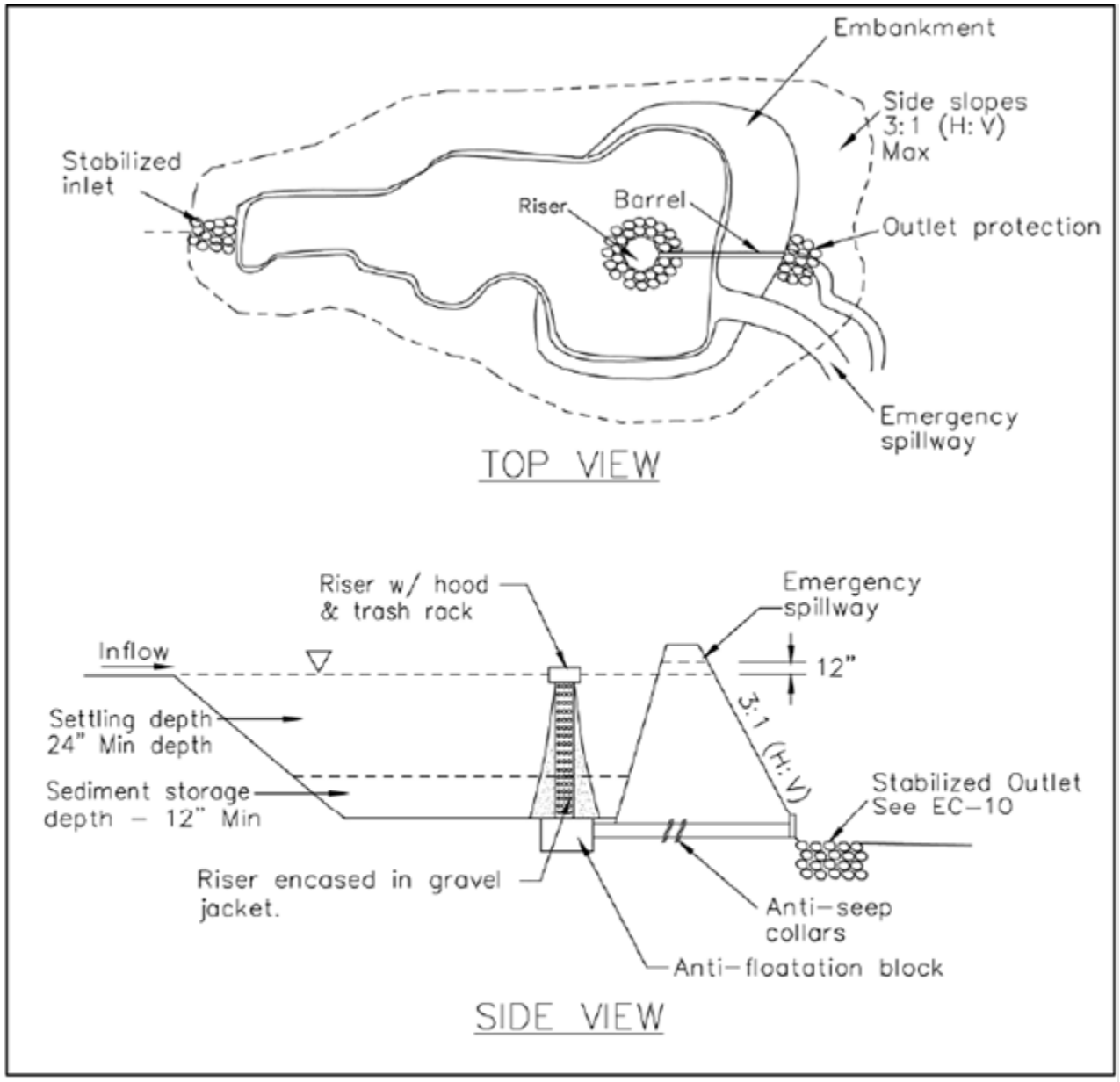


FIGURE 1: TYPICAL TEMPORARY SEDIMENT BASIN
MULTIPLE ORIFICE DESIGN
NOT TO SCALE

Source: CASQA

Figure 1

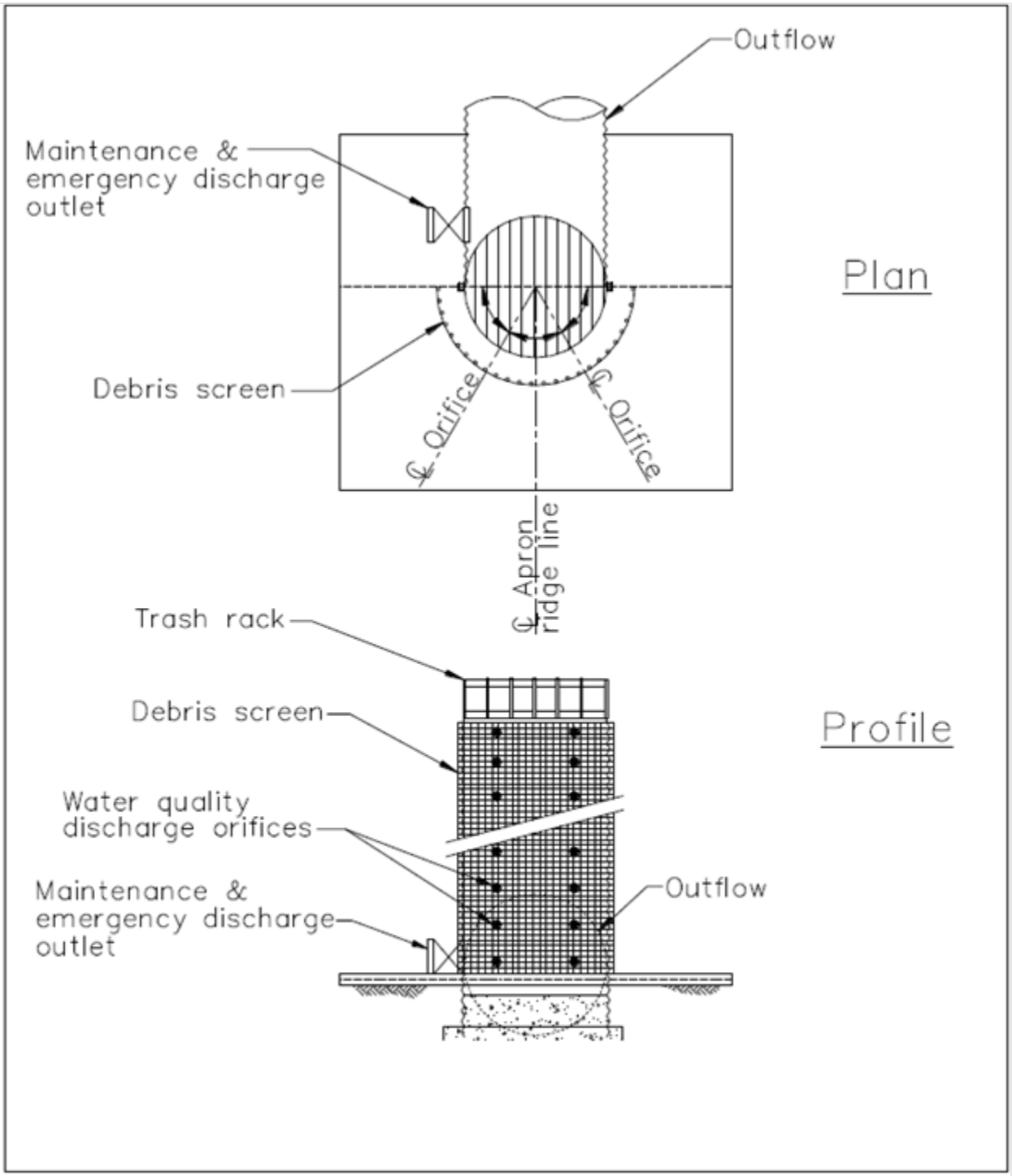


FIGURE 2: MULTIPLE ORIFICE OUTLET RISER
NOT TO SCALE

Source: CASQA

Figure 2

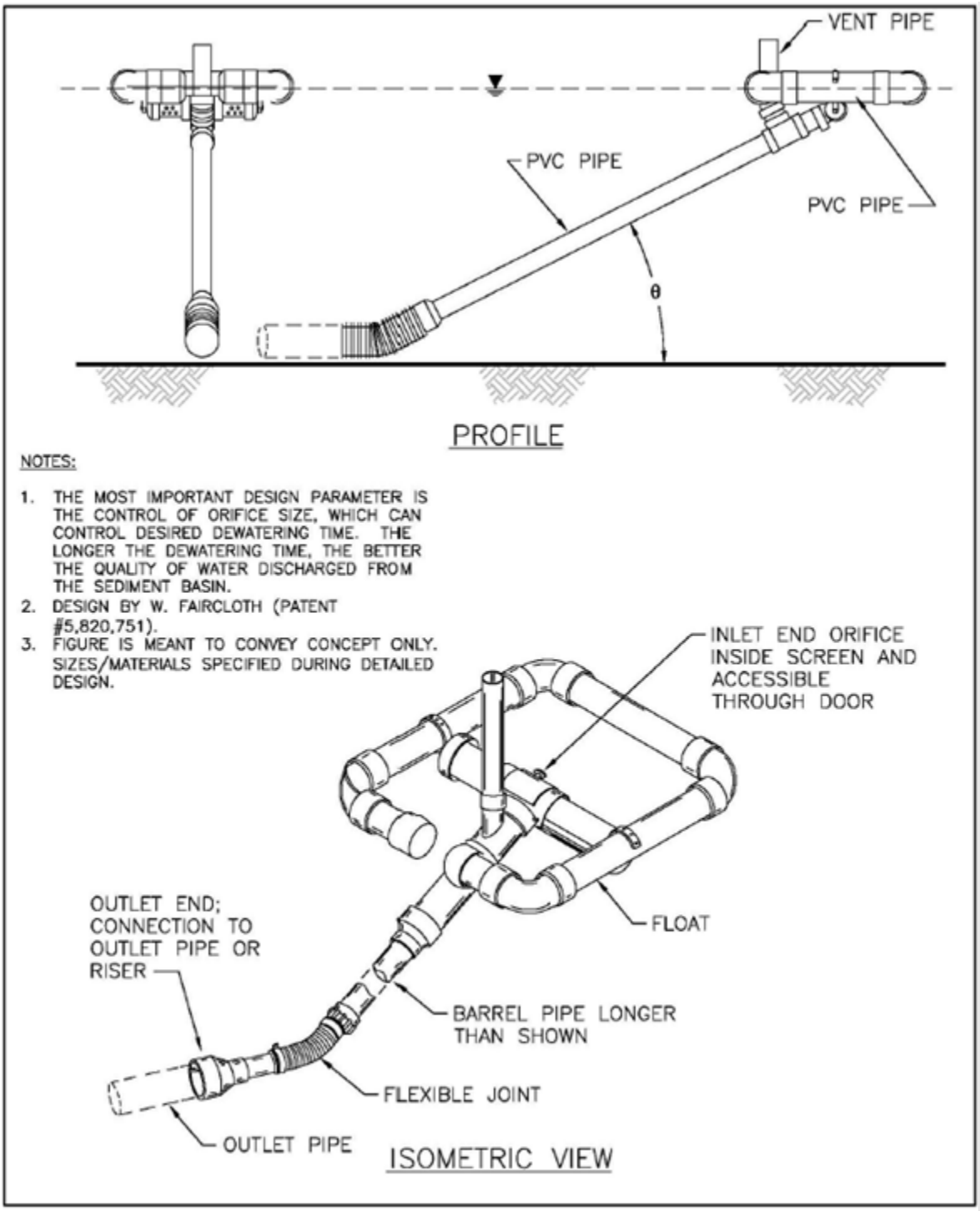


FIGURE 3: TYPICAL SKIMMER
NOT TO SCALE

Source: CASQA

Figure 3

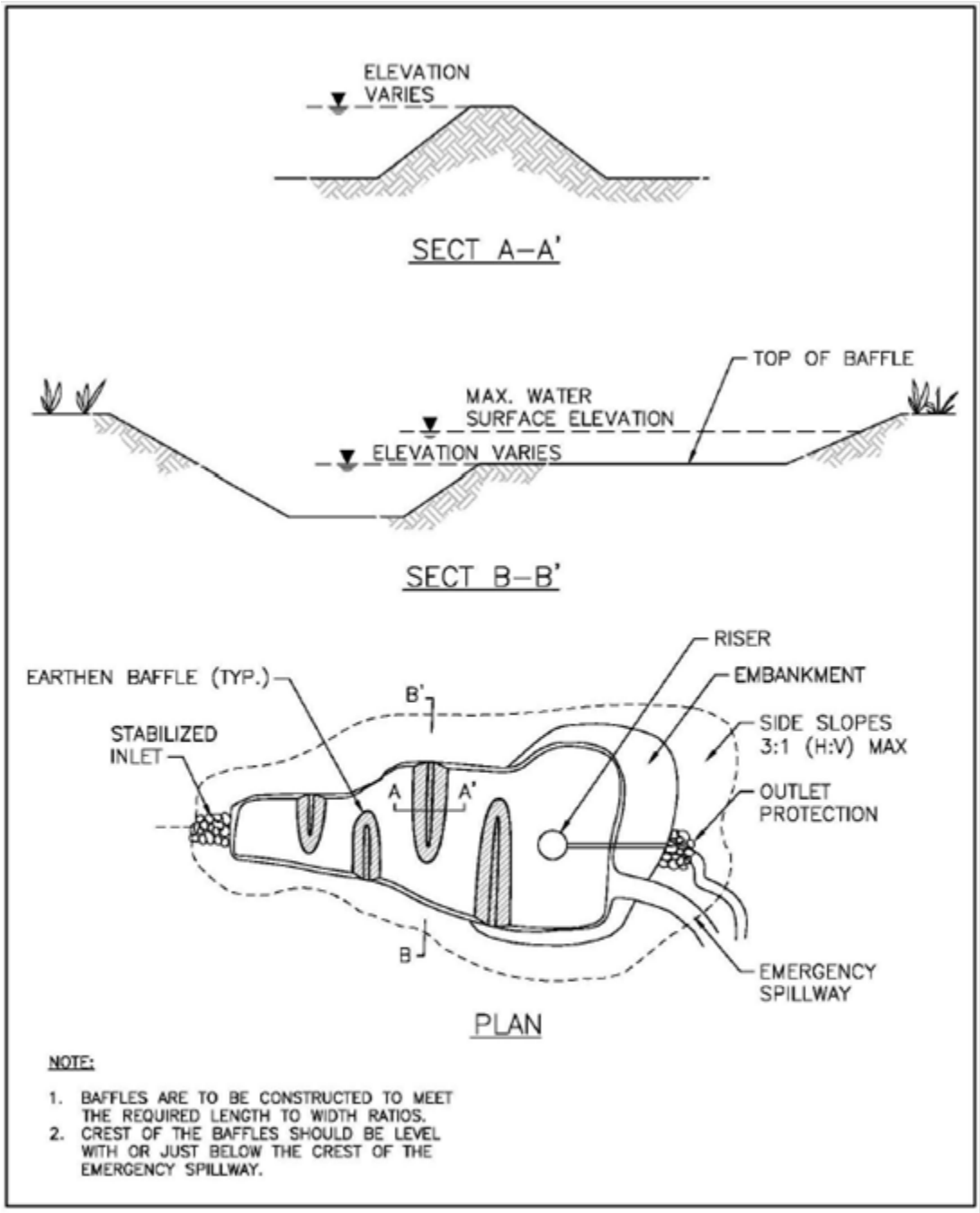
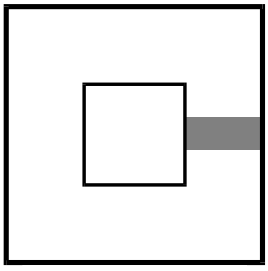


FIGURE 4: TYPICAL TEMPORARY SEDIMENT BASIN WITH BAFFLES
NOT TO SCALE
Source: CASQA

Figure 4

Temporary Sediment Trap/Curb Cutback



Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☑
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A sediment trap/curb cutback is a temporary containment area that allows sediment in collected storm water to settle out during infiltration or before the runoff is discharged through a stabilized spillway. Sediment traps are formed by excavating or constructing an earthen embankment.

Curb cutback is implemented when the construction project uses the removed section of pavement and uses the depression of the curb as a temporary containment to collect sediment before reaching a storm drain.

Appropriate Applications

- Sediment traps may be used on construction projects where the drainage area is less than 5 acres (ac). Traps should be placed where sediment-laden stormwater enters a storm drain or watercourse.
- As a supplemental control, sediment traps provide additional protection for a water body or for reducing sediment before it enters a drainage system.

Limitations

- Requires large surface areas to permit infiltration and sediment settling.
- Size may be limited by availability of right-of-way.
- Not appropriate for drainage areas larger than 5 ac.
- Only removes large and medium-sized particles and requires upstream erosion control.
- Sediment traps may appear attractive and dangerous to children, requiring protective fencing.
- Sediment traps should not be located in live streams.

- Curb cutback typically does not allow for a large storage area and therefore requires frequent maintenance to prevent sediment-laden discharges.

Standards and Specifications

General Requirements

- Areas under embankments, structural works, and sediment traps must be cleared and stripped of vegetation in accordance with Standard Specifications Section 17-2 – "Clearing and Grubbing."
- Earthwork must be in accordance with Standard Specifications Section 19 – "Earthwork." Contractor is specifically directed to Standard Specifications Sections 19 5 and 19 6 entitled, "Compaction" and "Embankment Construction," respectively.
- Fencing, in accordance with Standard Specifications Section 80 – "Fences," should be provided to prevent unauthorized entry.
- Remove and dispose deposited solids from sediment traps under Standard Specifications Section 14-10 – "Solid Waste Disposal and Recycling" unless another method is authorized.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).
- The outflow from sediment traps may be provided with outlet protection to prevent erosion and scouring of the embankment and channel. See BMP SS-10, "Outlet Protection/Velocity Dissipation Devices."
- For curb cutback, excavate soil from behind the curb, sidewalk, or roadway at least 3 to 4 inches down from the top of the hardscape and bring the soil back, at a minimum, 3 to 4 feet from the hardscape. Site conditions might allow for increase in capacity.

Other Considerations

- The sediment trap should be situated according to the following criteria: (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.
- Sediment traps should be sized to accommodate a settling zone and sediment storage zone with recommended minimum volumes of 67 cubic yards per acre (yd3/ac) and 33 yd3/ac of contributing drainage area, respectively, based on 0.5 inches of runoff volume over a 24-hour period. Multiple traps and/or additional volume may be required to accommodate site-specific rainfall and soil conditions.
- Use rock or vegetation to protect the trap outlets against erosion.
- Traps with an impounding levee greater than 4.5 feet tall measured from the lowest point to the impounding area to the highest point of the levee, and traps capable of impounding more than 35,000 cubic feet, must be designed by a Civil Engineer registered with the state of California. The design must be submitted to the RE for approval at least 7 days prior to basin construction. The design should include maintenance requirements to ensure continuous function of the trap outlet and bypass structures.

Temporary Sediment Trap/Curb Cutback

SC-3

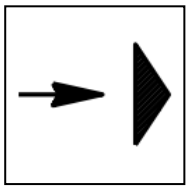
Maintenance and Inspection

- Inspect sediment traps/curbs before, during, and after rainfall events and weekly year-round. During extended rainfall events, inspect sediment traps at least every 24 hours.
- If captured runoff has not completely infiltrated within 96 hours, then the sediment trap must be dewatered.
- Inspect trap banks for embankment seepage and structural soundness.
- Inspect outlet structure and rock spillway for any damage or obstructions. Repair damage and remove obstructions as needed or as directed by the RE.
- Inspect outlet area for erosion and stabilize if required, or as directed by the RE.
- Remove accumulated sediment when the volume has reached one-third the original trap volume.
- Inspect fencing for damage and repair as needed or as directed by the RE.
- Temporary sediment trap/ Curb cutback locations must be shown in the WPCDs along with other BMPs.

SWPPP or WPCP

- Temporary sediment trap/curb cutback must be discussed in Section 600.1.3 of the SWPPP or Section 30.2.2 of the WPCP

Temporary Check Dams



Standard Symbol

BMP Objectives	
Soil Stabilization	☑
Sediment Control	☑
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Temporary check dams reduce scour and channel erosion by reducing flow velocity and encouraging sediment settlement. A check dam is a small device constructed of rock, gravel bags, compost socks, fiber rolls, or other proprietary product placed across a natural or man-made channel or drainage ditch.

Appropriate Applications

- Temporary check dams may be installed:
  - In small open channels that drain 10 acres (ac) or less.
  - In steep channels where storm water runoff velocities exceed 5 feet/second.
  - During the establishment of grass linings in drainage ditches or channels.
  - In temporary ditches where the short length of service does not warrant establishment of erosion-resistant linings.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).

Limitations

Not to be used in live streams.

- Not appropriate in channels that drain areas larger than 10 ac.
- Not to be placed in channels that are already grass lined unless erosion is expected, as installation may damage vegetation.
- Requires extensive maintenance following high-velocity flows.

- Promotes sediment trapping, which can be re-suspended during subsequent storms or removal of the check dam.
- Not to be constructed from straw bales or silt fence.

Standards and Specifications

General Requirements

- Remove obstructions, rocks, clods, and debris greater than 1 inch in diameter from the ground before installing temporary check dams.
- If check dams are used in combination with rolled erosion control product (RECP) or blanket, install the RECP or blanket first.
- Place a temporary check dam perpendicular to the centerline of the ditch or drainage line.
- Install the check dam with enough spillway depth to prevent flanking of a concentrated flow around its ends.
- Type 1 or Type 2 check dams are appropriate for unlined ditches. Type 2 check dams are appropriate if the ditch is concrete lined.

Fiber Roll (Type 1) Check Dam

Refer to SC-5, “Fiber Rolls.”

- Secure the fiber rolls with rope and notched wood stakes.
- Drive the stakes into the soil until the notch is even with the top of the fiber roll.
- Lace rope between the stakes and over the fiber roll. Knot the rope at each stake.
- Tighten by driving the stakes further into the soil and forcing the fiber roll against the surface of the ditch or drainage line.

Gravel-filled Bag (Type 2) Check Dam

Bag Material: Bags are a geosynthetic material, either polypropylene, polyethylene, or polyamide woven fabric with (1) a minimum unit weight of 4 ounces per square yard, (2) mullen burst strength exceeding 300 pounds per square in (psi) in conformance with the requirements in ASTM designation D3786, and (3) ultraviolet stability exceeding 70 percent, in conformance with the requirements in ASTM designation D4355.

Bag Size: Each gravel-filled bag shall be 24 to 32 inches long, 16 to 20 inches wide, and 3 inches thick. Alternative bag sizes must be submitted to the RE for approval prior to deployment.

Gravel: Fill material is between 3/8 and 3/4 inches in diameter and must be clean and free from clay balls, organic matter, and other deleterious materials. Gravel-filled bags should be secured when being opened so gravel does not escape. Gravel-filled bags weigh between 30 and 50 pounds. Fill material is subject to approval by the RE.

- Place a Type 2 temporary check dam as a single layer of gravel-filled bags, placed end-to-end to eliminate gaps.

- If you need to increase the dam height, add more layers of gravel-filled bags. Stack the bags in the upper row to overlap the joints in the lower row. Stabilize the rows by adding more rows of bags in the lower layers.
- Tightly abut bags and stack gravel bags using a pyramid approach. Gravel bags should not be stacked any higher than 3 feet.
- Upper rows of gravel bags should overlap joints in lower rows.

Other Considerations

- Check dams should be placed at a distance and height to allow small pools to form behind them. Install the first check dam approximately 15 feet from the outfall device and at regular intervals based on slope gradient and soil type.
- For multiple check dam installation, backwater from the downstream check dam should reach the toe of the upstream dam.
- High flows (typically a 2-year storm or larger) should 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 should be removed when grass has matured sufficiently to protect the ditch or swale from erosion.
- Check dam materials should consist of biodegradable materials whenever feasible.
- Rock check dams might be more applicable if concentrated flows are possible.

Maintenance and Inspection

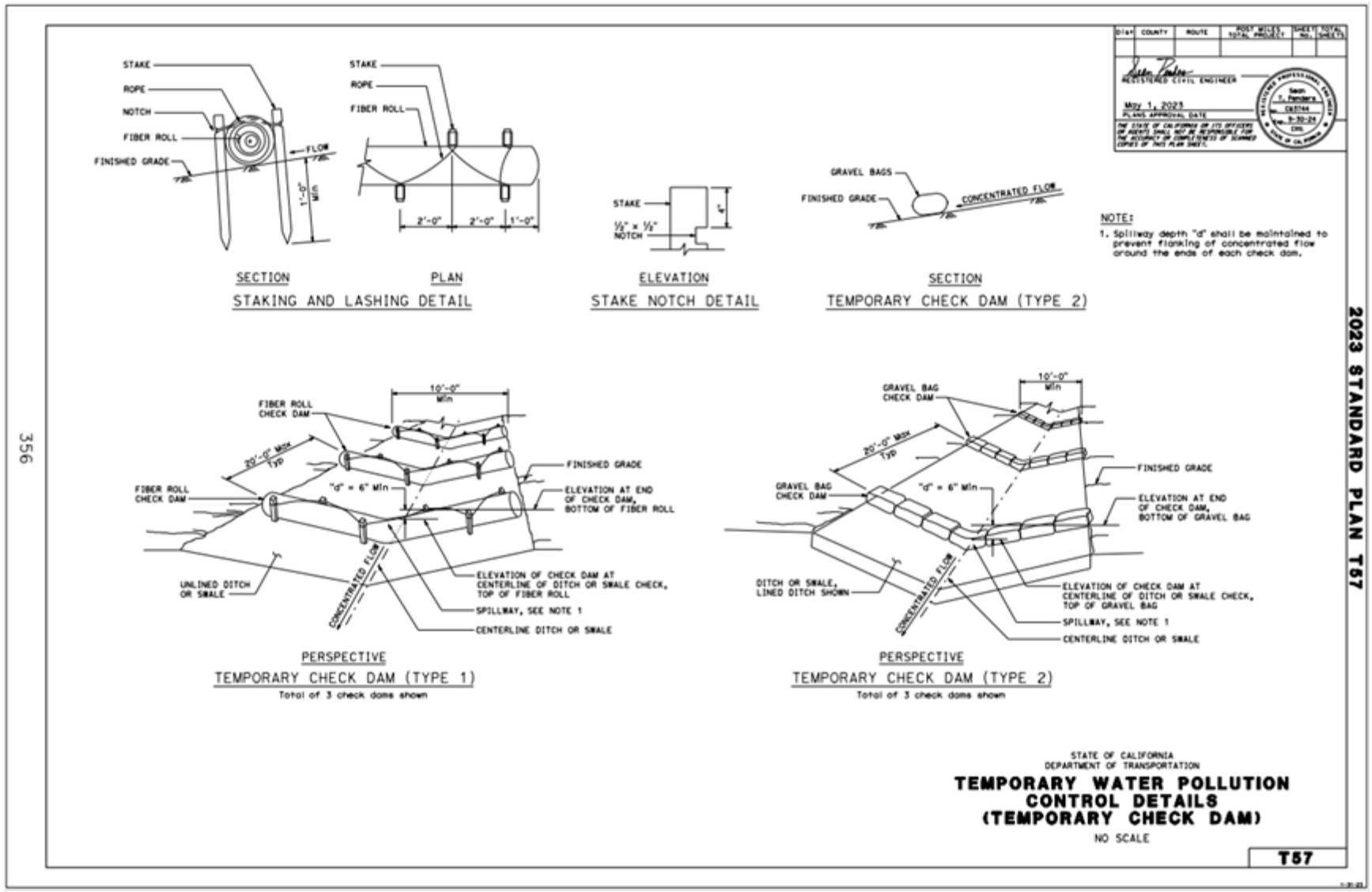
- Check dams must be inspected at a minimum weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Replace missing rock, bags, fiber rolls, etc., that have degraded or become damaged.
- Remove sediment when depth reaches one-third of the check dam height.
- Remove accumulated sediment prior to permanent seeding or soil stabilization.
- Remove check dam and accumulated sediment when check dams are no longer needed or when directed by the RE.
- Removed sediment can be incorporated in the project at locations designated by the RE or disposed outside the highway right of way in conformance with the Standard Specifications.

SWPPP or WPCP

- Temporary check dams must be discussed in Sections 600.1.1 and 600.1.3 of the SWPPP or Section 30.2.2 of the WPCP.

Temporary Check Dams

SC-4



Temporary Fiber Rolls

Standard Symbol

BMP Objectives	
Soil Stabilization	☑
Sediment Control	☑
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A temporary fiber roll consists of wood excelsior, rice or wheat straw, or coconut fibers that are rolled or bound into a tight tubular roll and placed on the toe and face of slopes to intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and remove sediment. Temporary fiber rolls may also be used for drainage inlet protection and as check dams under certain situations.

Appropriate Applications

- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).
- Fiber rolls may be applied as both temporary and permanent sediment controls (after receiving approval from Division of Maintenance).
- Fiber rolls may be used as check dams in unlined ditches or as temporary drainage inlet protection down-slope of exposed soil areas.
- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- Below the toe of exposed and erodible slopes.
- Around temporary stockpiles.
- Along the perimeter of a project.

Limitations

- Runoff and erosion may occur if fiber roll is not adequately trenched in.
- Fiber rolls at the toe of slopes greater than 5:1 (H:V) may require the use of a large sediment barrier as specified in Standard Specifications Section 13 – 10.03D Temporary Large Sediment

Barrier or installations achieving the same protection (i.e., stacked smaller-diameter fiber rolls, etc.).

- Difficult to move once saturated.
- Fiber rolls could be transported by high flows if not properly staked and/or trenched in.
- Fiber rolls have limited sediment capture zone.
- Do not use fiber rolls on slopes subject to creep, slumping, or landslide.
- Plastic netting should not be used.
- Plastic netting is only allowed where fiber rolls will be used for short durations and will be removed (requires RE approval).

Standards and Specifications

Materials

- Fiber rolls must be pre-manufactured and filled with weed-free rice or wheat straw, wood excelsior, or coconut fiber. Fiber rolls must be covered with biodegradable jute, sisal, or coir fiber netting secured tightly at each end.
- Fiber rolls must have a minimum functional longevity of 1 year.
- Fiber rolls must be:
  - 8 to 10 inches in diameter and at least 1.1 pounds per foot (lb/ft)
  - 10 to 12 inches in diameter and at least 3 lb/ft
- Large sediment barriers are a subset of fiber rolls. Large sediment barriers must be:
  - 18 to 22 inches in diameter
  - At least 8 feet in length
  - At least 6.5 lb/ft
- Fiber rolls used within the jurisdiction of the Lahontan Regional Water Quality Control Board must be made entirely of biodegradable materials if the project is near an environmentally sensitive area, are intended to be left in place after construction is completed, or regulatory permits prohibit the use of non-photo/biodegradable fiber rolls.
- Submit a Certificate of Compliance for fiber rolls.
- Rope to fasten fiber rolls must be 1/4 inches in diameter and biodegradable, such as sisal or manila.
- Wood stakes must be untreated fir, redwood, cedar, or pine and cut from sound timber. The ends must be pointed for driving into the ground. Notched stakes must be at least 1 by 2 by 24 inches in size. Stakes without notches must be at least 1 by 1 by 24 inches.

Typical Temporary Fiber Roll Installation

- Before installing fiber roll, remove obstructions from the ground, including rocks, clods, and debris greater than 1 inch in diameter.
- For any 20-foot section of fiber roll, prevent the fiber roll from varying more than 5 percent from level.
- Use the following spacing unless otherwise noted on the project plans or special provisions:
  - 10 feet apart for slopes steeper than 2:1 (H:V)
  - 15 feet apart for slopes from 2:1 to 4:1 (H:V)
  - 20 feet apart for slopes from 4:1 to 10:1 (H:V)
  - 50 feet apart for slopes flatter than 10:1 (H:V)
- For Type 1 installations:
  - Place in a furrow that is from 2 to 4 inches deep.
  - Fasten with wood stakes every 4 feet along the length of the fiber roll.
  - Fasten the ends of the fiber roll by placing a stake 6 inches from the end of the roll.
  - Drive the stakes into the soil so the top of the stake is less than 2 inches above the top of the fiber roll.
- For Type 2 installations:
  - Fasten with notched wood stakes and rope.
  - Drive stakes into the soil until the notch is even with the top of the fiber roll.
  - Lace the rope between stakes and over the fiber roll. Knot the rope at each stake.
  - Tighten the fiber roll to the surface of the slope by driving the stakes further into the soil.
- If more than one fiber roll is placed in a row, the rolls should overlap, not abut. Stagger overlapping joints in adjacent rows by 5 to 10 feet.

Typical Large Sediment Barrier Installation

- Place a single row of fiber rolls end-to-end approximately parallel with the slope contour. For any 20-foot section of fiber roll, do not allow the fiber roll to vary by more than 5 percent from level.
- Place the fiber rolls in a furrow that is from 6 to 8 inches deep.
- Secure the fiber rolls with wood stakes 4 feet apart.
- Place a stake 18 inches from each end of each fiber roll.
- Drive the stakes into the soil such that the top of the stakes are less than 2 inches above the top of the fiber rolls.
- Angle the last 6 feet upslope at the downhill end of the run.

Removal

- For permanent installations, do not remove fiber rolls. Fiber rolls will degrade over time, while underlying soils are stabilized by other BMPs.
- For temporary installations, remove fiber rolls, collect and dispose sediment accumulation, and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

Maintenance and Inspection

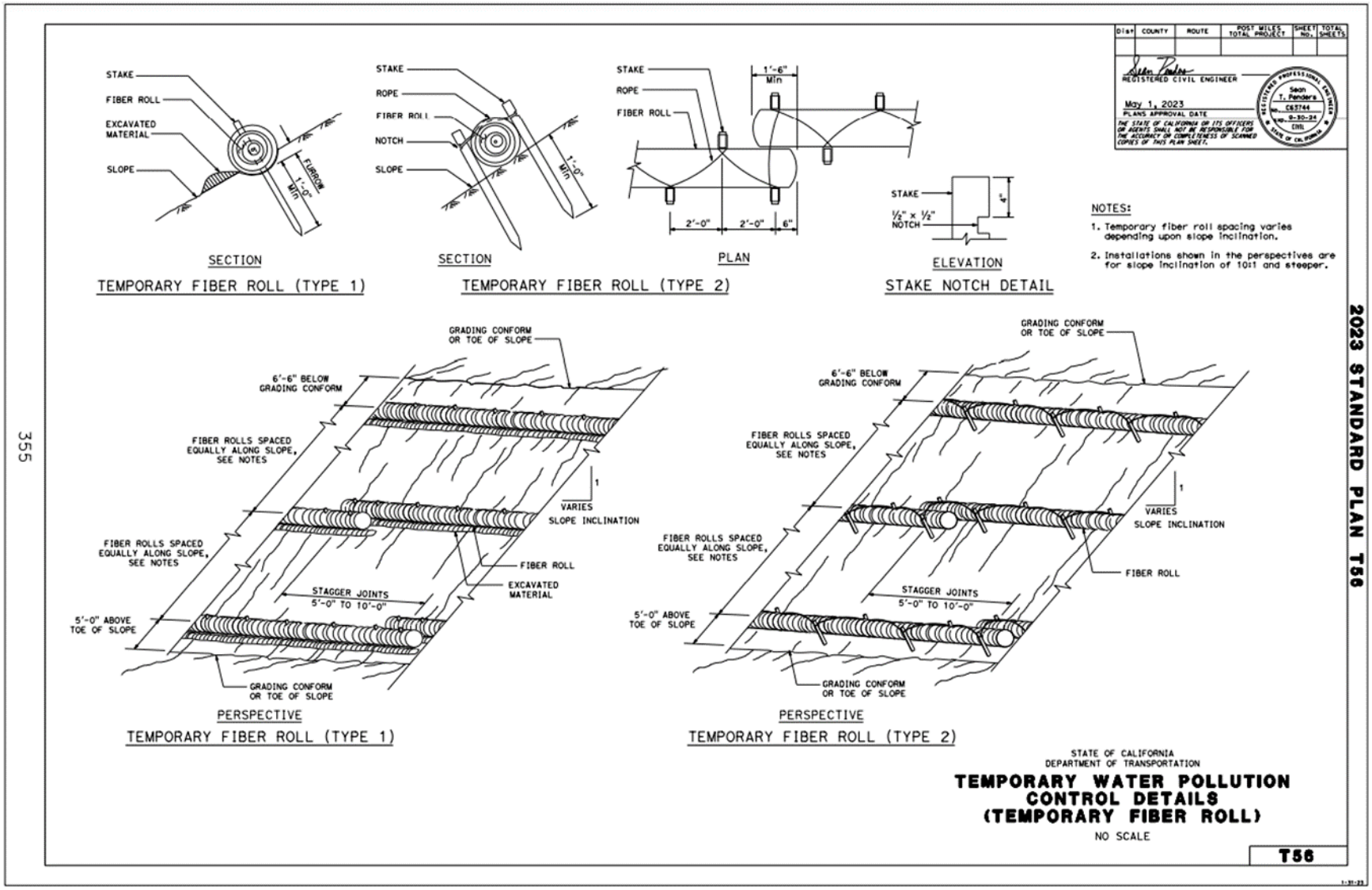
- Remove sediment from behind the fiber roll if sediment is 1/3 of fiber roll height above ground.
- Repair or adjust the fiber roll if rills or other evidence of concentrated runoff occur beneath the fiber roll.
- Repair or replace the fiber roll if they become split, torn, or unraveled.
- Add stakes if the fiber roll slumps or sags.
- Replace broken or split wood stakes.
- Remove sediment deposits, trash, and debris from fiber roll as needed. If removed sediment is deposited within project limits, it must be stabilized and not exposed to erosion by wind or water.
- Perform maintenance as needed or as required by the RE or by Construction General Permit or the Lake Tahoe Hydrologic Unit Construction General Permit requirements.
- Inspect fiber rolls before and following rainfall events and a least daily during prolonged rainfall. Perform maintenance as needed or as required by the RE.
- Maintain fiber rolls to provide an adequate sediment holding capacity and runoff velocity reduction.
- Fiber roll placement must be shown on the WPCDs.

SWPPP or WPCP

- Fiber rolls must be discussed in Sections 600.1.1 and 600.1.3 of the SWPPP or Section 30.2.2 of the WPCP and the respective WPCDs.

Temporary Fiber Rolls

SC-5



Temporary Fiber Rolls

SC-5

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 1, 2023
PLANS APPROVAL DATE

Sean T. Penders
C63744
9-30-24
CIVIL

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

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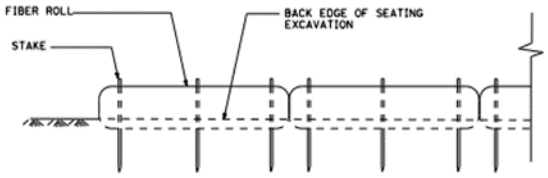
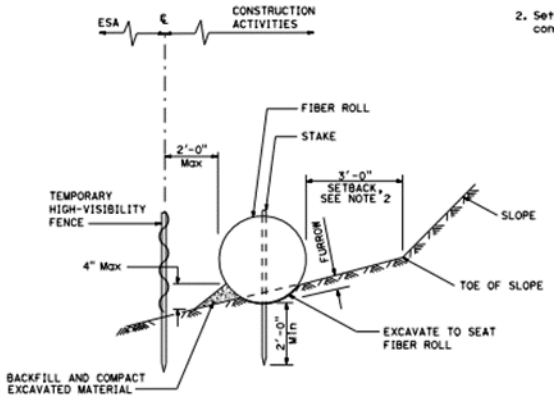


FRONT ELEVATION

TEMPORARY LARGE SEDIMENT BARRIER



SECTION

PLACEMENT DETAIL FOR TEMPORARY HIGH-VISIBILITY FENCE
USED WITH TEMPORARY LARGE SEDIMENT BARRIER

See Note 1

NOTES:

1. Temporary high-visibility fence shown for reference purposes only.
2. Setback dimension may vary according to field conditions or as designated on plans.

2023 STANDARD PLAN T66

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

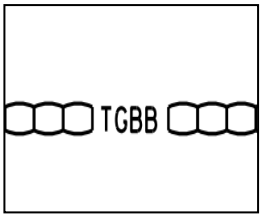
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY LARGE SEDIMENT BARRIER)

NO SCALE

T66

1-31-23

Temporary Gravel Bag/Earthen Berm



Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☑
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A temporary gravel bag berm consists of a single row of gravel bags that are installed end to end to form a barrier across a slope to intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide some sediment removal. Gravel bags can be used where flows are moderately concentrated, such as ditches, swales, and storm drain inlets (see SC-10, “Drainage Inlet Protection”) to divert and/or detain flows.

Temporary earthen berms are linear sediment barriers designed to intercept sheet flows. Water gets impounded upstream of the earthen berm, which allows sediment to settle out and release runoff as sheet flow, preventing erosion.

Appropriate Applications

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

- Along streams and channels.
- Below the toe of exposed and erodible slopes.
- Down slope of exposed soil areas.
- Around stockpiles.
- Across channels to serve as a barrier for utility trenches or provide a temporary channel crossing for construction equipment to reduce stream impacts.
- Parallel to a roadway to keep sediment off paved areas.
- At the top of slopes to divert roadway runoff away from disturbed slopes.
- Along the perimeter of a site.

Temporary Gravel Bag/Earthen Berm SC-6

- To divert or direct flow or create a temporary sediment basin.
- During construction activities in stream beds when the contributing drainage area is less than 5 acres.
- When extended construction period limits the use of either silt fences or straw bale barriers.
- When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.
- At grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

Limitations

- Degraded gravel bags may rupture when removed, spilling contents.
- Installation can be labor intensive.
- Limited durability for long-term projects.
- When used to detain concentrated flows, maintenance requirements increase.
- Earthen berms should not be used to intercept flows with moderate to high velocities that may erode the earthen berm.
- Earthen berms are susceptible to erosion from concentrated flows.

Standards and Specifications

Materials

- **Bag Material:** The gravel bag material must comply with Section 96-1.02F Gravel-Filled Bag of the Standard Specifications.
- **Bag Size:** Each gravel-filled bag should be 24 to 32 inches long, 16 to 20 inches wide, and 3 inches thick. Alternative bag sizes must be submitted to the RE for approval prior to deployment.
- **Gravel:** Fill material should be between 3/8 and 3/4 inches in diameter and be clean and free from clay balls, organic matter, and other deleterious materials. The opening of gravel-filled bags must be secured such that gravel does not escape. Gravel-filled bags weigh between 30 and 50 pounds. Fill material is subject to approval by the RE.
- Earthen berms must comply with Standard Specifications Section 13-10.03I

Installation

- When used as a linear control for sediment removal:
  - Install along a level contour.
  - Place gravel-filled bags end to end to eliminate gaps in a gravel-bag berm.
  - Angle the last 6 feet upslope at the downhill end of the run.
  - Stack the bags such that the upper row overlaps the joints in the lower row.

  - Add layers of gravel-filled bags to increase the height of a temporary gravel-bag berm if needed. Stack the bags in the upper row to overlap the joints in the lower row. Stabilize the rows by adding rows of bags in the lower layers.
- Generally, gravel-bag barriers can be used in conjunction with temporary soil stabilization controls up slope.
- Construct gravel-bag barriers with a setback from the toe of a slope. Where it is determined to be not practicable due to specific site conditions, the gravel-bag barrier may be constructed at the toe of the slope but be constructed as far from the slope toe as practicable.
- Refer to SC-4, “Temporary Check Dams” when used for concentrated flows.
- Submit a Certificate of Compliance for gravel-filled bag material.
- Earthen berms are constructed with either native soil or an alternative selected material.
- Earthen berms must be at least 8 inches high and 36 inches wide.
- Earthen berms must be compacted, either manually or mechanically.

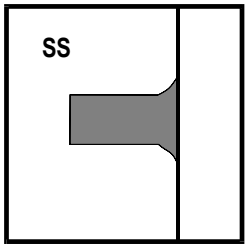
Maintenance and Inspection

- Gravel-bag/earthen berms must be inspected in accordance with CGP requirements for the associated project type and risk level, or with the LTCGP. At a minimum, BMPs must be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Reshape or replace gravel bags as needed, or as directed by the RE.
- Repair washouts or other damages as needed, or as directed by the RE.
- Inspect gravel-bag/earthen berms for sediment accumulations and remove sediment when accumulation reaches one-third of the berm height. Removed sediment can be incorporated in the project at locations designated by the RE or disposed outside the highway right of way in conformance with the Standard Specifications.
- Remove gravel-bag berms when no longer needed. Remove sediment accumulations and clean, re-grade, and stabilize the area.
- If using earthen berm, ensure soil remains compacted through the duration of the berm.
- Maintain earthen berms to provide sediment-holding capacity and to reduce concentrated flow velocities.
- Repair the berm if rills or other evidence of concentrated runoff has overtopped it.
- Gravel bag/Earthen berm placement must be shown on the WPCDs and reflect site conditions.

SWPPP or WPCP

- Gravel bag/Earthen berm must be discussed in Sections 600.1.1 and 600.1.3 of the SWPPP or Section 30.2.2 of the WPCP and shown in the respective WPCDs.

Street Sweeping



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☑
Tracking Control	☑
Wind Erosion Control	☑
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

BMPs to remove tracked sediment to prevent the sediment from entering a storm drain or receiving waters.

Appropriate Applications

These practices are implemented anywhere sediment is tracked from the project site onto public or private paved roads, typically at jobsite entrances and exits.

Limitations

Sweeping and vacuuming may not be effective when soil is wet or muddy.

Standards and Specifications

General Requirements

- Sweep by hand or mechanical methods, such as vacuuming. Kick brooms or sweeper attachments may not be used.
- At least one street sweeper in good working order must be at the job site at all times when street sweeping work is required.
- Use one of the following types of street sweepers:
  - Mechanical sweeper followed by a vacuum-assisted sweeper
  - Vacuum-assisted, dry, waterless, sweeper
  - Regenerative-air sweeper

- Submit the number and type of street sweepers that will be used on the project for each activity at least 5 business days before starting the activities listed above. Keep and submit street sweeping activity records that include sweeping times, locations, and the quantity of material collected.
- Sweep paved roads at construction entrance and exit locations and on-site paved areas:
  - During clearing and grubbing, earthwork, trenching, and pavement-structure construction activities.
  - When vehicles are entering and leaving the job site.
  - After soil-disturbing activities.
  - After observing off-site tracking of material.
- Sweep within 1 hour if sediment or debris is observed during the activities described above that require sweeping.
- Sweep within 24 hours if sediment or debris is observed during activities that do not require sweeping.
- Keep dust to a minimum during street sweeping activities. Use water for dust control or a vacuum whenever dust generation is excessive or sediment pickup is ineffective. Refer to WE-1 for wind erosion control BMPs.
- Remove collected material, including sediment, from paved shoulders, drainage inlets, curbs and dikes, and other drainage areas.
- After sweeping is finished, collected material may be stockpiled. Stockpiles protection is included in WM-03 Stockpile Management. If not mixed with debris, trash, or potentially hazardous objects, consider incorporating the removed sediment back into the project if approved by the Resident Engineer. Otherwise, dispose stockpiled material at least once per week according to Standard Specifications Section 14-10.
- Street sweeping does not void the requirements for residue collection included in other work activities, such as grooving, grinding, or asphalt concrete planning.

Maintenance and Inspection

- Inspect potential sediment tracking locations daily.
- Monitor and inspect tracking control BMPs such as TC-1, “Temporary Construction Entrance” to reduce sediment accumulation on roads.
- Be careful not to sweep up any unknown substance or any object that may be hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- Sweeper material must be disposed in compliance with waste regulations.

SWPPP or WPCP

- Street sweeping must be discussed in Section 600.1.3 of the SWPPP or Sections 30.2.2 and 30.2.3 of the WPCP.

Sandbag Barrier

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☑
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A sandbag barrier is a temporary linear sediment barrier that consists of stacked sandbags designed to intercept and slow the flow of sediment-laden sheet flow runoff. Sandbag barriers allow sediment to settle from runoff before water leaves the construction site.

Appropriate Applications

- Along the perimeter of a site.
- Along streams and channels.
- Below the toe of exposed and erodible slopes.
- Down slope of exposed soil areas.
- Around stockpiles.
- Across channels to serve as a barrier for utility trenches or provide a temporary channel crossing for construction equipment, and to reduce stream impacts in accordance with the approved Temporary Creek Diversion Plan.
- Parallel to a roadway to keep sediment off paved areas.
- At the top of slopes to divert roadway runoff away from disturbed slopes.
- To divert or direct flow or create a temporary sediment/desilting basin.
- During construction activities, in stream beds when the contributing drainage area is less than 5 acres.
- When extended construction period limits the use of either silt fences or straw bale barriers.
- Along the perimeter of vehicle and equipment fueling and maintenance areas or chemical storage areas.

- To capture and detain non-stormwater flows until proper cleaning operations occur.
- When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.
- To temporarily close or continue broken, damaged, or incomplete curbs.

Standards and Specification

Materials

- **Sandbag Material:** Sandbags can be woven polypropylene, polyethylene, or polyamide fabric with (1) a minimum unit weight of 4 ounces per square yard, (2) mullen burst strength exceeding 300 pounds per square inch in conformance with the requirements in ASTM designation D3786, and (3) ultraviolet stability exceeding 70 percent in conformance with the requirements in ASTM designation D4355. Use of burlap is not acceptable.
- **Sandbag Size:** Each sand-filled bag should be 18 inches long, 12 inches wide, and 3 inches thick, and have a mass of approximately 33 pounds. Bag dimensions are nominal and may vary based on locally available materials. Alternative bag sizes must be submitted to the RE for approval prior to deployment.
- **Fill Material:** All sandbag fill material can be non-cohesive, Class 1 or Class 2 permeable material free from clay and deleterious material, conforming to the provisions in Standard Specifications Section 47-2.02D – “Permeable Material.” The requirements for the Durability Index and Sand Equivalent do not apply. Fill material is subject to approval by the Resident Engineer (RE).

Installation

- When used as a linear sediment control:
  - Install along a level contour.
  - Turn ends of sandbag row upslope to prevent flow around the ends.
  - Generally, sandbag barriers may be used in conjunction with temporary soil stabilization controls upslope to provide effective erosion and sediment control.
- Construct sandbag barriers with a setback of at least 3 feet from the toe of a slope. Where it is determined to be not practical due to specific site conditions, the sandbag barrier may be constructed at the toe of the slope, but should be constructed as far from the slope toe as practicable.

Limitations

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

- Consider using gravel bags whenever possible since they often do not require as much maintenance or impact wildlife when used near environmentally sensitive areas.

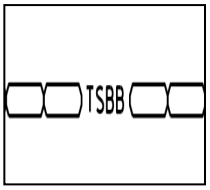
Maintenance and Inspection

- Inspect sandbag barriers before and after each rainfall event, and weekly year-round.
- Reshape or replace sandbags as needed, or as directed by the RE.
- Repair washouts or other damages as needed, or as directed by the RE.
- Inspect sandbag barriers for sediment accumulations and remove sediments when accumulation reaches one-third the barrier height. Removed sediment can be incorporated in the project at locations designated by the RE or disposed outside the highway right of way in conformance with the Standard Specifications 14-10.
- Remove sandbags when no longer needed. Remove sediment accumulation and clean, re-grade, and stabilized the area. No sandbags should be left in place after construction activities are complete.

SWPPP or WPCP

- Sandbag barriers must be discussed in Sections 600.1.1 and 600.1.3 of the SWPPP or Section 30.2.2 of the WPCP.

Temporary Straw Bale Barrier



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☑
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A temporary straw bale barrier is a temporary linear sediment barrier consisting of straw bales designed to intercept and slow sediment-laden sheet flow runoff. Temporary straw bale barriers allow sediment to settle from runoff before water leaves the construction site.

Appropriate Applications

- Along the perimeter of a site.
- Along streams and channels.
- Below the toe of exposed and erodible slopes.
- Downslope of exposed soil areas.
- Around stockpiles.
- Across minor swales or ditches with small catchments.
- Around above-grade-type temporary concrete washouts (see WM-8, “Concrete Waste Management”).
- Parallel to a roadway to keep sediment off paved areas.

Limitations

- Installation can be labor intensive.
- Temporary straw bale barriers are maintenance intensive.
- Degraded straw bales may fall apart when removed or if left in place for extended periods.
- Cannot be used on paved surfaces.

- Not to be used for drain inlet protection.
- Not to be used in areas of concentrated flow.
- Can be an attractive food source for some animals.
- May introduce undesirable non-native plants to the area.

Standards and Specifications

Materials

- Straw must conform to the provisions in Standard Specifications Section 21-2.02H – "Straw."
- Each straw bale should be a minimum of 14 inches wide, 18 inches high, 36 inches long, and have a minimum weight of 50 pounds (lb).
- The straw bale must be composed entirely of vegetative matter, except for the binding material.
- Bales can be bound by either wire, nylon, or polypropylene string placed horizontally. Jute and cotton binding may not be used. Baling wire should be at least 16 gauge. Nylon or polypropylene string should have a diameter of approximately 0.08 inches with a breaking strength of 80 lb.
- Wood or metal posts should be used as stakes. Posts for straw bale barriers must comply with Standard Specifications Section 16-2.03 – "Temporary High-visibility Fences."

Installation

- Place a single row of straw bales end to end and parallel with the slope contour. Do not allow any 20-foot section of straw bale barrier to vary by more than 5 percent from level.
- Place straw bales in a trench or key them into the slope. Place the bales such that the binding wire or string does not come in contact with the soil. Use wood or metal posts as stakes.
- Secure each straw bale with two posts. The first post in each bale must be driven toward the previously laid bale to force the bales together. Drive the posts into the soil such that the top of the post is less than 2 inches above the top of the straw bale. The post must extend a minimum of 2 feet in the ground below the bottom of the straw bales.
- Angle the last 6 feet upslope at the downhill end of the run.
- See page 4 of this Fact Sheet for installation detail.

Other Considerations

- Construct straw bale barriers with a setback of at least 3 feet from the toe of a slope. Where it is determined to be not practical due to specific site conditions, the straw bale barrier may be constructed at the toe of the slope but be constructed as far from slope the toe as practical.
- This BMP may be implemented on a project-by-project basis in addition to other BMPs when determined necessary and feasible by the Resident Engineer (RE).
- Straw bale barriers may be used in combination with a silt fence (see SC-2 – "Temporary Silt Fence") for additional sediment control.

Maintenance and Inspection

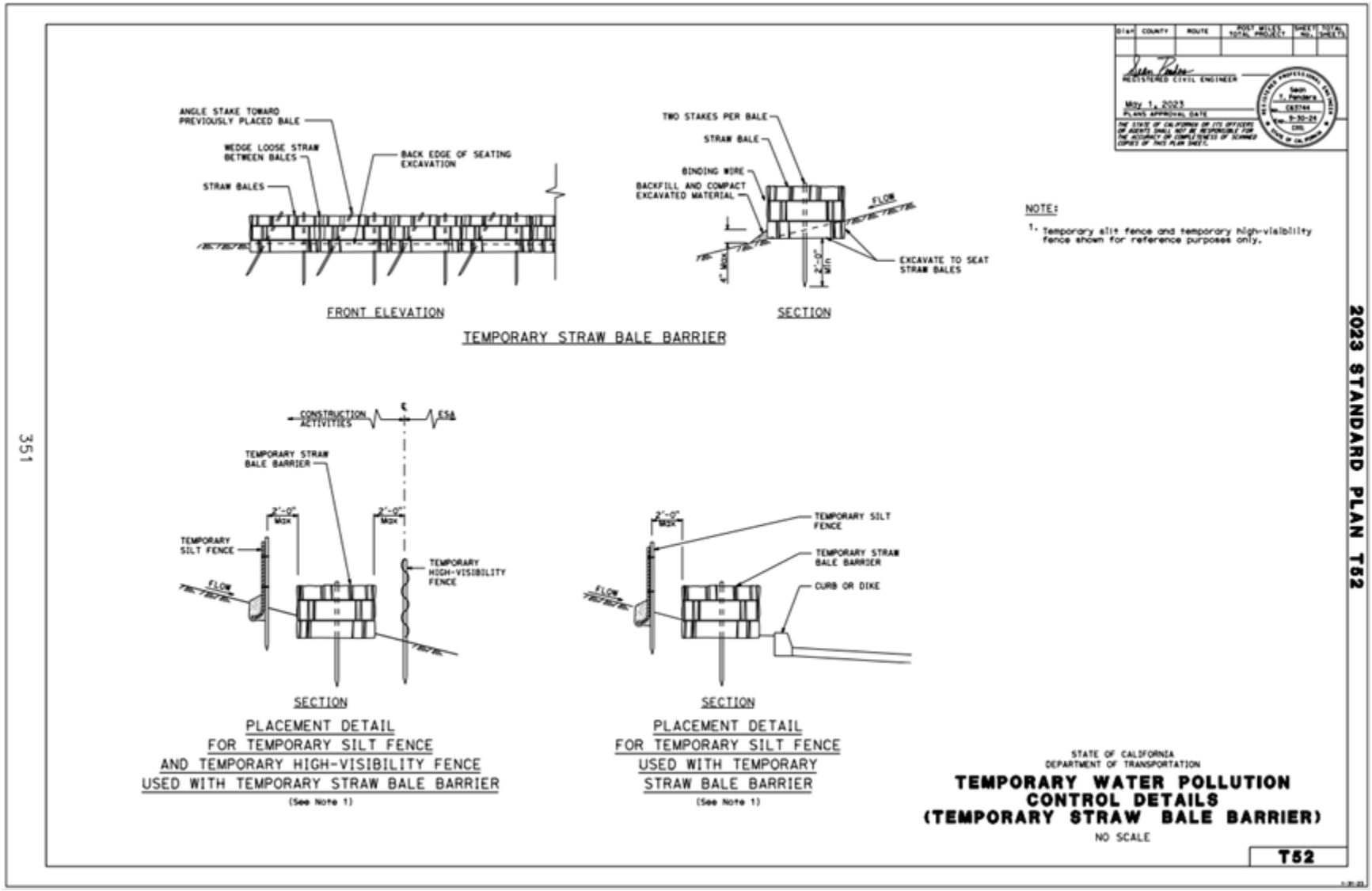
- At a minimum, BMPs must be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect straw bale barriers for sediment accumulations and remove sediment when depth reaches one-third the barrier height. Removed sediment should be disposed outside the highway right-of-way in conformance with the Standard Specifications.
- Replace or repair damaged bales as needed or as directed by the RE.
- Repair washouts or other damages as needed or as directed by the RE.
- Remove straw bales when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilized the area.

SWPPP or WPCP

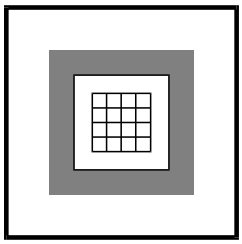
Straw bale barriers must be discussed in Section 600.1.3 of the SWPPP or Section 30.2.2 of the WPCP. Straw bale barrier placement must be shown on the WPCDs and reflect current site conditions.

Temporary Straw Bale Barrier

SC-9



Temporary Drainage Inlet Protection



Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☑
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Temporary drainage inlet protection consists of devices used at storm drain inlets that detain and/or filter sediment-laden runoff prior to discharge into storm drainage systems. This is achieved by allowing sediment to settle, and/or filtering sediment upstream of a linear sediment barrier.

Appropriate Applications

- Where ponding will not encroach into highway traffic.
- Where sediment-laden surface runoff may enter an inlet.
- Where disturbed drainage areas have not yet been permanently stabilized.
- Where the drainage area is 1 acre or less.
- Can be used year-round.

Limitations

- Requires an adequate area for water to pond without encroaching upon traveled way; it should not present an obstacle to oncoming traffic.
- May require other methods of temporary protection to prevent sediment-laden stormwater and non-stormwater discharges from entering the storm drain system.
- 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, such as SC-4 – “Temporary Check Dams,” in conjunction with temporary drainage inlet protection.
- Frequent maintenance is required.

- Silt fence inlet protection is appropriate in open areas that are subject to sheet flow and for flows not exceeding 0.5 cubic feet per second (cfs).
- Gravel bag barriers for inlet protection are applicable when sheet flows or concentrated flows exceed 0.5 cfs and it is necessary to allow overtopping to prevent flooding.
- Fiber rolls and foam barriers are not appropriate for locations where they cannot be properly anchored to the surface.
- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected and overflow capability is needed.
- For drainage areas larger than 1 acre, runoff should be routed to a sediment trapping device designed for larger flows. See BMPs SC-2, “Sediment/Desilting Basin” and SC-3, “Sediment Trap/Curb Cutback.”

Standards and Specifications

General Requirements

- Refer to Standard Specifications Section 13-6.03C for “Temporary Drainage Inlet Protection” and 13-6.03F for “Rigid Plastic Barriers.”
- 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 or combination of methods to use. Update inlet protection as site conditions change.
- Use a linear sediment barrier to redirect runoff and control ponding to prevent ponding from encroaching on the traveled way or overtopping the curb or dike.
- Prior to installation, clear the area around each inlet of obstructions, including rocks, clods, and debris greater than 1 inch in diameter.
- Install linear sediment barriers upstream of the inlet and parallel with the curb, dike, or flow line to keep sediment from entering the inlet.
- Remove accumulated sediment according to maintenance and inspection recommendations. Accumulated sediment may be disposed outside the highway right-of-way in conformance with Standard Specifications Section 14-10.

Type 1 – Silt Fence

- This method should be used for drain inlets that require protection in areas where finished grade is established and erosion control seeding has been applied or is pending. The silt fence (Type 1) protection is illustrated on page 6. 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.

Type 2 – Excavated Drop Inlet Sediment Trap

- This method may be used for drainage inlets that require protection in areas that have been cleared and grubbed, and where exposed soil areas are subject to grading. The excavated drop inlet sediment trap (Type 2) is illustrated on page 7. Construction is similar to a temporary silt fence; see BMP SC-1, “Temporary Silt Fence.” Size the excavated trap to provide a minimum storage capacity calculated at the rate of 67 cubic yards per acre of drainage area.

Type 3A – Gravel Bag Berm for Combined Inlets

- This method may be used for drain inlets surrounded by asphalt concrete (AC) or paved surfaces. The gravel-bag berm for combined inlets (Type 3A) is illustrated on pages 8-9. Flow from a severe storm must not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with BMP SC-6, "Temporary Gravel Bag/Earthen Berm." Gravel bags are used due to their high permeability.

Type 3B – Gravel Bag Berm for Grate Inlets

- This method may be used for drainage inlets surrounded by AC or paved surfaces. The gravel bag berm for grate inlets (Type 3B) is illustrated on page 10. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Place gravel bags in accordance with BMP SC-6, "Temporary Gravel Temporary Bag/Earthen Berm." Gravel bags are used due to their high permeability.

Type 4A – Flexible Sediment Barrier for Grate Inlets

- This method may be used for drainage inlets that require protection in areas that have been cleared and grubbed, and where exposed soil areas are subject to grading. Flexible sediment barrier for grate inlets (Type 4A) is placed around the inlet and keyed and anchored to the surface. They are intended for use as inlet protection where the area around the inlet is unpaved and the foam barrier or fiber roll can be secured to the surface. Place fiber rolls over the erosion control blanket. Resident Engineer (RE) or appropriate licensed professional approval is required.

Type 4B – Flexible Sediment Barrier for Combined Inlets

- This method may be used for drainage inlets that require protection in areas that have been cleared and grubbed, and where exposed soil areas are subject to grading. Flexible sediment barrier for combined inlets (Type 4B) is placed in rows upstream of the inlet and along the curb or dike. The barriers are keyed and anchored to the surface. They are intended for use as inlet protection where the area around the inlet is unpaved and the foam barrier or fiber roll can be secured to the surface. Place the barrier to provide a tight joint with the curb or dike. Cut the cover fabric or jacket to ensure a tight fit. RE approval is required.

Type 5 – Sediment Filter Bag

- This method may be used in areas with vehicle and equipment traffic that could damage aboveground inlet protection devices. To install the sediment filter bags, (1) remove the drainage inlet grate, (2) place the sediment filter bag in the opening, and (3) replace the grate to secure the sediment filter bag in place.

Type 6A – Catch Basin with Grate

- Catch basin with grate (Type 6A) is shown on page 16. Cover grate inlet with rigid plastic barrier and secure on each end with gravel-filled bags. If using a rigid sediment barrier and the grated inlet does not have a curb opening, placed the barrier using a gasket to prevent runoff from flowing under the barrier. Secure the barrier to the pavement with nails and adhesive, gavel-filled bags, or a combination of both.

Type 6B – Curb Inlet without Grate

- Curb Inlet without Grate (Type 6B). Place the flexible sediment barrier across the curb inlet opening and secure with gravel-filled bags.

Maintenance and Inspection

General Requirements

- Inspect all drainage inlet protection devices before and after every rainfall event and weekly year-round. During extended rainfall events, inspect inlet protection devices at least once every 24 hours.
- Inspect the storm drain inlet after severe storms to check for bypassed material.
- Remove all drainage inlet protection devices within 30 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 and re-grade area around the inlet and clean the inside of the storm drain inlet, as it must be free of sediment and debris at the time of final inspection.

Type 1 – Filter Fabric Fence

- Make sure the stakes are securely driven in the ground and are structurally sound (i.e., not bent, cracked, or splintered and are reasonably perpendicular to the ground). Replace damaged stakes.
- Replace or clean the fabric when it becomes clogged with sediment. Make sure the fabric does not have any holes or tears. Repair or replace fabric as needed or as directed by the RE.
- At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height.

Type 2 – Excavated Drop Inlet Sediment Trap

- Remove sediment from basin when its volume has been reduced by one-half.

Type 3A – Gravel-bag Berm for Combined Inlets

- Inspect bags for holes, gashes, and snags.
- Check gravel bags for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier.

Type 3B – Gravel-bag Berm for Grate Inlets

- Inspect bags for holes, gashes, and snags.
- Check gravel bags for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier.

Type 4A – Flexible Sediment Barrier for Grate Inlets

- Check flexible sediment barrier for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier.

Type 4B – Flexible Sediment Barrier for Combined Inlets

- Check flexible sediment barrier for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier.

Type 5 – Sediment Filter Bag

- Change sediment filter bag carefully, ensuring captured sediment does not spill into the drainage inlet.

Type 6A – Catch Basin with Grate

- Check barrier and gravel-filled bags for proper arrangement and displacement. Routinely remove accumulated sediment.

Type 6B – Curb Inlet without Grate

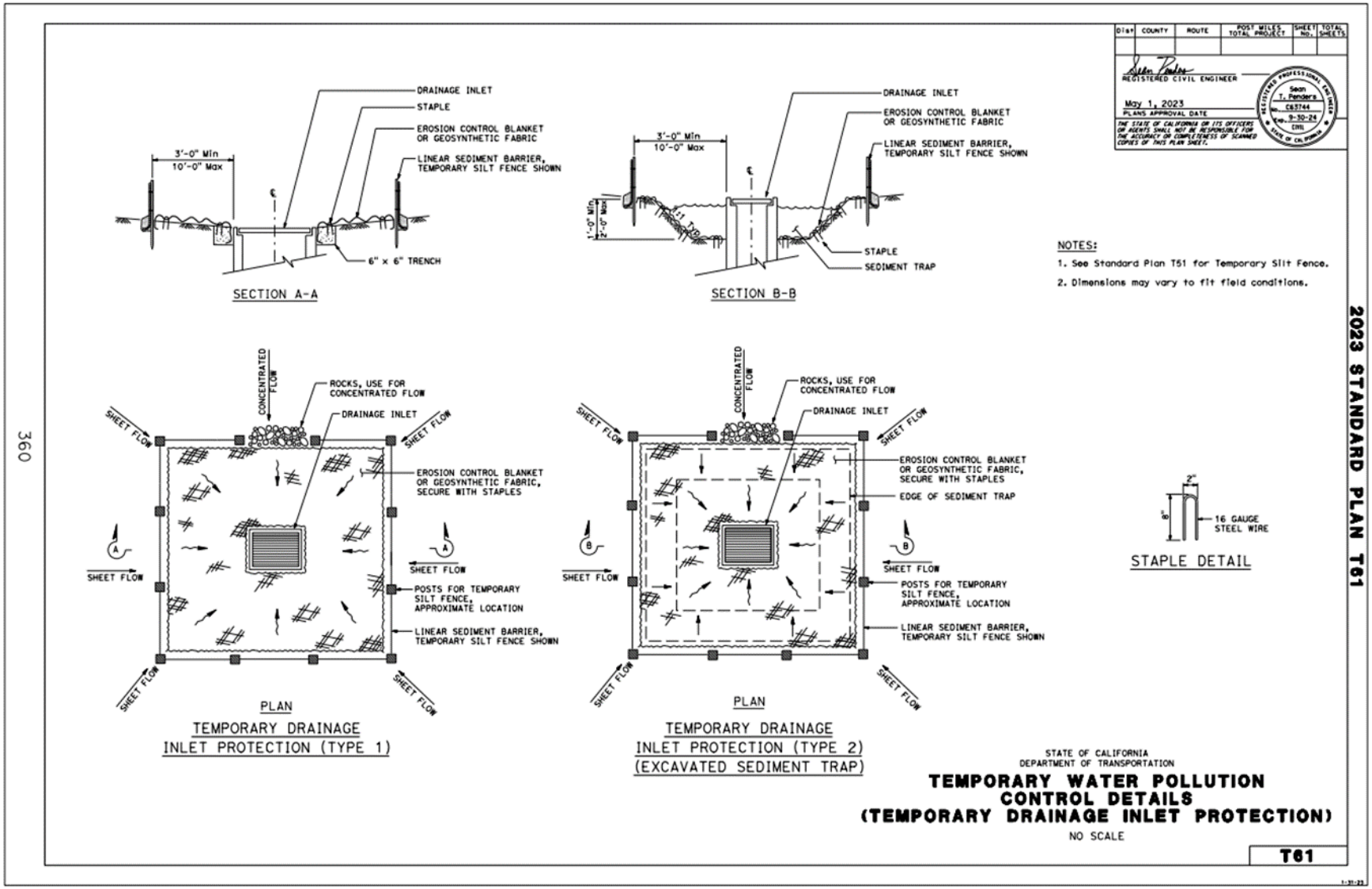
- Check barrier and gravel-filled bags for proper arrangement and displacement.
- Remove the sediment behind the barrier when it reaches one-third the height of the barrier.

SWPPP or WPCP

- Temporary drainage inlet protection must be discussed in Section 600.1.3 of the SWPPP or Section 30.2.2 of the WPCP. Temporary drainage inlet protection placement type must be shown on the WPCDs and reflect site conditions.

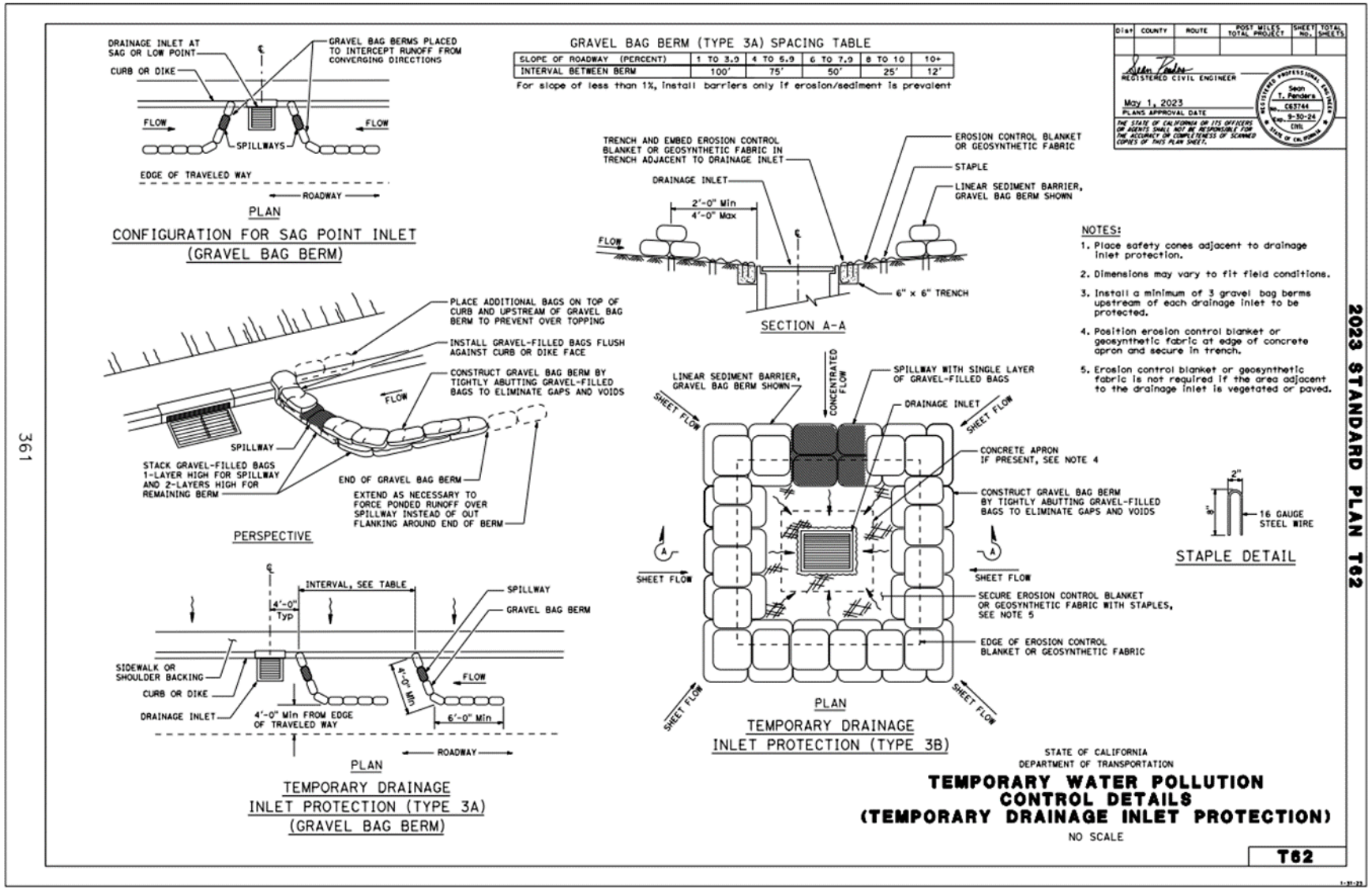
Temporary Drainage Inlet Protection

SC-10



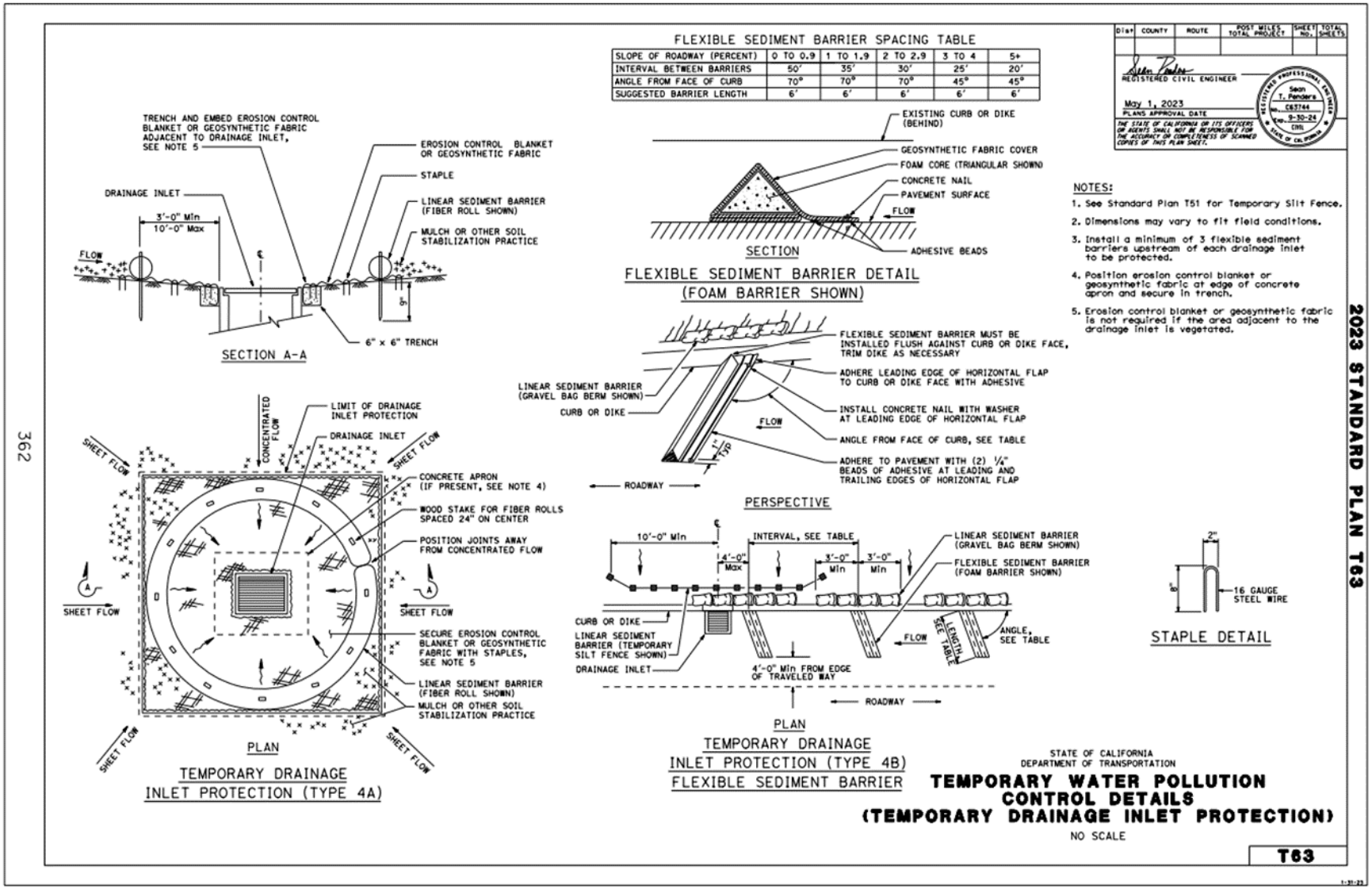
Temporary Drainage Inlet Protection

SC-10



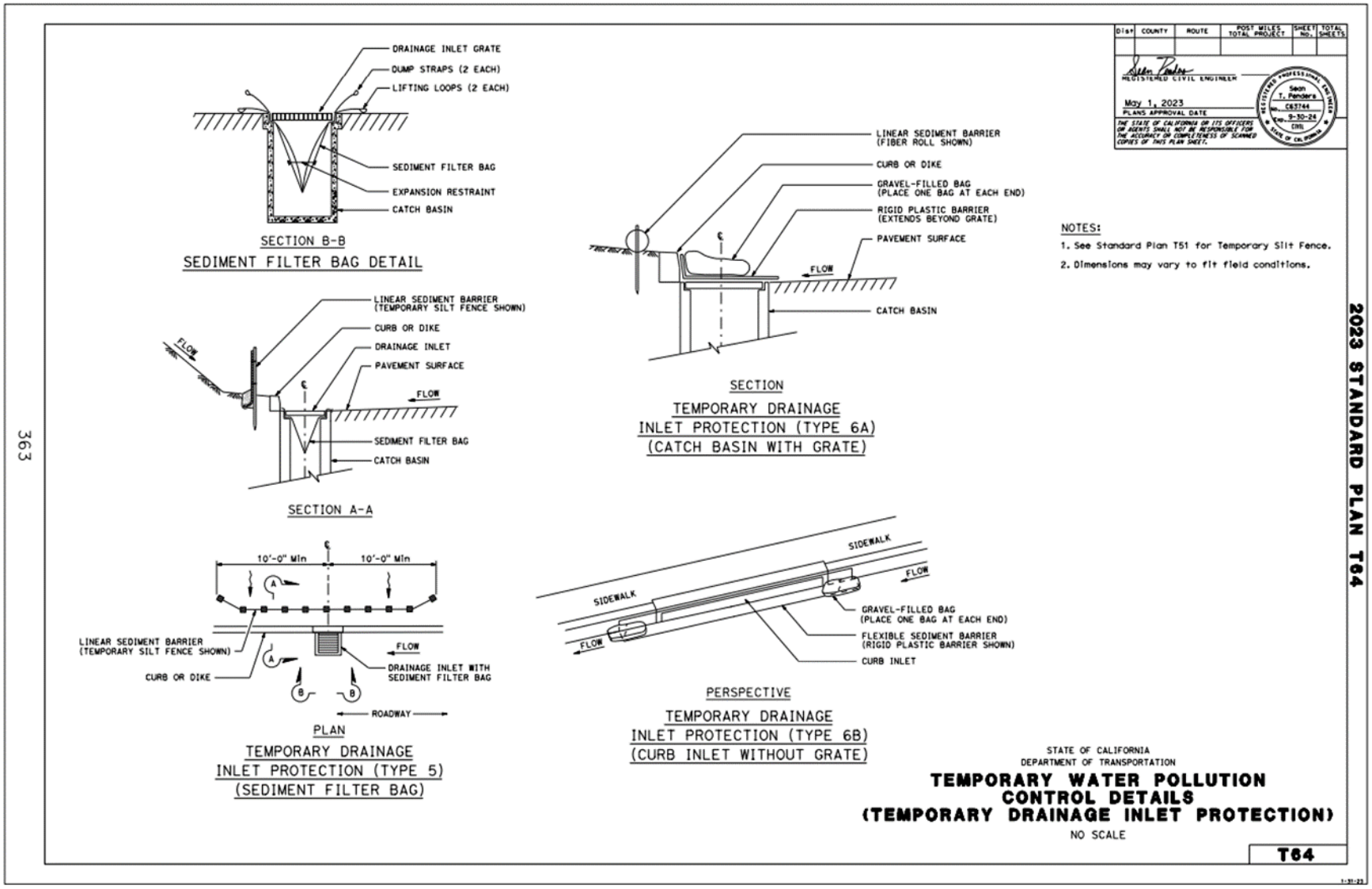
Temporary Drainage Inlet Protection

SC-10



Temporary Drainage Inlet Protection

SC-10



Temporary Compost Stocks

//////CS///////

Standard Symbol

BMP Objectives	
Soil Stabilization	☑
Sediment Control	☑
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Temporary compost socks are a mesh sock that contains compost that acts as three-dimensional, biodegradable structures that intercept and filter sheet flow. Compost socks can filter runoff, retain sediment, and reduce sheet flow velocities. Compost socks may be used as either a temporary or permanent sediment control measure.

Appropriate Applications

- As both temporary and permanent sediment controls.
- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- Along the perimeter of a project.
- As check dams in unlined ditches.
- Downslope of exposed soil areas.
- At operational storm drains as a form of inlet protection.
- Around temporary stockpiles.

Limitations

- Compost can potentially leach nutrients into runoff and negatively affect water quality. Compost should not be used directly upstream from a nutrient-impaired water body.
- Compost socks are susceptible to damage by traffic. Compost socks may be used around heavy machinery, but frequent disturbance decreases sock performance.

Temporary Compost Stocks

SC-11

Standards and Specifications

General Requirements

- Compost socks must comply with Standard Specifications 13-10.03J, 21-2.02Q and 21-2.03Q.
- Compost for compost socks must comply with Standard Specifications Section 21-2.01D(2) and 21-2.02K.
- Compost sock installation is illustrated in Standard Plan H51.
- Compost socks consist of a 12-inch-diameter mesh tube filled with compost. The mesh tube must be composed of a natural biodegradable product, such as cotton, jute, sisal, burlap, or coir. The mesh tube must be clean, evenly woven, and free of encrusted concrete or other contaminating materials, cuts, tears, broken or missing yarns, and thin, open, or weak places.
- Compost socks must have a functional longevity of 1 year.

Installation

- Before installing a compost sock, remove obstructions from the ground, including rocks, clods, and debris greater than 1 inch in diameter.
- For any 20-foot section of compost sock, prevent the compost sock from varying more than 5 percent from level.
- Use the following spacing unless otherwise noted on the project plans or special provisions:
  - 10 feet apart for slopes steeper than 2:1 (H:V)
  - 15 feet apart for slopes from 2:1 to 4:1 (H:V)
  - 20 feet apart for slopes from 4:1 to 10:1 (H:V)
  - 50 feet apart for slopes flatter than 10:1 (H:V)
- Place mesh tube, secure the end, and fill uniformly with compost. Secure the remaining end.
- For Type 1 installations:
  - Place in a furrow that is from 2 to 4 inches deep.
  - Fasten with wood stakes every 4 feet along the length of the compost sock.
  - Fasten the ends of the compost sock by placing a stake 6 inches from its end.
  - Drive the stakes into the soil so the stake top is less than 2 inches above the top of the compost sock.
- For Type 2 installations:
  - Fasten with notched wood stakes and rope.

  - Drive stakes into the soil until the notch is even with the top of the compost sock.
  - Lace the rope between stakes and over the compost sock. Knot the rope at each stake.
  - Tighten the fiber roll to the surface of the slope by driving the stakes further into the soil.
- If more than one compost sock is placed in a row, the socks should overlap, not abut. Stagger overlapping joints in adjacent rows by 5 to 10 feet.

Removal

- For permanent installations: do not remove compost socks. Compost socks will degrade over time.
- For temporary installations: remove sock, rope, and stakes if ordered by the Resident Engineer. Cut sock and empty contents in place.

Other Considerations

- Compost may be pre-seeded before placement into the mesh tube to assist in establishing vegetation. Once established, vegetation root systems provide additional soil stability and runoff filtration.
- Permanent compost sock applications are particularly advantageous below embankments, especially adjacent streams, by limiting re-entry and disturbance to sensitive areas.
- Organic material in compost is important for pollutant removal and vegetation establishment. Organic content of the compost should range from 30 to 65 percent, depending on site conditions.

Maintenance and Inspection

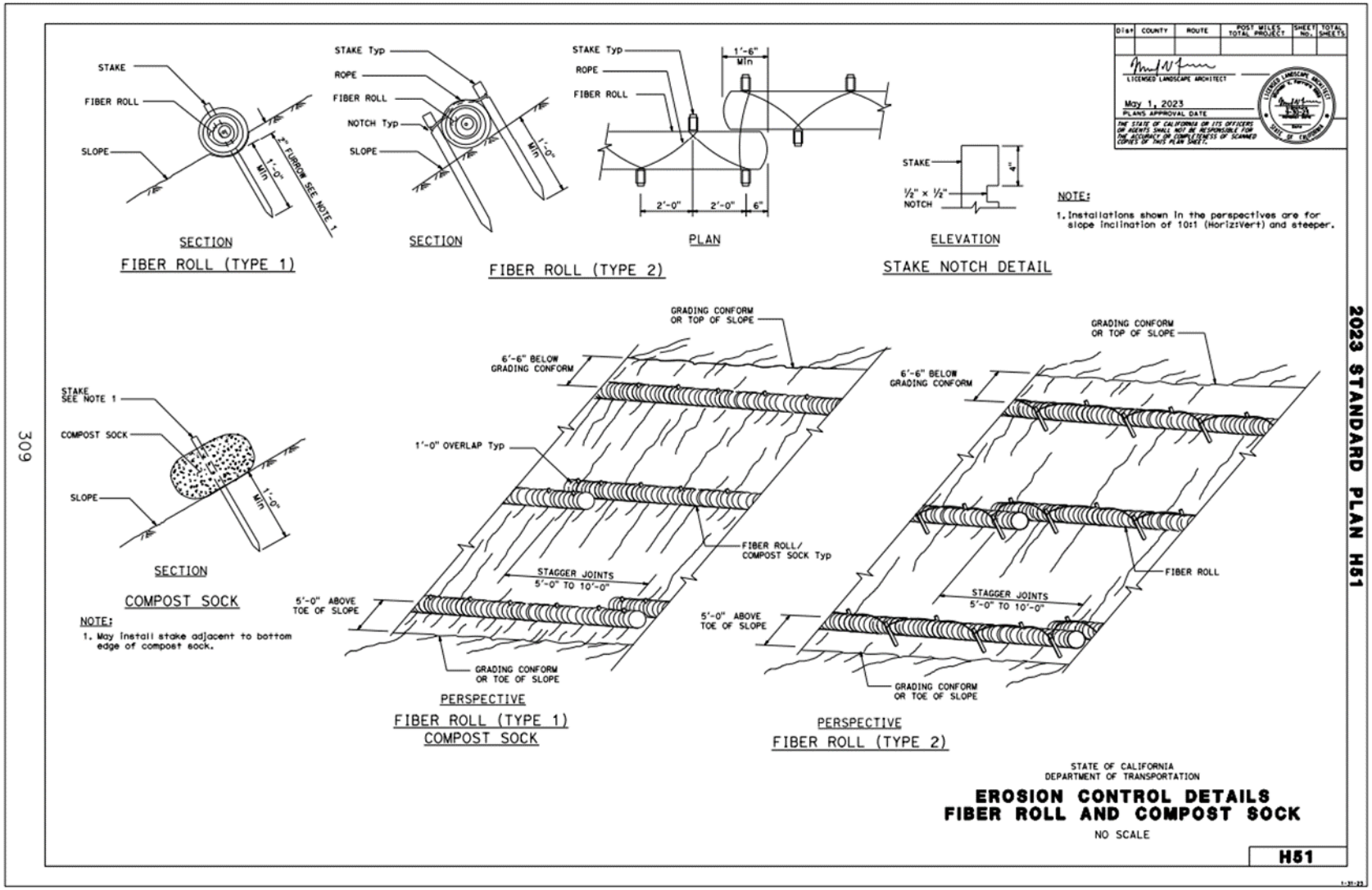
- Inspect compost socks before and after each rainfall event, and weekly year-round.
- Remove sediment from behind the compost sock if sediment is 1/3 of compost sock height above ground.
- Repair or adjust the compost sock if rills or other evidence of concentrated runoff occur beneath the sock.
- Repair or replace compost socks if they become split, torn, or unraveled.
- Add stakes if the compost sock slumps or sags.
- Replace broken or split wood stakes.
- Maintain compost socks to provide an adequate sediment-holding capacity and runoff velocity reduction.

SWPPP or WPCP

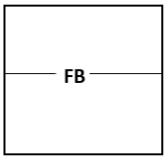
- Compost socks must be discussed in Section 600.1.3 of the SWPPP or Section 30.2.2 of the WPCP.

Temporary Compost Stocks

SC-11



Temporary Foam Barrier



Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☑
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Temporary foam barriers are one type of flexible sediment barriers. They are synthetic alternatives to fiber rolls, compost socks, and straw bale barriers and consist of a geosynthetic fabric with a urethane foam-filled core and a fabric apron that helps prevent undermining and scour. These synthetic linear sediment barriers are generally more robust sediment controls than standard fiber rolls and may be appropriate for continuous use in stormwater collection areas.

Appropriate Applications

- Along the perimeter of a project.
- As check dams in ditches, channels, or other stormwater collection areas.
- Down-slope of exposed soil areas.
- At operational storm drains as a form of inlet protection.
- Around temporary stockpiles.
- On either paved surfaces or soil.
- As a linear sediment control for SC-10, “Temporary Drain Inlet Protection.”

Limitations

- Frequent maintenance is required if sediment-laden discharges are upstream of the BMP to maintain operability.

Temporary Foam Barrier

SC-12

Standards and Specifications

General Requirements

- Temporary foam barriers must comply with Standard Specifications Sections 13-10.02I and 13-10.03H.
- Temporary foam barriers consist of:
  - A urethane foam-filled core.
  - Geosynthetic fabric cover and flap.
  - Triangular, circular, or square cross section.
  - Vertical height of at least 5 inches after installation.
  - Horizontal flap at least 8 inches in width.
  - Length of at least 4 feet per unit.
  - Ability to interlock separate units into a long barrier such that water will not flow between units.
- Geosynthetic fabric for temporary foam barriers covers must have:
  - Minimum grab break load of 200 pounds, per ASTM D4632.
  - Minimum apparent elongation of 15 percent, per ASTM D4632.
  - Average water flow rate of 100 to 150 gallons per minute per square foot, per ASTM D4491.
  - Minimum permittivity of 0.05 1/sec, per ASTM D4491.
  - Maximum apparent opening size of the 40 U.S. standard sieve size, per ASTM D4751.
  - Minimum ultraviolet radiation resistance of 70% retained grab breaking load at 500 hours of exposure, per ASTM D4355.
- Submit a Certificate of Compliance for flexible sediment barriers.

Installation

- Remove obstructions from the ground, including rocks, clods, and debris greater than 1 inch in diameter.
- Secure temporary foam barriers to pavement with either:
  - 1-inch concrete nails, 1-inch washers, and solvent-free adhesive
  - Gravel-filled bags
  - A combination of both of the above methods
- Secure temporary foam barriers to soil with 6-inch nails and 1-inch washers.
- Secure connection points of two adjacent sections of temporary foam barriers with two nails.
- Do not pierce the foam core of the barrier with nails.

Temporary Foam Barrier

SC-12

Maintenance and Inspection

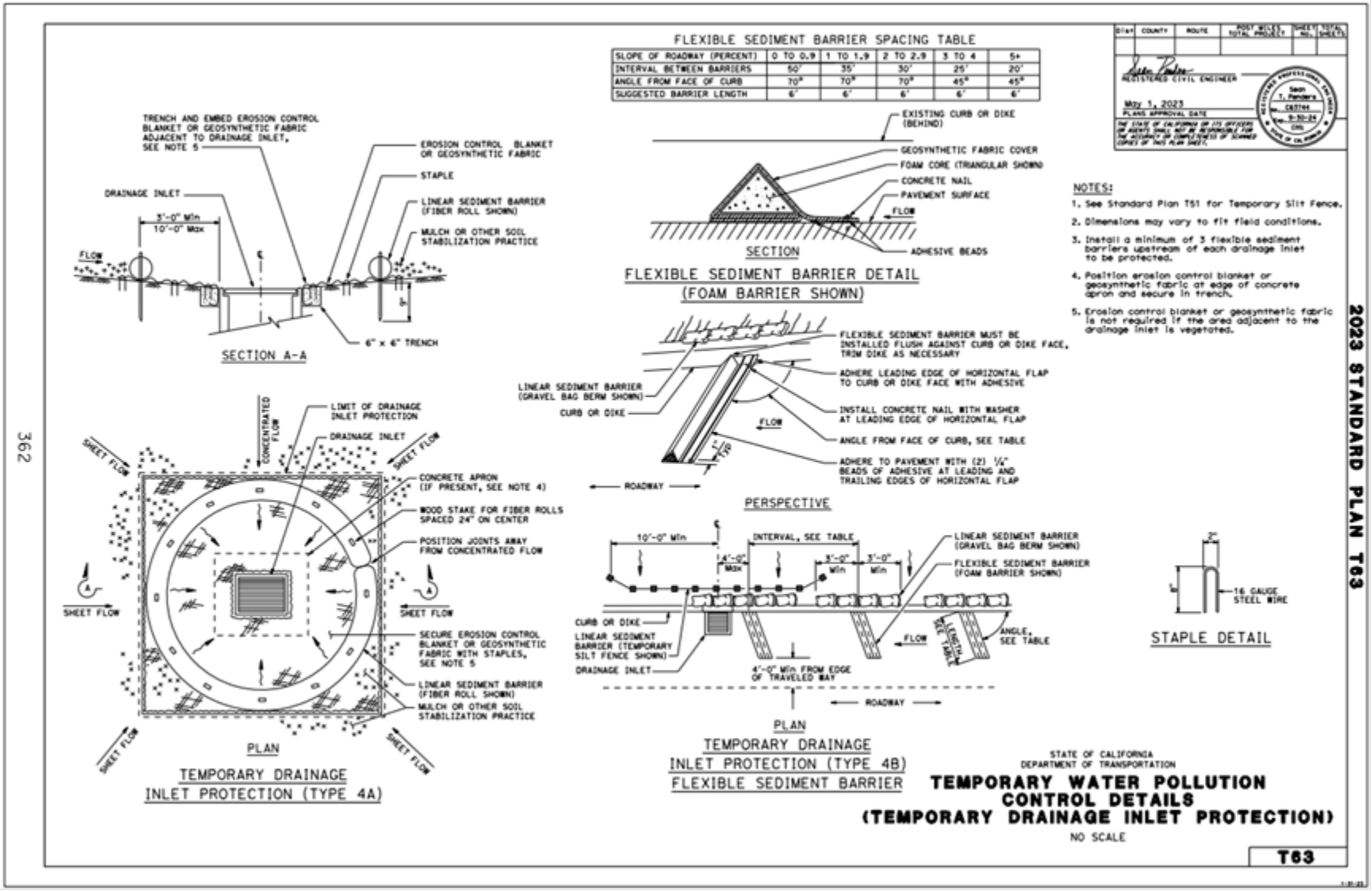
- Inspect temporary foam barriers before and after each rainfall event, and weekly year-round.
- Maintain temporary foam barriers to provide sediment-holding capacity and to reduce concentrated flow velocities.
- Repair or adjust the temporary foam barriers if rills or other evidence of concentrated runoff occur beneath it.
- Repair or replace split, torn, or unraveled material. Add or replace posts, stakes, or fasteners as needed to prevent sagging or slumping.
- Reattach any temporary foam barriers that detach from the pavement.
- Remove sediment deposits if the sediment exceeds 1/3 of the height above the ground behind a foam barrier.
- Remove all flexible sediment barriers once construction is complete.

SWPPP or WPCP

- Flexible sediment barriers, such as temporary foam, must be discussed in Section 600.1.3 of the SWPPP or Section 30.2.2 of the WPCP.

Temporary Foam Barrier

SC-12



Section 5
Wind Erosion Control BMP

5.1 Wind Erosion Control

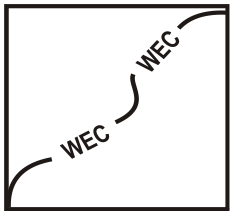
Wind erosion control consists of applying water or other dust palliatives as necessary to prevent or alleviate dust nuisance. Wind erosion control BMPs are shown in Table 5-1.

Table 5-1. Wind Erosion Control BMPs

ID	BMP Name
WE-1	Wind Erosion Control

Other BMPs that are sometimes applied to DSAs to control wind erosion are BMPs SS-3 through SS-7, shown in Section 3 of this Manual; BMP TC-2, shown in Section 6; and BMP NS-7, shown in Section 7. The remainder of this section describes the working details for the wind erosion control BMP.

Wind Erosion Control



Standard Symbol

BMP Objectives	
Soil Stabilization	☑
Sediment Control	☑
Tracking Control	☐
Wind Erosion Control	☑
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

- Wind erosion control consists of applying water or other dust palliatives as necessary to prevent or alleviate erosion by the forces of wind. Dust control must be applied in accordance with Caltrans standard practices. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives; see SS-7 for “Temporary Cover and Rolled Erosion Control Products.”
- Must comply with local agencies, such as air quality management districts that require dust control plans or dust control permits, as well as any Clean Air Act requirements.

Appropriate Applications

This practice is generally implemented on all exposed soils subject to wind erosion.

Limitations

- Effectiveness depends on soil, temperature, humidity, and wind velocity.
- Chemically treated subgrades could cause soil to become water repellant, preventing infiltration or the long-term re-vegetation of the site.

Standards and Specifications

Standard Specification Section 10-5 contains general requirements for dust control.

- Effective dust control is accomplished by applying dust palliatives, temporary soil stabilization BMPs, and/or tracking controls, and by managing stockpiles.
- Dust palliatives are covered under Section 18 of the Standard Specifications. Acceptable dust palliatives include water, dust-control binders, and dust suppressants. Dust-control binders must comply with specifications for tackifier. Dust suppressants include petroleum-based organic

product, nonpetroleum-based organic product, hygroscopic product, and synthetic polymer emulsion.

- If a dust suppressant or tackifier is used, submit a Dust Treatment Plan. Submit a Certificate of Compliance for dust suppressants, tackifiers, and fibers.
- Identify and stabilize key access points with the use of tracking control BMPs.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Temporary soil stabilization BMPs, such as SS-3, “Temporary Hydraulic Mulch;” SS-4, “Temporary Hydroseed;” SS-5, and “Temporary Soil Binder” also provide wind erosion control benefits.
- Ensure proper implementation of BMPs WM-3, “Stockpile Management,” and SC-7, “Street Sweeping,” as these BMPs provide wind erosion control benefits.
- Ensure that water is applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles to ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- Chemical dust suppression products could have environmental water quality impacts. Depending on the product and the time of application, water quality sampling for non-visible pollutants should be assessed when a storm event is forecasted.
- Many products are available for chemical or petroleum-based organics stabilization. These products should not create any adverse effects on stormwater, plant life, or groundwater and should meet all applicable regulatory requirements, including inspection, documentation, monitoring, and reporting.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.
- If reclaimed water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the RWQCB requirements. Non-potable water must not be conveyed in tanks or drainpipes that will be used to convey potable water, and there must be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances must be marked “NON-POTABLE WATER - DO NOT DRINK.”
- Appendix B of this Manual includes additional information on selecting temporary soil stabilization products that could be used for wind erosion control.

Maintenance and Inspection

- Check areas daily for erosion and visible dust.
- Most water-based dust-control measures require frequent application. Obtain vendor or independent information on longevity of chemical dust suppression.

SWPPP or WPCP

- Wind erosion control must be discussed in Sections 300 and 600.1.5 of the SWPPP or Section 30.2.4 of the WPCP

Section 6
Tracking Control BMP

6.1 Tracking Control

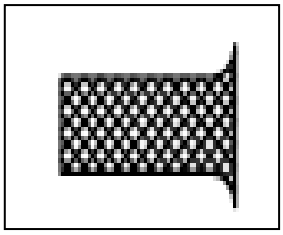
Tracking control consists of preventing or reducing vehicle tracking from entering a storm drain or watercourse. Tracking control BMPs are shown in Table 6-1.

Table 6-1. Tracking Control BMPs

ID	BMP Name
TC-1	Temporary Construction Entrance
TC-2	Temporary Construction Roadway
TC-3	Entrance/Outlet Tire Wash

The remainder of this section describes the working details for the tracking control BMPs.

Temporary Construction Entrance



Standard Symbol

BMP Objectives	
Soil Stabilization	☑
Sediment Control	☐
Tracking Control	☑
Wind Erosion Control	☑
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A temporary construction entrance is defined as a point of entrance to a construction site that is stabilized to reduce the tracking of mud and sediment onto public roads by construction vehicles.

Appropriate Applications

- Where dirt or mud can be tracked onto public roads.
- Adjacent to water bodies.
- Where poor soils are encountered.
- Where dust is a problem during dry weather conditions.

Limitations

- Site conditions will dictate design and need.
- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.

Standards and Specifications

General Requirements

- Temporary construction entrance must comply with Standard Specification Section 13-7.03 – “Temporary Construction Roadways and Entrances.”
- Corrugated steel panels must be pressed or shop welded. They should have a slot or hook for coupling the panels together.

- Class 8 RSP fabric shall be used to line a temporary construction entrance/exit. Do not drive on the fabric until the rock is spread. Repair damaged fabric by placing new fabric over the damaged area with at least an 18-inch overlap on all edges.
- Type A rock should be used for a Type 1 temporary construction entrance. Type A rock must comply with Section 13-7.03B (2) of the Standard Specifications.
- Type B rock should be used for a Type 2 temporary construction entrance. Type B rock must comply with Section 13-7.03B (2) of the Standard Specifications.
- Submit details for alternative construction entrances at least 5 business days before installation. This may include alternatives for the sump and corrugated steel panels or to eliminate the sump.

Installation

- Prepare the location for the temporary construction entrance/exit by:
  - Removing vegetation and clearing debris.
  - Grading the ground to a uniform plane.
  - Removing sharp objects that could damage the fabric.
  - Compacting the top 1.5 feet of soil to at least 90 percent relative compaction.
- Construct the temporary construction entrance by (standard plans attached below):
  - Placing the fabric along the length of the construction entrance/exit.
  - Overlapping fabric ends by at least 12 inches.
  - Covering the fabric with rock within 24 hours.
  - Spreading rock over the fabric in the direction of traffic.
  - Keeping a 6-inch layer of rock over the fabric to prevent damage from the spreading equipment.
- For a Type 2 temporary construction entrance, place rock under the corrugated steel panels. Use at least six corrugated steel panels for each entrance. Couple the panels together to prevent movement.
- If a sump is used, install it within 20 feet of the temporary construction entrance.

Other Considerations

- Implement BMP SC-7, “Street Sweeping” as required under Section 13-4.03F and 13-7 of the Standard Specifications.
- Require all employees, subcontractors, and suppliers to use the temporary construction entrance. If the construction entrance has metal plates as part of the BMP, all vehicles must be required to use them.
- Route runoff from temporary construction entrances through a sediment-trapping device before discharge.
- Design a temporary construction entrance to support the heaviest vehicles and equipment that will use it.

- The use of asphalt concrete grindings is not allowed (high potential for leaching hydrocarbons) unless it complies with the Caltrans SWMP. Designate combination or single purpose entrances and exits to the construction site to maintain smooth flow of traffic.

Maintenance and Inspection

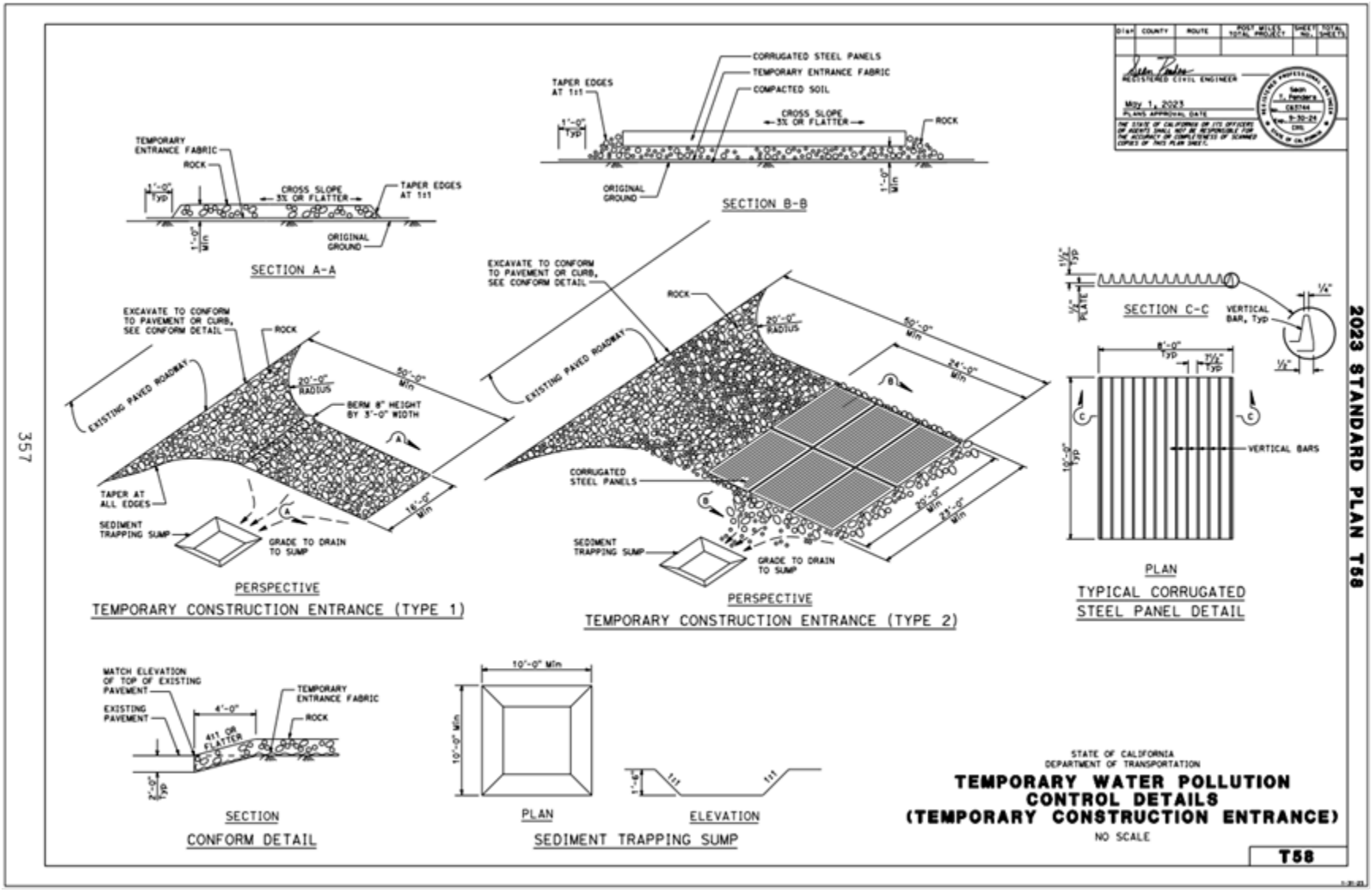
- Inspect before, during and after each rainfall event, and weekly year-round.
- Inspect immediate site access roads daily; implement SC-7, “Street Sweeping” as needed.
- Remove aggregate, separate it, and dispose of sediment if temporary construction entrance is clogged with sediment.
- Keep all temporary construction entrance ditches clear.

SWPPP or WPCP

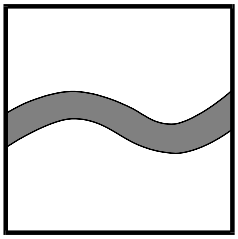
Tracking control BMPs are to be included and discussed in Section 600.1.4 for the SWPPP and Section 30.2.3 of the WPCP.

Temporary Construction Entrance

TC-1



Temporary Construction Roadway



Standard Symbol

BMP Objectives

Soil Stabilization	☑
Sediment Control	☐
Tracking Control	☑
Wind Erosion Control	☑
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A temporary construction roadway is a stabilized access road. It is designed to control dust and erosion created by vehicular tracking.

Appropriate Applications

- Use construction roadways and short-term detour roads:
  - Where mud tracking is a problem during wet weather.
  - Where dust is a problem during dry weather.
  - When road is adjacent to water bodies.
  - Where poor soils are encountered.
  - Where there are steep grades and additional traction is needed.

Limitations

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

Temporary Construction Roadway TC-2

Standards and Specifications

General Requirements

- Refer to Standard Specification Section 13-7.03 for temporary roadway standards.
- Class 10 RSP fabric must be used to line temporary construction roadways. Do not drive on the fabric until the rock is spread. Repair damaged fabric by placing new fabric over the damaged area with at least an 18-inch overlap on all edges.
- Type A or Type B rock may be used for temporary construction roadways. Type A and B rock must comply with Standard Specifications Section 13-7.03B(2). Coordinate materials with those used for stabilized construction entrances. Refer to TC-1, “Temporary Construction Entrance/Exit.”
- The use of cold mix asphalt, AC grindings, or blast furnace slag for stabilized construction roadways is not allowed (high potential to leach hydrocarbons) unless it complies with the Caltrans SWMP.

Installation

- Prepare the location for the temporary roadway by:
  - Removing vegetation and clear debris.
  - Grading the ground to a uniform plane.
  - Grading the ground surface to drain in a way that prevents runoff from leaving the construction site.
  - Removing sharp objects that could damage the fabric.
  - Compacting the top 1.5 feet of soil to at least 90 percent relative compaction.
- Construct the temporary construction roadway by (standard plans attached below):
  - Placing the fabric along the length of the roadway.
  - Overlapping fabric ends by at least 12 inches.
  - Covering the fabric with rock within 24 hours.
  - Spreading rock over the fabric in the direction of traffic.
  - Keeping a 6-inch layer of rock over the fabric to prevent damage from the spreading equipment.

Other Considerations

- Design stabilized access to support the heaviest vehicles and equipment that will use it.
- Implement TC-1, “Temporary Construction Entrance” and TC-3, “Entrance/Outlet Tire Wash” in combination with temporary construction roadway for maximum tracking control.

Maintenance and Inspection

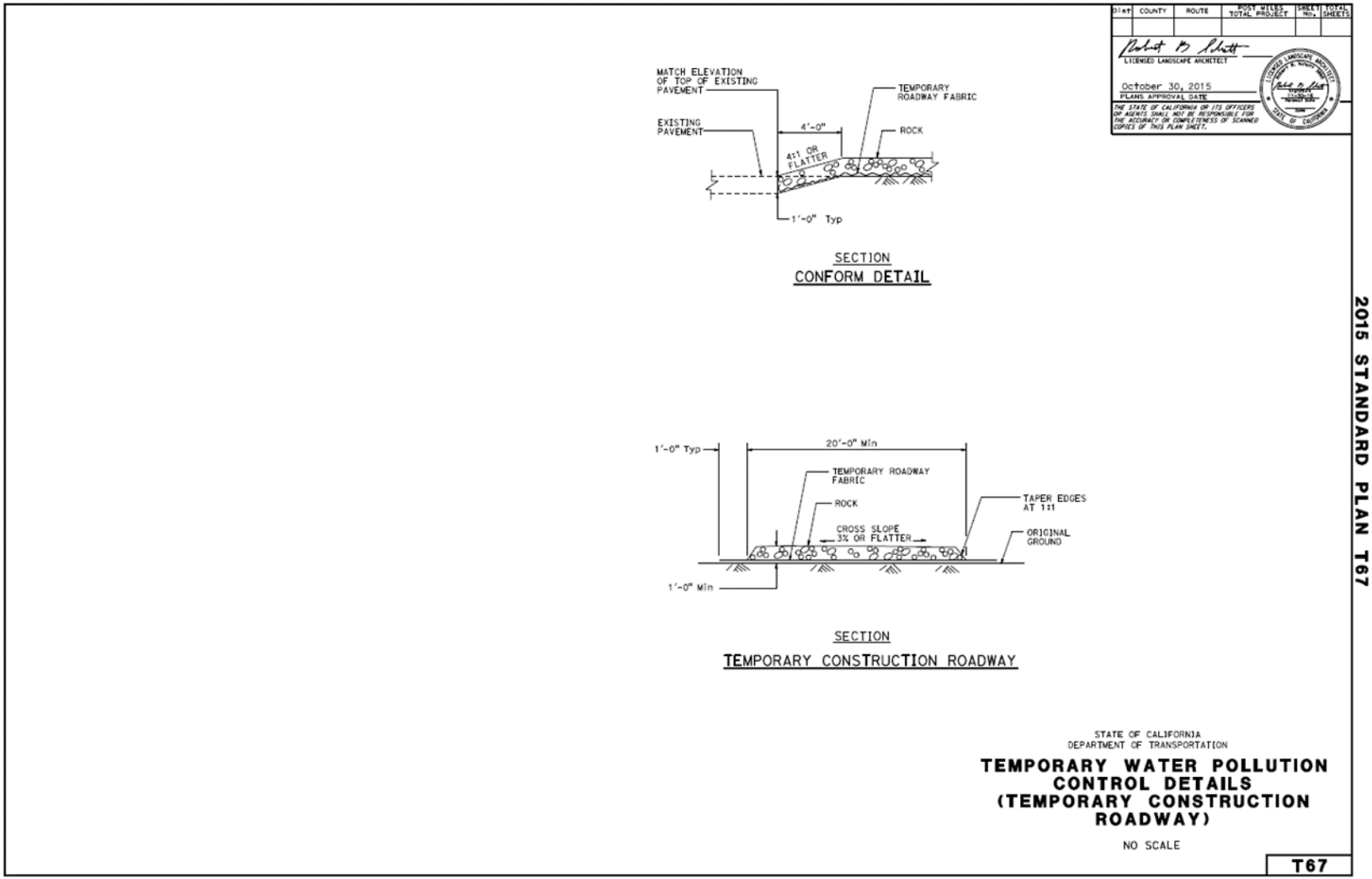
- Inspect before and after each rainfall event, and weekly year-round.
- Inspect immediate site access roads daily; implement SC-7, “Street Sweeping” as needed.
- Keep all temporary roadway ditches clear.
- When no longer required, remove stabilized construction roadway and re-grade and re-vegetate as necessary.

SWPPP or WPCP

Tracking control BMPs are to be included and discussed in Section 600.1.4 of the SWPPP, or Sections 30.2.3 and 30.2.4 of the WPCP.

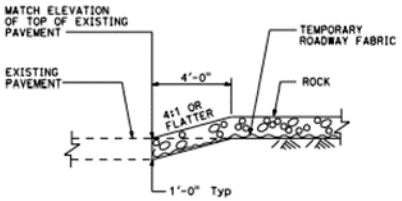
Temporary Construction Roadway

TC-2



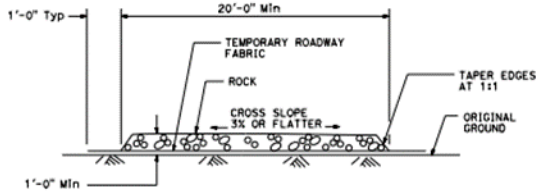
Temporary Construction Roadway

TC-2



SECTION

CONFORM DETAIL



SECTION

TEMPORARY CONSTRUCTION ROADWAY

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 1, 2023

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

Sean T. Penders C63744 9-30-24 CIVIL STATE OF CALIFORNIA

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2023 STANDARD PLAN T67

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

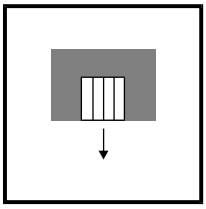
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY CONSTRUCTION ROADWAY)

NO SCALE

T67

1-31-23

Temporary Entrance/Outlet Tire Wash



Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☑
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A tire wash is an area located at stabilized construction access points to remove sediment from tires and undercarriages and to prevent sediment from being transported onto public roadways.

Appropriate Applications

- On construction sites where construction vehicles may track dirt and mud onto public roads.
- On a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer.

Limitations

- Requires a supply of wash water and way to collect or capture tire wash area runoff.
- Requires a turnout or doublewide exit to prevent entering vehicles from driving through the wash area.

Standards and Specifications

- Require all employees, subcontractors, and others that leave the site with mud-caked tires and/or undercarriages to use the wash facility.
- Incorporate with a temporary construction entrance/exit. See TC-1, “Temporary Construction Entrance.”
- Construct on level ground when possible, on a pad of Type A or Type B rock. Either Class 8 or 10 RSP fabric should be placed below the rock.
- Wash rack must be designed and constructed/manufactured for anticipated traffic loads.
- Vehicle wash water is non-stormwater that requires management and disposal. See NS-8, “Vehicle and Equipment Cleaning.”

- Provide a drainage ditch that will convey the runoff from the wash area to a sediment trapping device or similar device. The drainage ditch should be of sufficient grade, width, and depth to carry the wash runoff.
- Implement BMP SC-7, “Street Sweeping” as needed.
- Refer to TC-1, “Temporary Construction Entrance” for details regarding design and installation of construction entrances and exits to the project site.

Maintenance and Inspection

- Inspect before rain events, daily during extended rain events, after each rain event, and weekly year-round.
- Inspect immediate site access roads daily; implement SC-7, “Street Sweeping” as needed.
- Remove accumulated sediment in wash rack and/or sediment trap to maintain system capacity and performance.
- Inspect routinely for damage and repair as needed. Document non-stormwater (sediment trapping device or similar device) in appropriate inspection form.

SWPPP or WPCP

- Temporary Entrance/Outlet Tire Wash is to be included and discussed in Section 600.1.4 of the SWPPP or Section 30.2.3 of the WPCP.

Section 7

Non-Stormwater Management BMP

7.1 Non-Stormwater Management

Non-stormwater management BMPs are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with stormwater. These practices involve day-to-day operations of the construction site and are usually under the control of the Contractor. These BMPs are also referred to as "good housekeeping practices," which involve keeping a clean, orderly construction site.

Table 7-1 lists the non-stormwater management BMPs. It is important to note that all these BMPs have been authorized by Caltrans for statewide use, and they must be implemented depending on the conditions/applicability of deployment described as part of the BMP.

Table 7-1. Non-Stormwater Management BMPs

ID	BMP Name
NS-1	Water Conservation Practices
NS-2	Dewatering
NS-3	Paving, Sealing, Saw Cutting, Grooving and Grinding Activities
NS-4	Temporary Stream Crossing
NS-5	Temporary Creek Diversion Systems
NS-6	Illegal Connection and Illicit Discharge Detection and Reporting
NS-7	Potable Water/Irrigation
NS-8	Vehicle and Equipment Cleaning
NS-9	Vehicle and Equipment Fueling
NS-10	Vehicle and Equipment Maintenance
NS-11	Pile Driving
NS-12	Concrete Curing
NS-13	Material and Equipment Use Over Water
NS-14	Concrete Finishing
NS-15	Structure Removal Over or Adjacent to Water

The remainder of this section describes the working details for each of the non-stormwater management BMPs.

Water Conservation Practices

Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☑
Materials and Waste Management	☐

Definition and Purpose

Water conservation practices are construction methods that minimize the use of water on site or use water in a manner that avoids causing runoff, erosion, and/or the discharge of pollutants to the storm drain system or receiving waters. Proper use of this BMP reduces or prevents non-stormwater discharges.

Appropriate Applications

Water conservation practices are implemented on all construction sites wherever water is used.

Limitations

- If not implemented correctly, discharges may trigger reporting and monitoring requirements and delay construction work.

Standards and Specifications

- Keep water equipment in good working condition.
- Ensure tracking controls are implemented in, near, and around water truck filling areas.
- Repair water leaks promptly.
- Authorization is required for activities that could potentially discharge water into a storm drain system or receiving waters.
- Avoid using water to clean construction areas. Do not wash paved areas with water. Paved areas and roadways should be swept and vacuumed in accordance with SC-7, “Street Sweeping.”
- Apply water for dust control in accordance with Standard Specifications Section 10-4 – Water Usage and BMP WE-1, “Wind Erosion Control.”

- Direct construction water runoff to areas where it can infiltrate into the ground or be collected and reused.
- Manage run-on to minimize contact with job site.
- Retain water spilled while filling water trucks within the designated water truck filling areas. Prevent tracking from water trucks and other equipment.
- Report discharges to the Resident Engineer immediately.

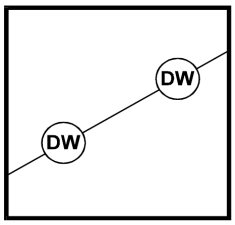
Maintenance and Inspection

- Inspect water equipment areas at least weekly, prior to a forecasted rain event, daily during extended rain events, and post storm events.
- Inspect non-stormwater BMPs daily when non-stormwater operations are ongoing.
- Repair water equipment as needed.

SWPPP or WPCP

Water Conservation Practices must be discussed in Section 600.1.4 of the SWPPP or Section 30.3.1 of the WPCP.

Dewatering



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☑
Materials and Waste Management	☐

Definition and Purpose

Dewatering is a practice that manages the discharge of pollutants when non-stormwater and accumulated precipitation (stormwater) must be removed from a work location so that construction work may be accomplished.

Appropriate Applications

- For collection and discharge of non-stormwater and stormwater (accumulated rainwater) from excavations or temporary containment facilities. Non-stormwater includes, but is not limited to, groundwater, dewatering of piles, water from cofferdams, water diversions, and water used during construction activities that must be removed from a work area.
- To manage the removal of accumulated precipitation (stormwater) from depressed areas at a construction site.
- Stormwater mixed with non-stormwater should be managed as non-stormwater.

Limitations

- Dewatering operations for non-stormwater will require, and must comply with, applicable local permits, project-specific permits, and regulations.
- Site conditions will dictate design and use of dewatering operations.
- Avoid dewatering discharges where possible via infiltration, reusing the water for dust control, etc.
- If the dewatering discharge is not subject to a regional permit and it is absent of pollutants in quantities that threaten to cause pollution or a nuisance, dewatering under Attachment J of the CGP can be used.

Dewatering

NS-2

Standards and Specifications

General Requirements

- Dewatering shall be conducted in accordance with the Caltrans "Field Guide to Construction Site Dewatering Manual" and Standard Specifications Section 13-4.03G.
- A dewatering and discharge work plan shall be submitted at least 15 days before the start of dewatering activities that details the location of dewatering and discharge activities, quantity of water to be used, equipment, and discharge point. The dewatering and discharge work plan must conform to Standard Specifications Section 13-4.01C and 13-4.01G.
- Dewatering discharges must not cause erosion, scour, or sedimentation that could impact natural bedding materials.
- Discharge the water within the project limits. Dispose the water if it cannot be discharged within project limits due to site constraints or contamination.
- Do not discharge stormwater or non-stormwater that has an odor, discoloration other than sediment, an oily sheen, or foam on the surface. Immediately notify the Resident Engineer upon discovering any such condition.
- The RWQCB may require a separate NPDES permit for a dewatering operation. These permits will have specific testing, monitoring, and discharge requirements.
- Discharges must comply with regional and watershed-specific discharge requirements.
- Additional permits or permissions from other agencies may be required for dewatering cofferdams or diversions.
- Dewatering records shall be kept with the SWPPP or WPCP and maintained for a minimum of 3 years after the construction project is terminated.
- The controls discussed in this BMP address sediment only. If the presence of polluted water with hazardous substances is identified as polluted 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 RE and comply with Standard Specifications Section 4-1.06 – "Differing Site Conditions."

Sediment Treatment

- A variety of methods can be used to treat water during dewatering operations from the construction site. The size of particles present in the sediment and/or RWQCB Dewatering Permit or receiving water limitations on sediment are key considerations for selecting sediment treatment option(s); in some cases, the use of multiple devices may be appropriate.
- Refer to the sediment treatment options described in Appendix B of the Field Guide to Construction Site Dewatering to determine the optimal method to achieve sediment removal.
- Refer to the applicable project dewatering and/or stormwater permit for monitoring and sampling forms and requirements.

Maintenance and Inspection

- Inspect dewatering operation areas at least weekly, prior to a forecasted rain event, daily during extended rain events, and post qualifying precipitation events.
- Accumulated sediment removed during the maintenance of a dewatering device may be disposed outside the right-of-way in conformance with Standard Specifications Section 14-10 “Solid Waste Disposal and Recycling.”
- Accumulated sediment commingled with other pollutants must be disposed in accordance with all applicable laws and regulations.

SWPPP or WPCP

Dewatering must be discussed in Section 600.2.1 of SWPPP and specific sample collection, collection, and parameters must be discussed in Section 1100 (if using Attachment J) or 1300 if required by a specific RWQCB Dewatering Permit or in Section 30.3.1 of the WPCP.

Paving, Sealing, Sawcutting, Grooving, and Grinding Activities

PSSG

Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☑
Materials and Waste Management	☑

Definition and Purpose

Procedures and practices for conducting paving, sealing, sawcutting, and grinding activities to minimize the transport of pollutants to the storm drain system or receiving water body.

Appropriate Applications

These procedures are implemented where operations such as paving, surfacing, resurfacing, grinding, coring, grooving, sealing, or saw cutting generate spoils, residue, or process water that may pollute storm water runoff or discharge to the storm drain system or receiving water body.

Limitations

- Activities related to paving, sealing, sawcutting, grooving, and grinding operations should be limited when precipitation is forecasted to prevent the triggering for visible and non-visible pollutant monitoring.
- Discharges of freshly paved surfaces can raise pH and trigger permit violations.

Standards and Specifications

General Requirements

- Refer to Standard Specifications Section 13-4.03E(7) – “Paving, Sealing, Sawcutting, Grooving, and Grinding Activities.”
- Do not allow the following materials to enter the storm drain system or receiving waters: cementitious material, asphaltic material, aggregate or screenings, sawcutting, grooving,

grinding residue, pavement chunks, shoulder backing, methacrylate resin, and sandblasting residue. This list is not exhaustive.

- Drainage inlets shall be protected, and linear sediment barriers (such as silt fences, gravel bag berms, or fiber rolls) shall be used to protect receiving waters during operations related to paving, sealing, sawcutting, grooving, or grinding.
- Drainage inlets and manholes shall be protected during application of seal coat, tack coat, slurry seal, and/or fog seal. Refer to SC-10, “Temporary Drainage Inlet Protection.”
- Whenever precipitation is forecasted, limit paving, sawcutting, and grinding to places where runoff can be captured. Grinding or grooving of pavement shall not be conducted when precipitation is forecasted unless runoff can be captured.
- Seal coat, tack coat, slurry seal, or fog seal shall not be applied when precipitation is forecasted during the application or curing period.
- Slurry shall be removed with a vacuum immediately after it is produced and shall be prevented from running off the pavement or into lanes open to traffic.
- The residue from grooving and grinding activities shall be collected with a vacuum attachment on the grinding machine and shall be prevented from flowing across the pavement. See also WM-8, “Concrete Waste Management,” and WM-10, “Liquid Waste Management.”
- Material removed from existing roadways may be stockpiled, if allowed, away from drainage inlets and receiving waters in accordance with BMP WM-3, “Stockpile Management” and Standard Specifications Section 13-4.03C(3) –“Stockpile Management.”. No materials should be stockpiled or used in a manner that may result in an unauthorized discharge.
- Drip pans or absorbent materials shall be placed under paving equipment when not in use. Refer to WM-4, “Spill Prevention and Control.” Equipment shall be cleaned in accordance with NS-8, “Vehicle and Equipment Cleaning.”
- Do not coat asphalt trucks and equipment with substances that contain soap, foaming agents, or toxic chemicals.

Asphalt Concrete and Concrete Pavement Handling

- Prevent sand and gravel from entering streets, storm drains, and receiving waters.
- Substances used to coat asphalt transport trucks, asphalt trucks, and asphalt spreading equipment shall not contain soap, foaming agents, or toxic chemicals.
- Asphalt spoils must be recycled or disposed in accordance with WM-5, “Solid Waste Management,” and/or WM-6, “Hazardous Waste Management.”
- AC and CC grindings, pieces, or chunks approved by the RE for reuse in embankments or shoulder backing shall not be at risk of entering storm drain systems or receiving waters.
- Temporarily protect inlets and receiving waters until the structure is stabilized or permanent controls are in place.
- The reuse of AC or PCC grindings, pieces, or chunks as road base must be placed at least 5 feet above the seasonal high groundwater elevation, with the approval of the Resident Engineer (RE). Shoulder backing containing recycled asphalt pavement shall not be placed within 100

feet measured horizontally from a culvert, watercourse, or bridge and must comply with the SWMP.

- During chip seal application and sweeping operations, petroleum or petroleum-covered aggregate must not be allowed to enter storm drains or receiving waters. Temporarily protect inlets and receiving waters until stabilized.
- Clean asphalt-coated equipment off site whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris in accordance with WM-5, “Solid Waste Management,” and/or WM-6, “Hazardous Waste Management” and NS-8 “Vehicle and Equipment Cleaning,” whichever is applicable.
- Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in WM-8, “Concrete Waste Management” or dispose in accordance with WM-5, “Solid Waste Management.”

Thermoplastic Striping and Pavement Markers

- Contractor shall not pre-heat, transfer, or load thermoplastic within 50 feet of drainage inlets or receiving waters.
- Do not unload, transfer, or load bituminous material for pavement markers within 50 feet of drainage inlets or receiving waters.
- All thermoplastic striper and pre-heater equipment shutoff valves shall be inspected to ensure that they are working properly to prevent thermoplastic from leaking.
- The pre-heater shall be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave 6 inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move when the vehicle is deadheaded.
- Melting tanks shall be loaded with care, with a minimum of 6 inches of freeboard in case of splashing when vehicle is deadheaded. When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- Immediately remove drips, overspray, improper markings, paint, and thermoplastic tracked by traffic with an authorized method.
- Collect and dispose bituminous material from the roadway after removal of markers in accordance with WM-5, “Solid Waste Management.”
- Clean truck beds daily of loose debris and melted thermoplastic. When possible, recycle thermoplastic material. Thermoplastic waste shall be disposed in accordance with BMP WM-5, “Solid Waste Management” and/or WM-6, “Hazardous Waste Management,” as applicable.

Maintenance and Inspection

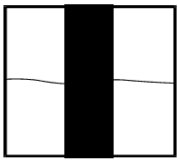
- Inspect and maintain machinery and BMPs regularly to minimize leaks and drips.
- Ensure that employees and subcontractors are implementing appropriate measures during paving operations.
- If project operations trigger the Industrial General Permit (IGP) (industrial operations located within project limits regardless of whether the facility is within or outside Caltrans’ right-of-way and outside Caltrans’ right-of-way but within project limits), ensure that any run-on or runoff from

IGP activities does not have potential to create pollution onto Caltrans right-of-way. Refer to SWMP for additional guidance.

SWPPP or WPCP

Paving, Sealing, Sawcutting, Grooving and Grinding operations must be discussed in Section 600.2.1 of the SWPPP or Section 30.3.1 of the WPCP.

Temporary Stream Crossing



Standard Symbol

BMP Objectives	
Soil Stabilization	☑
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☑
Materials and Waste Management	☐

Definition and Purpose

A temporary stream crossing is a structure placed across a stream or water body that allows vehicles to cross during construction and helps minimize, reduce, or manage erosion and downstream sedimentation caused by the vehicles.

Appropriate Applications

- Where appropriate regulatory permits have been secured and requirements strictly followed.
- Where construction equipment or vehicles need to frequently cross a waterway.
- When alternate access routes impose significant constraints.
- When crossing perennial streams or waterways causes significant erosion.
- Where construction activities will not last longer than 1 year.

Limitations

- Typically, stream crossings require regulatory permits such as RWQCB 401 Certification, U.S. Army Corps of Engineers 404 Permit, and approval by California Department of Fish and Wildlife.
- If numerical-based water quality standards are mentioned in any of these regulatory permits, monitoring and water quality sampling may be required and must comply with Standard Specifications Section 13-11 – “Water Quality Monitoring” or the contract special provisions. If monitoring related to these numerical-based water quality standards is not addressed in the Contract Documents, contact the Resident Engineer.
- Ensure that project-specific requirements from regulatory permits for the installation, removal or restoration of creek banks are fully implemented.

- Will usually disturb the waterway during installation and removal.
- Installation may require dewatering or temporary diversion of the stream. See NS-2, “Dewatering” and NS-5, “Clear Water Diversion.”
- May become a constriction in the waterway, which can obstruct flood flow and cause flow backups or washouts. If improperly designed, flow backups can increase the pollutant load through washouts and scouring.
- Use of natural or other gravel in the stream for construction of a cellular confinement system (CCS) ford crossing will be contingent upon approval by fisheries agencies.
- Ford crossings may degrade water quality due to contact with vehicles and equipment.
- A CCS should not be used in excessively high or fast flows.
- Upon completion of construction activities, CCS blocks must be removed from stream.

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, and low-flow perennial streams. A CCS is also appropriate for use in 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 shall be prepared under direction of, and approved by, a registered civil and/or structural engineer. Both hydraulic and construction loading requirements shall be considered with the following:
  - Comply with the requirements for culvert and bridge crossings, as contained in the Caltrans Highway Design Manual, particularly if the temporary stream crossing will remain during high flow periods.
  - Provide stability in the crossing and adjacent areas to withstand the design flow. The design flow and safety factor shall be selected based on careful evaluation of the risks due to over topping, flow backups, or washout.
  - Avoid using oil, AC, or other potentially hazardous waste materials for the temporary traveled surface over the stream crossing.

Temporary Stream Crossing

NS-4

Construction Considerations

- Stabilize construction roadways, adjacent work area, and stream bed 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.
- Install temporary sediment control BMPs in accordance with sediment control BMPs presented in Section 4 to minimize embankment scour due to flow conditions.
- Vehicles and equipment shall not be driven, operated, fueled, cleaned, maintained, or stored in the wet or dry portions of a water body where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed, except as authorized by the construction project regulatory permits as necessary to complete the work.
- Temporary water body crossings and encroachments shall be constructed to minimize scour. Cobbles used for temporary water body crossings or encroachments shall be clean, rounded river cobble.
- The exterior of vehicles and equipment that will encroach on the water body within the project shall be maintained free of grease, oil, fuel, and residues.
- Disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations. Precautions shall be taken to avoid damage to vegetation. Disturbed vegetation shall be replaced with the appropriate soil stabilization measures. Appropriate use of high-visibility fencing should be conducted and maintain in accordance with SS-2, “Preservation of Existing Vegetation.”
- Riparian vegetation, when removed pursuant to the provisions of the work, shall be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation shall be covered by a sufficient layer of clean river-run cobble to prevent damage to the underlying soil and root structure. The cobble shall be removed upon completion of project activities.
- Any temporary artificial obstruction placed within flowing water shall only be built from material, such as clean gravel, that will cause little or no siltation.
- Drip pans shall be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.

Specific Considerations

- Culverts are relatively easy to construct and able to support heavy equipment loads.
- Fords are the least expensive of the crossings, with maximum load limits.
- Temporary fords are not appropriate if construction will continue through a period of high flows if thunderstorms are likely, or if the stream is perennial.
- CCS crossing structures consist of clean, washed gravel and cellular confinement system blocks. CCSs are appropriate for streams that would benefit from an influx of gravel, e.g., salmonid streams, streams or rivers below reservoirs, and urban channelized streams. Many urban stream systems, such as dams, gravel mines, and concrete channels, are gravel-deprived due to human influences.

- CCSs allow designers to use either angular or naturally occurring rounded gravel because the cells provide the necessary structure and stability. In fact, natural gravel is optimal for this technique because of the habitat improvement it will provide after removal of the CCS.
- A gravel depth of 6 to 12 inches for a CCS structure is sufficient to support most construction equipment.
- An advantage of a CCS crossing structure is that relatively little rock or gravel is needed because the CCS provides the stability.
- Bridges are generally more expensive to design and construct but provide the least disturbance to the stream bed and constriction of the waterway flows.

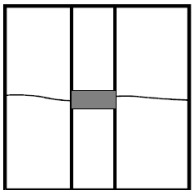
Maintenance and Inspection

- Periodically remove debris behind fords, in culverts, and under bridges.
- Replace lost protective aggregate from inlets and outlets of culverts.
- Remove temporary crossing promptly when it is no longer needed.
- Inspection shall, at a minimum, occur weekly and after each significant rainfall, and include checking for:
  - Blockage in the channel, debris buildup in culverts or behind fords, and under bridges.
  - Erosion of abutments, channel scour, riprap displacement, or piping in the soil.
  - Structural weakening of the temporary crossing, such as cracks, and undermining of foundations and abutments.

SWPPP or WPCP

Temporary Stream Crossing must be discussed in Section 600.2.1 of the SWPPP or Section 30.3 of the WPCP.

Clear Water Diversion



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☑
Materials and Waste Management	☐

Definition and Purpose

Clear water diversion consists of a system of structures and measures that intercept surface water runoff upstream of a project site, transport it around the work area, and discharge it downstream with minimal water quality degradation from either the project construction operations or the diversion's construction. Clear water diversions are used to reduce sediment pollution from construction work occurring in or adjacent to water.

Isolation techniques are clear water diversion methods that isolate near-shore work from a waterbody. Structures commonly used as part of this system include diversion ditches, berms, dikes, slope drains, rock, gravel bags, wood, sheet piles, aqua barriers, cofferdams, filter fabric or turbidity curtains, drainage and interceptor swales, pipes, or flumes.

Appropriate Applications

- A clear water diversion is typically implemented where appropriate permits have been secured and work must be performed in a live stream or water body. Work in jurisdictional waters typically require the following, at a minimum: Clean Water Act Section 401 (RWQCB Water Quality Certification), Clean Water Act Section 404, and Fish and Game Code Section 1600 permits.
- Clear water diversions are appropriate for isolating construction activities occurring within or near a water body, such as streambank stabilization, or culvert, bridge, pier, or abutment installation. They may also be used in combination with other methods, such as clear water bypasses and/or pumps.
- Implement SS-12, "Streambank Stabilization" to minimize impacts to streambanks.
- Where working areas encroach on live streams, barriers adequate to prevent the flow of muddy water into streams should be constructed and maintained between working areas and streams. During barrier construction, muddying of streams should be held to a minimum.

- Channel diversions are appropriate for small streams where there is adequate right-of-way to create a temporary channel around a construction work area and geosynthetics or rock can be used to handle the shear stresses associated with the expected flows.
- Berms are appropriate for small perennial, intermittent, or ephemeral streams with temporary culverts or pipe diversions. Berms may also be used to shift flows to one side or the other within a channel.
- Gravel-bag berms (SC-6, “Temporary Gravel Bag/Earthen Berms”) are appropriate for smaller streams where the hydraulic forces and water pressure can be adequately addressed with the weight of gravel-filled bags and plastic sheeting. This method results in a cofferdam-like isolation from the receiving water.
- Cofferdams are appropriate for small streams and lakes to confine flows to one side, create a dry work area, or to berm entire small streams. Typically, cofferdams are used in association with structures at Caltrans, though some inflatable cofferdams may be used for smaller applications.
- Pumped diversions are suitable for short-term projects in intermittent and low-flow streams. Excavation of a temporary bypass channel, or passing the flow through a pipe (called a flume) is appropriate for diverting streams less than 20 feet wide and with flow rates less than 100 cubic feet per second.
- Piped diversions are appropriate for short-term projects with little base flow.
- Water quality monitoring must typically be performed before and during in-water work, including the installation, operation, and removal of clear water diversions. Follow the requirements outlined in the Standard Specifications or special provisions.

Limitations

- Diversion/encroachment activities will usually disturb the waterway during installation and removal of diversion structures.
- Specific permit requirements or mitigation measures, such as those required by the U.S. Army Corps of Engineers, California Department of Fish and Wildlife, Federal Emergency Management Agency, RWQCB, etc., may be included in Contract Documents because of clear water diversion/ encroachment activities.
- Diversion/encroachment activities may constrict the waterway, obstruct flood flows, and cause flooding or washouts. Diversion structures should not be installed without identifying potential impacts to the stream channel.
- Diversion or isolation activities should not completely dam streamflow.
- The designer should consider the stream size, depth of water, and risks for temporary stream diversion. Use this BMP and specification for small streams and low-risk projects.
- Cofferdams and more elaborate systems should be designed by engineering services staff with the appropriate structural background or by the Contractor. The design decision and design parameters should be coordinated by the project engineers that all permitting and highway design requirements are met.
- Dewatering and removal may require additional sediment control or water treatment (See NS-2, “Dewatering”).

- Heavy equipment driven in wet portions of a water body to accomplish work should be completely clean of petroleum residue. Water levels should be below the gearboxes of the equipment in use, or lubricants and fuels sealed such that water inundation should not result in leaks.
- Mechanical equipment operated in the water shall not be submerged to a point above any axle of said mechanical equipment.
- Excavation equipment buckets may reach out into the water to remove or place fill materials. Only the bucket of the crane/excavator/backhoe may operate in a water body. The main body of the crane/excavator/backhoe shall not enter the water body, except as necessary to cross the stream to access the work site.
- Stationary equipment such as motors and pumps located within or adjacent to a water body shall be positioned over drip pans.
- Equipment shall not be parked below the high-water mark unless allowed by a regulatory agency's permit or approval.
- Drip pans shall be placed under all vehicles, and equipment placed on docks, barges, or other structures over water bodies, when the vehicle or equipment is planned to be idle for more than 1 hour.
- Where possible, avoid or minimize diversion/encroachment impacts by scheduling construction during periods of low flow or when the stream is dry. See also the project special provisions for scheduling requirements.
- Scheduling shall also consider seasonal releases of water from dams, fish migration and spawning seasons, and water demands due to crop irrigation.
- Materials and equipment should be moved from diversion work areas prior to forecasted rain events to prevent non-storm water discharges.

Standards and Specifications

General Requirements

- Most small stream diversions can be designed by the district and coordinated with the HQ OHSD. In many cases, the diversion can be located on the plan sheet referencing the non-standard specification for temporary creek diversion.
- Many projects will have multiple culverts, so it may be appropriate to develop a table of the lump-sum costs for each system. This should be provided to the RE for use in reviewing the Temporary Creek Diversion System Plan to help determine if all needed items are included.
- The types of diversion for small to medium-sized streams may include:
  - Pumped systems
  - Temporary culverts
  - Inflatable cofferdams (consult HQ OHSD for specifications)
- For larger (large rivers, lakes, bays, and ocean areas) temporary creek diversions that have a higher risk to worker safety and a more extensive design is required to address the forces for the depth and flow of the water, the district's structures representative should be consulted for the design (e.g., larger rivers where coffer dams are required). The engineer must consult and

follow the Caltrans Engineering Services Shoring Guidance and consult with Construction as the owner of the specification.

  - Diversion can be constructed from timber, soil, or steel, but in most cases are designed and constructed with steel sheet piles. Refer to Standard Specifications Section 19-3.01C(2) Cofferdams.
  - Guidance: *Caltrans Shoring Guide* (Engineering Services)
  - Dewatering: *Field Guide to Construction Site Dewatering*; NS-2, "Dewatering;" and Section 13-4.03G of the Standard Specifications for use with cofferdams or other large in-water work.
  - May need to treat or control seepage water prior to discharge; consult appropriate requirements for treatment design needs.

- When any artificial obstruction is being constructed, maintained, or placed in operation, sufficient water shall, at all times, be allowed to pass downstream to maintain aquatic life.
- Disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations.
- Disturbed vegetation shall be replaced with the appropriate soil stabilization measures and in accordance with the project's special provisions.
- Riparian vegetation, when removed pursuant to the provisions of the work, shall be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation shall be covered by a sufficient layer of clean river-run rock to prevent damage to the underlying soil and root structure. The rock shall be removed upon completion of project activities.
- Construct diversion structures with materials free of potential pollutants such as soil, silt, sand, clay, grease, or oil.
- Clear water diversions incorporating clean washed gravel may be appropriate for use in salmon spawning streams.
- Coordination with a variety of functional units at the Caltrans may be required to implement.

Design Considerations

- Determine if the construction of the temporary diversion system causes more environmental damage to the riparian, wetland, or 100-year floodplain area than constructing the project without the diversion BMP. This is a consideration for all projects, but is usually appropriate for short-term construction projects for temporary or ephemeral streams, where scheduling the project when the stream is dry may be more effective than the construction of a large diversion system in a sensitive environmental area, where construction equipment could disturb fragile vegetation, roots, sensitive species, soil structure, and root systems.
- Stream hydrology considerations include stream channel geometry, tributary watershed area, stream bed material, and predicted flow rates during construction. Follow methods in HDM Section 810 for the appropriate methods and rates for sizing the temporary diversion system.
- In the past, when sizing systems, many temporary diversion system guidance documents required mandatory minimum return storms for sizing the systems, for example the 2-year, 5-year, or 10-year, 24-hour return period. This can result in temporary diversion systems as large as the drainage system they are replacing and result in large impacts to the stream riparian

zone, with large, disturbed soil areas. Overly conservative approaches for the hydrology sizing to protect the environment can inadvertently cause other impacts to the environment. Each project should be sized for the appropriate risks and be based on regulatory restrictions.

- In coordination with District Hydraulics, consider the consequences for diversion exceedance, including public and work safety, environmental, legal, regulatory permit requirements, costs, space, and schedule.

Hydrology Sizing Methods

- The sizing of clear water diversion systems varies by the time of year, local hydrology, and duration of the diversion. If there is a prescriptive storm size in a permit document, design to the required event size. A 2-year, 24-hour storm event has been used by many as a default event, but recent studies have shown that this may oversize the system and cause more disturbance in the sensitive stream zone than is necessary.
- Diversion structures must be adequately designed to accommodate fluctuations in water depth or flow volume due to tides, storms, flash floods, etc. Careful analysis of the local hydrology history and risk analysis is required to minimize the diversion impacts.

Temporary Diversions/Encroachments

- Construct diversion channels in accordance with SS-9, “Earth Dikes/Drainage Swales, and Ditches.”
- In high-flow-velocity areas, stabilize slopes of embankments and diversion ditches using an appropriate liner, in accordance with SS-12, “Streambank Stabilization,” and SS-7, “Temporary Cover & Rolled Erosion Control Products (RECP),” or use rock slope protection, as described in Standard Specifications Section 72 2 – “Rock Slope Protection.”
- Where appropriate, use natural streambed materials such as large cobbles and boulders for temporary embankment/slope protection, or other temporary soil stabilization methods.
- Provide for velocity dissipation at transitions in the diversion, such as the point where the stream is diverted to the channel and the point where the diverted stream is returned to its natural channel. See also SS-10, “Outlet Protection/Velocity Dissipation Devices.”

Temporary Dry Construction Areas

- When dewatering behind temporary structures to create a temporary dry construction area, such as cofferdams, pass pumped water through a sediment settling device, such as a portable tank, settling basin, or active treatment system if necessary before returning water to the water body; see NS-2, “Dewatering” and Standard Specifications Section 13-8 – “Temporary Active Treatment System.”
- 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 RE and comply with Standard Specifications Section 4-1.06 – “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.

Instream Construction Sediment Control

There are three options currently available for reducing turbidity while working in a stream or river. The stream can be:

- Isolated from the area in which work is occurring by means of a water barrier.
- Diverted around the work site through a pipe or temporary channel.

Additionally:

- One can employ construction practices that minimize sediment suspension.
- The highest hazard for sedimentation from instream construction generally occurs when the sediment control structure is being installed and when it is being removed. Generally, the best time to install the stream isolation or diversion structure is when the stream flow is low. Conversely, the optimum time to remove in-stream diversion or isolation structures may be during the rising limb of a storm hydrograph. A probable “worst time” to release high total suspended solids (TSS) into a stream system with diminishing aquatic habitat might be when the stream flow is very low, e.g., summer low flow. During these times, the flow may be low while the biological activity in the stream is very high. On the other hand, the addition of short-term spike in TSS or sediment during a big storm discharge might have a relatively low impact on the aquatic habitat or turbidity because the stream is already turbid, and the stream energy is capable of transporting both suspended solids and large quantities of bedload through the system.

Techniques to Minimize Total Suspended Solids

- **Padding.** Padding laid in the stream below the work site may trap some solids that are deposited in the stream during construction. After work is done, the padding is removed from the stream and placed on the bank to assist in revegetation.
- **Clean, washed gravel.** Using clean, washed gravel decreases solid suspension, as there are fewer small particles deposited in the stream.
- **Excavation using a large bucket**. Each time a bucket of soil is placed in the stream a portion is suspended. Approximately the same amount is suspended whether a small or large amount of soil is placed in the stream. Therefore, using a large excavator bucket instead of a small one will reduce the total amount of soil that washes downstream.
- **Use of dozer for backfilling.** Using a dozer for backfilling instead of a backhoe follows the same principles – the fewer times soil is deposited in the stream, the less soil will be suspended.
- **Partial dewatering with a pump.** Partially dewatering a stream with a pump reduces the amount of water, and thus the amount of water that can suspend sediment.

Washing Fines

- Partial washing fines is an “in-channel” sediment control method that uses water, either from a water truck or hydrant, to wash any stream fines that were brought to the surface of the channel bed during restoration back into the interstitial spaces of the gravel and cobbles. This technique is useful in both intermittent or ephemeral stream channels with gravelly to cobble substrate and may be useful in perennial streams just prior to removing isolation structures.
- The purpose of this technique is to reduce or eliminate the discharge of sediment from the channel bottom during the first seasonal flows, or “first flush.” Sediment should not be allowed into stream channels; however, occasionally in-channel restoration work will involve moving or otherwise disturbing fines (sand and silt-sized particles) that are already in the stream, usually below bank-full discharge elevation. Subsequent re-watering (resumption of flows) of the channel can result in a plume of turbidity and sedimentation.
- This technique washes the fines back into the channel bed. Bedload materials, including gravel cobbles, boulders, and those fines are naturally mobilized during higher storm flows. This technique is intended to delay the discharge until the fines would naturally be mobilized.
- This technique should be used when construction work is required in channels. It is especially useful in intermittent or ephemeral streams in which work is performed “in the dry” and which subsequently become re-watered.

Prior to using this technique consider the following:

- The stream must have sufficient gravel and cobble substrate composition.
- This technique requires consideration of time of year and timing of expected stream flows.
- The optimum time for the use of this technique is in the fall, prior to winter flows.
- Consultation with, and approval from, the Department of Fish and Wildlife and the RWQCB may be required.

The following items should be considered when preparing project plans and specifications when this technique is used:

- Apply sufficient water to wash fines but not cause further erosion or runoff.
- Apply water slowly and evenly to prevent runoff and erosion.
- Consult with Department of Fish and Wildlife and the RWQCB for specific water quality requirements of applied water (e.g., chlorine).

Isolation Techniques

Isolation techniques are methods that isolate near-shore work from a waterbody. Techniques include sheet pile enclosures, inflatable cofferdams like Aqua Dam, berms or gravel-bag berms (see SC-6, “Temporary Gravel Bag/Earthen Berm”) with impermeable membrane or plastic sheeting, gravel bags, cofferdams, and K-rail.

Filter Fabric Isolation Technique

A filter fabric isolation structure is a temporary structure built into a waterway to enclose a construction area and reduce sediment pollution from construction work in or adjacent to water. This structure is composed of filter fabric, gravel-filled bags, and steel t-posts.

- Filter fabric may be used for construction activities such as streambank stabilization, or culvert, bridge, pier, or abutment installation. It may also be used in combination with other methods, such as clean water bypasses and/or pumps.
- This method involves placement of gravel bags or continuous berms to “key-in” the fabric, and subsequently staking the fabric in place.
- If spawning gravel (gravel between 1 and 4 inches) is used, all other components of the isolation can be removed from the stream and the gravel can be spread out and left as salmon spawning habitat if permitted in the project’s 404 permit. Whether spawning gravel or other types of gravel are used, only clean washed gravel should be used as infill for the gravel bags or continuous berm.
- This is a method that should be used in relatively calm water, and can be used in smaller streams.
- Prior to using this technique consider the following:
  - Do not use if the installation, maintenance, and removal of the structures will disturb sensitive aquatic species of concern.
  - Not appropriate for projects where dewatering is necessary.
  - Not appropriate to completely dam streamflow.
- The following items should be considered when preparing project plans and specifications when this technique is used:
  - For the filter fabric isolation method, a non-woven or heavy-duty fabric (refer to Standard Specifications Section 96-1.02B) is recommended over standard silt fencing. Using rolled geotextiles allows non-standard widths to be used.
  - Anchor filter fabric with gravel-filled bags filled with clean, washed gravel. Do not use sand. If a bag should split open, the gravel can be left in the stream if permitted under the project’s 404 permit to provide aquatic habitat benefits.
  - Another anchor alternative is a continuous berm, made with the continuous berm machine. This is a gravel-filled bag that can be made in very long segments. Berm length is usually limited to 20 feet for ease of handling.
  - Place the fabric on the bottom of the stream and place either a bag of clean, washed gravel or a continuous berm over the bottom of the fabric, such that a bag-width of fabric lies on the stream bottom. The bag should be placed on what will be the outside of the isolation area.
  - Pull the fabric up and place a metal t-post immediately behind the fabric on the inside of the isolation area; attach the fabric to the post with three diagonal nylon ties.
  - Continue placing fabric as described above until the entire work area has been isolated, staking the fabric at least every 6 feet.
  - During construction, inspect daily during the work week.
  - Schedule additional inspections during storm events.
  - Immediately repair any gaps, holes, or scour.
  - Remove sediment buildup.
  - Ensure pipe diversion is properly anchored to prevent shifting or leaking during use.

- Remove BMP upon completion of construction activity. Recycle or re-use if applicable.
- Re-vegetate areas disturbed by BMP removal if needed.

Turbidity Curtain Isolation Technique

- A turbidity curtain is a fabric barrier used to isolate the nearshore work area. The barriers are intended to confine the suspended sediment. The curtain is a floating barrier, and thus does not prevent water from entering the isolated area; rather, it prevents suspended sediment from getting out.
- Turbidity curtains should be used where sediment discharge to a stream is unavoidable. They are used when construction activities adjoin quiescent waters, such as lakes, ponds, lagoons, bays, and slow-flowing rivers. The curtains are designed to deflect and contain sediment within a limited area and provide sufficient retention time so that the soil particles will fall out of suspension.
- Prior to using this technique consider the following:
  - Turbidity curtains should not be used in flowing water; they are best suited for use in quiescent ponds, lakes, lagoons, bays, and very-slow-moving rivers.
  - Turbidity curtains should not be placed across the entire width of a channel.
  - Removing sediment that has been deflected and settled out by the curtain may create a discharge problem through the re-suspension of particles and by accidental dumping by the removal equipment.
  - Turbidity curtains may require a higher level of maintenance, adjustments, and relocation when deployed in comparison to structural isolation methods. However, turbidity curtains consist of flexible materials and may be repositioned and reconfigured as the limits of construction activity change.
- The following items should be considered when preparing project plans and specifications when this technique is used:
  - Turbidity curtains should be oriented parallel to the direction of flow wherever possible to avoid exerting excessive pressure on the fabric.
  - The curtain should extend the entire depth of the watercourse in calm-water situations.
  - In wave conditions, the curtain should extend to within 1 foot of the bottom of the watercourse, such that the curtain does not stir up sediment by hitting the bottom repeatedly. If it is desirable for the curtain to reach the bottom in an active-water situation, a pervious filter fabric may be used for the bottom 1 foot.
  - The top of the curtain should consist of flexible flotation buoys, and the bottom shall be held down by a load line incorporated into the curtain fabric. The fabric shall be a brightly colored impervious mesh.
  - The curtain shall be held in place by anchors placed at least every 100 feet, or as recommended by the manufacturer based on site-specific conditions, such as flow rate, wind speeds, currents, tidal influence, and wave action.
  - Place the anchors first, then tow the fabric out in a furled condition and connect to the anchors. The anchors should be connected to the flotation devices and not to the bottom of the curtain. Once in place, cut the furling lines, and allow the bottom of the curtain to sink. A

second set of anchors may be required in tidally influenced waters to secure the curtain against both the flow and ebb tides.

- Sediment that has been deflected and settled out by the curtain may be removed if so directed by the on-site inspector or the RE. Consideration must be given to the probable outcome of the removal procedure. It must be asked if it will create more of a sediment problem through re-suspension of the particles or by accidental dumping of material during removal. It is recommended that the soil particles trapped by the turbidity curtain only be removed if there has been a significant change in the original contours of the affected area in the watercourse.
- Particles should always be allowed to settle for a minimum of 6 to 12 hours prior to their removal or prior to removal of the turbidity curtain.
- The curtain should be inspected daily for holes or other problems; needed repairs should be made promptly.
- Allow sediment to settle for 6 to 12 hours prior to removal of sediment or curtain. This means that after removing sediment, wait an additional 6 to 12 hours before removing the curtain.
- To remove, install furling lines along the curtain, detach from anchors, and tow out of the water. Water quality monitoring is typically required before removing the turbidity curtain to verify that the entrained water, sediment, and other potential contaminants such as sulfides would not violate a water quality standard when released.

K-rail River Isolation

- This is temporary sediment control or stream isolation method that uses K-rails to form the sediment deposition area or to isolate the in-stream or near-bank construction area.
- Barriers are placed end-to-end in a pre-designed configuration and gravel-filled bags are used at the toe of the barrier and also at their abutting ends to seal and prevent sediment movement beneath or through the barrier walls.
- The K-rail isolation can be used in streams with higher water velocities than many other isolation techniques.
- Prior to using this technique consider the following:
  - The K-rail method does not allow for full dewatering.
- The following items should be considered when preparing project plans and specifications when this technique is used:
  - To create a floor for the K-rail, move large rocks and obstructions. Place washed gravel and gravel-filled bags to create a level surface on which K-rail will sit.
  - Place the bottom two K-rails adjacent to each other and parallel to the direction of flow; fill the center portion with gravel bags. Place the third K-rail on top of the bottom two; there should be sufficient gravel bags between the bottom K-rails such that the top one is supported by the gravel. Place plastic sheeting around the K-rails and secure at the bottom with gravel bags.
  - Further support can be added by pinning and cabling the K-rails together. Also, large riprap and boulders can be used to support either side of the K-rail, especially where there is strong current.

- The barrier should be inspected at least once daily, and any damage, movement, or other problems should be addressed immediately.
- Sediment should be allowed to settle for at least 6 to 12 hours prior to removal of sediment, and for 6 to 12 hours prior to removal of the barrier.

Stream Diversions

- Stream diversions consist of a system of structures and measures that intercept an existing stream upstream of the project, transports it around the work area, and discharges it downstream. The selection of which stream diversion technique to use depends on the type of work involved, physical characteristics of the site, and the volume of water flowing through the project.
- Pumped diversions are appropriate in areas where de-watering is necessary.
- Dam-type diversions may serve as temporary access to the site.
- Appropriate where work areas require isolation from flows.

Prior to using this technique consider the following:

- Pumped diversions have limited flow capacity.
- Pumped diversions require frequent pump monitoring.
- Large flows during storm events can overtop dams.
- Flow diversion and re-direction with small dams involves in-stream disturbance and mobilization of sediment.

- The following items should be considered when preparing project plans and specifications when this technique is used:
  - Installation guidelines will vary based on existing site conditions and type of diversion used.
  - Diversions shall be sized to convey design flood flows.
  - Pump capacity must be sufficient for design flow; the upper limit is approximately 10 cubic feet per second (the capacity of two 8-inch pumps).
  - Adequate energy dissipation must be provided at the outlet to minimize erosion.
  - Dam materials used to create dams upstream and downstream of the diversion should be erosion resistant; materials such as steel plate, sheet pile, sandbags, continuous berms, inflatable water bladders, etc., would be acceptable.
  - When constructing a diversion channel, begin channel excavation at the proposed downstream end and work upstream. Once the watercourse to be diverted is reached and the excavated channel is stable, breach the upstream end and allow water to flow down the new channel. Once flow has been established in the diversion channel, install the diversion weir in the main channel; this will force all water to be diverted from the main channel.
  - Inspect diversion/encroachment structures before and after significant storms, and at least once per week while in service. Inspect daily during construction.
  - Pumped diversions require frequent pump monitoring.

- 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 buildup, and adequacy of the slope protection. Remove debris, and repair linings and slope protection as required. Repair holes, gaps, or scour.
- Upon completion of work, the diversion or isolation structure should be removed and flow should be re-directed through the new culvert or back into the original stream channel. Recycle or re-use if applicable.

SWPPP or WPCP

Clear Water Diversion must be discussed in Section 600.2.1 of the SWPPP or Section 30.3 of the WPCP.

Illegal Connection and Illicit Discharge Detection and Reporting

Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☑
Materials and Waste Management	☐

Definition and Purpose

Procedures and practices designed for construction contractors to recognize illegal connections, illicit discharges, or illegally dumped or discharged materials on a construction site, and for reporting incidents to the Resident Engineer (RE).

Appropriate Applications

- Illegal connection and illicit discharge detection and reporting is applicable anytime an illegal connection or illicit discharge is discovered or illegally dumped material is found on the construction site.
- This BMP applies to all construction projects.

Limitations

- Illegal connections and illicit discharges or 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 RE when illegal connections or illicit dumping or discharges are discovered, and take no further action unless directed by the RE.
- If pre existing hazardous materials or wastes are known to exist on site, the Contractor's responsibility will be detailed in separate special provisions. The on-site area should be clearly marked and described in the SWPPP or WPCP.

Illegal Connection and Illicit Discharge Detection and Reporting

NS-6

Standards and Specifications

Inspection

- Inspect site before beginning the job for evidence of illegal connections or illicit dumping or discharges.

Illegal Connection and Illicit Discharge Detection and Reporting

- Solids – Look for debris or trash 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 or discharge 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.
- Urban Areas – Evidence of illegal connections or illicit discharges is typically detected at storm drain outfall locations or manholes. Signs of an illegal connection or 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 – Illegal connections or 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 drainage junction structures.
  - Broken concrete or other disturbances at or near junction structures.

Reporting

- Notify the RE of any illegal connections or illicit dumping or discharge incidents at the time of discovery. Do not take further action unless ordered.
- The RE will notify the District Construction Stormwater Coordinator, who should coordinate with the NPDES Coordinator for reporting. Form MTCE-07 is used to document the initial investigation.

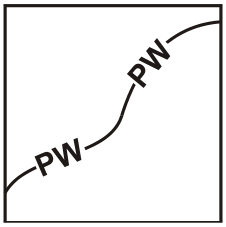
Inspection, Cleanup and Removal

- The Contractor is not responsible for investigation and cleanup of illegal connections or illicit discharges or dumping not generated by the Contractor. Caltrans may direct the Contractor to clean up non hazardous dumped or discharged material on the construction site. Assume that unlabeled or unidentifiable material is hazardous.
- Inspect the entire project site at least weekly to check for illegal connections or illicit discharges.

SWPPP or WPCP

Illegal Connection and Illicit Discharge Detection and Reporting must be discussed in Section 600.2.1 of the SWPPP or Section 30.3.1 of the WPCP.

Potable Water/Irrigation



Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☑
Materials and Waste Management	☐

Definition and Purpose

Potable water/irrigation management consists of practices and procedures to manage the discharge of potential pollutants generated during discharges from irrigation water lines, landscape irrigation, lawn or garden watering, planned and unplanned discharges from potable water sources, water line flushing, and hydrant flushing.

Appropriate Applications

Implement this BMP whenever the above activities or discharges occur at or enter a construction site.

Limitations

None identified.

Standards and Specifications

- Inspect irrigated areas within the construction limits for excess watering. Adjust watering times and schedules to ensure that the appropriate amount of water is being used and to minimize runoff. Consider factors such as soil structure, grade, relative compaction, time of year, and type of plant material in determining the proper amounts of water for a specific area.
- Take precautions to prevent irrigation water from eroding soil, wetting vehicles and pavement, or otherwise causing sediment, hydrocarbons, and other non-visible pollutants that accumulate on those surfaces to discharge into a storm drain system or receiving waterbody.
- When possible, discharges from water line flushing, temporary active treatment systems (see Appendix C “Temporary Active Treatment System) should be reused for landscaping purposes.
- Resident Engineer (RE) approval is required before beginning any washing activities that could discharge to the storm drain or receiving waterbody.

- Where possible, direct water from off-site sources around or through a construction site in a way that minimizes contact with the construction site.
- Perform pressure tests on the irrigation system supply lines to test for leaks, which could result in erosion or runoff if breached.
- Shut off the water source to broken lines, sprinklers, or valves as soon as possible to prevent excess water flow.
- Protect downstream storm water drainage systems and receiving waters from water pumped or bailed from trenches excavated to repair water lines.

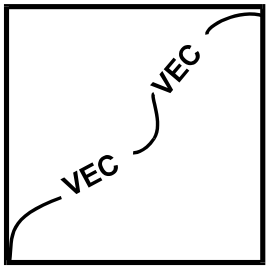
Maintenance and Inspection

- Repair broken water lines as soon as possible or as directed by the RE.
- Inspect irrigated areas regularly for signs of erosion and/or discharge.

SWPPP or WPCP

- Potable water/irrigation must be discussed in Section 600.2.1 of the SWPPP or Section 30.3 of the WPCP.

Vehicle and Equipment Cleaning



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☑
Materials and Waste Management	☐

Definition and Purpose

Vehicle and equipment cleaning procedures and practices are used to minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning operations to storm drain systems or to watercourses.

Appropriate Applications

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

Limitations

- This BMP may be limited or disallowed under regulatory agency permits, particularly near environmentally sensitive areas.
- Generates non-stormwater that requires management and, in some cases, the disposal of hazardous waste.

Standards and Specifications

General Requirements

- Limit vehicle and equipment cleaning or washing at the job site except for the safety and protection of the equipment and as needed to comply with regulatory agency permits and approvals.
- Cleaning of vehicles and equipment with soap, solvents, or steam shall not occur on the job site unless the RE has been notified in advance and the resulting wastes are fully contained in accordance with Standard Specifications Section 14-11 or 13-4.03D(5), whichever is applicable. Do not use diesel to clean vehicles, and minimize the use of solvents.

Vehicle and Equipment Cleaning NS-8

- Vehicle and equipment wash water shall be contained for percolation or evaporative drying away from storm drain inlets or receiving waters and should not be discharged within the highway right-of-way. Apply other appropriate BMPs as applicable.
- All vehicles/equipment that regularly enter and leave the construction site must be cleaned off site.
- Resulting wastes and by-products shall not be discharged or buried within the highway right-of-way, but must be captured and recycled or disposed according to the requirements of WM 10, "Liquid Waste Management" or WM-6, "Hazardous Waste Management," depending on the waste characteristics.

Implementation

- When vehicle/equipment washing/cleaning must occur on site and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area shall have the following characteristics, and shall be arranged with the QSD or WPC Manager:
  - Located away from storm drain inlets, drainage facilities, or watercourses.
  - Paved with concrete or asphalt, and bermed to contain wash waters and to prevent run-on and run off.
  - Configured with a sump to allow collection and disposal of wash water.
  - 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 shall be considered.
  - Use positive shutoff valve to minimize water usage.
  - Facility wash racks shall discharge to a sanitary sewer, recycle system, or other approved discharge system; they shall not discharge to the storm drainage system or watercourses.

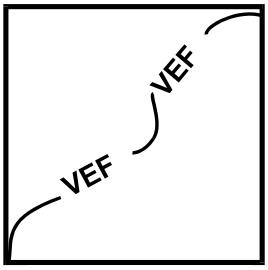
Maintenance and Inspection

- The control measure shall be inspected at least weekly, prior to a forecasted rain event, daily during extended rain events, and post-qualifying precipitation events.
- Inspect wash area and sump regularly. Remove liquids and sediment as needed or as directed by the Resident Engineer.

SWPPP or WPCP

- Vehicle equipment cleaning must be discussed in Section 600.2.1 of the SWPPP or Section 30.3.1 of the WPCP.

Vehicle and Equipment Fueling



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☑
Materials and Waste Management	☐

Definition and Purpose

Vehicle and equipment fueling procedures and practices are designed to minimize or eliminate the discharge of fuel spills and leaks into storm drain systems or to receiving waters.

Appropriate Applications

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

Limitations

- This BMP may be limited or disallowed under regulatory agency permits, particularly near environmentally sensitive areas.
- On-site vehicle and equipment fueling should only be used where it is impractical to send vehicles and equipment off-site for fueling.

Standards and Specifications

- When fueling must occur on site, the contractor shall select and designate an area or areas to be used, subject to approval of the Resident Engineer.
- Dedicated fueling areas shall be protected from stormwater run-on and runoff, and shall be located at least 50 feet from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms or dikes to prevent run-on, runoff, and to contain spills.
- For long-term projects, consider constructing roofs or using portable tents over maintenance and fueling areas.

- Absorbent spill clean-up materials and spill kits shall be available in fueling areas and on fueling trucks. These materials should be used on small spills instead of hosing down or burying techniques. Affected absorbent material and spill kits should be removed promptly and disposed properly after use.
- Drip pans or absorbent pads shall be readily available during vehicle and equipment fueling.
- Vehicle and equipment fueling areas shall not be left unattended during fueling activities.
- Nozzles used in vehicle and equipment fueling shall be equipped with an automatic shutoff to control drips.
- Use vapor recovery nozzles to help control drips, as well as air pollution where required by the air quality management districts.
- Ensure the nozzle is secured upright when not in use.
- Fuel tanks shall not be “topped off.”
- Federal, state, and local requirements shall be observed for any stationary above-ground storage tanks. Refer to WM-1, “Material Delivery and Storage” for specifics as to what needs to be included for BMP protection.
- Portable fuel canisters should be kept in a flammable cabinet when not in use.

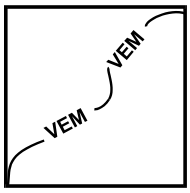
Maintenance and Inspection

- Vehicles and equipment shall be inspected on each day of use for leaks. Leaks shall be repaired immediately, or problem vehicles or equipment shall be removed from the project site.
- Fueling areas and storage tanks shall be inspected at least weekly, prior to a forecasted rain event, daily during extended rain events, and post-storm events.
- Immediately clean up spills and properly dispose contaminated soil and cleanup materials.

SWPPP or WPCP

- Vehicle and equipment fueling must be discussed in Section 600.2.1 of the SWPPP or Section 30.3.1 of the WPCP.

Vehicle and Equipment Maintenance



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☑
Materials and Waste Management	☐

Definition and Purpose

Procedures and practices to minimize or eliminate the discharge of pollutants to the storm drain systems or to receiving waters from vehicle and equipment maintenance activities.

Appropriate Applications

- These procedures apply on all construction projects where an on-site uncovered yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

- This BMP may be limited or disallowed under regulatory agency permits, particularly near environmentally sensitive areas.
- On-site vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment off site for fueling.

Standards and Specifications

- When maintenance must occur on site, the contractor shall select and designate an area to be used, subject to approval of the Resident Engineer and implement appropriate controls for the activities to be performed.
- Dedicated maintenance areas shall be on level ground and protected from storm water run-on and runoff, and shall be located at least 50 feet from downstream drainage facilities and receiving waters.
- Protect maintenance areas with berms or dikes to prevent run-on, runoff, and to contain spills.
- For long-term projects, consider constructing roofs or using portable tents over maintenance areas.

- Absorbent spill cleanup materials and spill kits shall be available in maintenance areas. They should be used on small spills instead of hosing down or burying techniques. Affected absorbent material and spill kits should be removed promptly and disposed properly after use.
- Drip pans or absorbent pads shall be placed under vehicles and equipment when performing maintenance work that involves fluids. Vehicles and equipment maintenance areas shall not be left unattended during maintenance activities.
- Drip pans or plastic sheeting shall be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1-hour.
- Properly dispose or recycle used batteries and tires, as well as any other vehicle or equipment parts.
- Substances used to coat asphalt transport trucks and asphalt-spreading equipment shall be non-toxic.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not dump fuels and lubricants onto the ground.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Do not bury used tires.
- Repair fluid and oil leaks immediately.
- Provide spill containment dikes or secondary containment around stored oil and chemical drums. Refer to WM-1, “Material Delivery and Storage” for details.

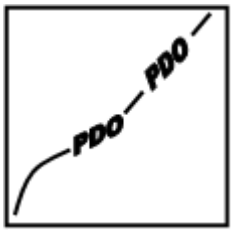
Maintenance and Inspection

- Vehicles and equipment shall be inspected on each day of use for leaks. Leaks shall be repaired immediately or removed from the project site.
- Maintenance areas and storage tanks shall be inspected regularly.
- Maintain waste fluid containers in leak-proof condition.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.
- Inspection and maintenance of vehicle and equipment maintenance areas must be properly documented, and the WPC manager must ensure no potential for discharges occur from these areas as part of the non-visible monitoring requirements.

SWPPP or WPCP

- Vehicle and equipment maintenance must be discussed in Section 600.2.1 of the SWPPP or Section 30.3 of the WPCP.

Pile Driving Operations



Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☑
Materials and Waste Management	☐

Definition and Purpose

The construction and retrofit of bridges and retaining walls often include driving piles for foundation support and shoring operations. Driven piles are typically constructed of concrete, steel, or timber. Driven sheet piles are used for shoring and cofferdam construction. Proper control and use of equipment, materials, and waste products from pile driving operations will reduce the discharge of potential pollutants to the storm drain system or receiving waters.

Appropriate Applications

These procedures apply to construction sites near or adjacent surface waters or groundwater where permanent and temporary pile-driving operations (impact and vibratory) take place, including operations using pile shells for construction of cast-in-steel-shell and cast-in-drilled-hole piles.

Limitations

None identified.

Standards and Specifications

- Have spill kits and cleanup materials available at all pile driving locations. Refer to WM-4, “Spill Prevention and Control.”
- Place drip pans, absorbent pads, or plastic sheeting with absorbent material under vehicles and equipment performing pile-driving activities. Refer to NS-9, “Vehicle and Equipment Fueling” and NS-10, “Vehicle and Equipment Maintenance.”
- Protect pile-driving equipment, including hammers and other hydraulic attachments, by parking them on plywood and covering them with plastic sheeting when precipitation is forecasted.
- When not in use, store pile-driving equipment on level ground away from concentrated flows of storm water, drainage courses, and inlets.

- Use less-hazardous vegetable oil instead of hydraulic fluid when practicable.
- Keep leak free all equipment that is in use in streambeds, or on docks, barges, or other structures over water bodies. The storage or use of equipment in streambeds or other water bodies shall comply with all applicable regulatory permits. Refer to NS-13, “Material and Equipment Use Over Water.”
- Implement other BMPs as applicable, such as NS-2, “Dewatering;” WM-5, “Solid Waste Management;” WM-6, “Hazardous Waste Management;” and WM-10, “Liquid Waste Management.”

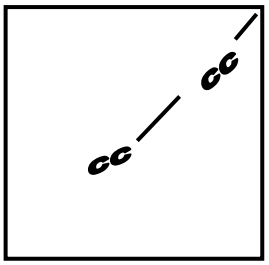
Maintenance and Inspection

- Inspect pile-driving areas and equipment for leaks and spills daily when they are in operation or within or next to water.
- Inspect pile-driving areas and equipment for leaks and spills at least weekly, prior to a forecasted rain event, daily during extended rain events, and post storm events. Depending on the specific operations; daily inspection may be required.
- Inspect equipment routinely and repair equipment as needed (e.g., worn or damaged hoses, fittings, gaskets).
- Inspection and maintenance of these areas must be properly documented, and the WPC manager must ensure no potential for discharges occurs from these areas as part of the non-visible monitoring requirements.

SWPPP or WPCP

- Pile-driving operations must be discussed in Section 600.2.1 of the SWPPP or Section 30 of the WPCP.

Concrete Curing



Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☑
Materials and Waste Management	☑

Definition and Purpose

Concrete curing is used in the construction of structures such as bridges, retaining walls, and pump houses. Concrete curing includes the use of both chemical and water methods. Proper procedures to minimize any potential for runoff during concrete curing must take place.

Appropriate Applications

All concrete elements of a structure (e.g., footings, columns, abutments, stems, soffit, deck) are subject to curing requirements.

Limitations

None identified.

Standards and Specifications

Chemical Curing

- Avoid over-spray of curing compounds.
- Minimize the drift of chemical cure as much as possible by applying the curing compound close to the concrete surface. Apply an amount of compound that covers the surface but does not allow any compound runoff.
- Use proper storage and handling techniques for concrete curing compounds. Refer to WM-1, “Material Delivery and Storage.”

- Protect drain inlets before applying curing compounds. Refer to SC-10, “Temporary Drainage Inlet Protection.”
- Implement WM-4, “Spill Prevention and Control.”

Water Curing for Bridge Decks, Retaining Walls, and Other Structures

- Direct cure water away from inlets and receiving waters to collection areas for removal as approved by the RE and in accordance with all applicable permits.
- Collect cure water and transport or dispose water in accordance with all applicable permits
- Use wet blankets or a similar method that maintains moisture while minimizing the use and possible discharge of water.

Maintenance and Inspection

- Ensure that employees and subcontractors implement appropriate measures for storage, handling, and use of curing compounds.
- Inspect any temporary diversion devices, lined channels, or swales for washouts, erosion, runoff, or debris. Replace lining and remove debris as necessary.
- Inspect cure containers and spraying equipment for leaks. Also, inspect concrete curing areas daily when there are ongoing operations.
- The WPC Manager must ensure no concrete curing activities occur when rain is forecasted that could lead to a discharge.

SWPPP or WPCP

- Concrete curing must be discussed in Section 600.2.1 of the SWPPP or Section 30.3.1 of the WPCP.

Material and Equipment Use Over Water

Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☑
Materials and Waste Management	☑

Definition and Purpose

Procedures for the proper use, storage, and disposal of materials and equipment on barges, boats, temporary construction pads, or similar locations that minimize or eliminate the discharge of potential pollutants into storm drain inlets or receiving waters.

Appropriate Applications

These procedures shall be implemented for construction materials and wastes (solid and liquid) and any other materials that may be detrimental if released. Applies where materials and equipment are used on barges, boats, docks, and other platforms over or adjacent a watercourse.

Limitations

Specific requirements may be included in the Contract Documents and permit documents associated with regulatory agencies, such as the Regional Water Quality Control Board (RWQCB), U.S. Army Corps of Engineers, and California Department of Fish and Wildlife.

Standards and Specifications

- Measures to prevent the discharge of potential pollutants into storm drain inlets or receiving waters while operating equipment or using materials over water are considered BMPs by the regulatory agencies and should be documented in the SWPPP.
- Implement this BMP in accordance with all necessary permits required for construction within or near receiving waters, such as RWQCB, U.S. Army Corps of Engineers, Department of Fish and Wildlife, and other local permitting agencies.

- Place drip pans and absorbent materials under equipment and vehicles and ensure that an adequate supply of spill clean-up materials are on site in accordance with a spill response plan, if applicable. Ensure that staff are trained regarding the deployment of the spill response plan.
- Drip pans shall be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is expected to be idle for more than 1 hour.
- Install watertight curbs or toe boards to contain spills and prevent materials, tools, and debris from falling off the barge, platform, dock, etc.
- Secure all materials to prevent discharges to receiving waters via wind.
- Discharges to receiving waters shall be reported to the Resident Engineer immediately upon discovery.
- Maintain vehicles and equipment in accordance with NS-10, “Vehicle and Equipment Maintenance.” If a leaking line cannot be repaired, remove equipment from over the water and repair immediately.
- Collect and contain demolished material in accordance with NS-15, “Structure Removal Over or Adjacent to Water.”
- Refer to WM-1, “Material Delivery and Storage” and WM-4, “Spill Prevention and Control.”
- Ensure the timely and proper removal of accumulated wastes over water. Refer to WM-5, “Solid Waste Management” and WM-6, “Hazardous Waste Management.”

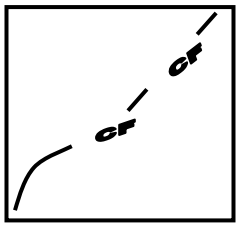
Maintenance and Inspection

- Inspect vehicles and equipment for leaks and spills daily when they are in operation; make necessary repairs.
- Ensure that employees and subcontractors implement appropriate measures for storage and use of materials and equipment.
- Inspect and maintain all associated BMPs and perimeter controls to ensure continuous protection of the watercourse.
- Inspect materials and equipment for leaks and spills at least weekly, prior to a forecasted rain event, daily during extended rain events, and post storm events.
- Inspect equipment routinely and repair equipment as needed (e.g., worn or damaged hoses, fittings, gaskets).
- Inspection and maintenance of these areas must be properly documented and ensure no potential for discharges from these areas as part of the non-visible monitoring requirements.

SWPPP or WPCP

Material and equipment use over water must be discussed in Section 600.2.1 of the SWPPP or Section 30.3.1 of the WPCP.

Concrete Finishing



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☑
Materials and Waste Management	☑

Definition and Purpose

Concrete finishing methods are used for bridge deck rehabilitation, paint removal, curing compound removal, and final surface finish appearances. Methods include sand blasting, shot blasting, grinding, or high-pressure water blasting. Proper procedures minimize the impact that concrete finishing methods may have on runoff.

Appropriate Applications

These procedures apply to all construction locations where concrete finishing operations are performed.

Limitations

Specific permit requirements may be included in the contract documents for certain concrete finishing operations.

Standards and Specifications

General Requirements

- Follow containment requirements stated in the project special provisions.
- Collect and properly dispose of water and solid waste from high-pressure water blasting operations.
- Collect and properly dispose of water from water blasting operations, and sand and solid waste from sandblasting operations.
- Protect drainage inlets within 50 feet of the sandblasting prior to beginning sandblasting operations. Refer to SC-10, “Temporary Drainage Inlet Protection.”

- Implement SC-7, “Street Sweeping” within the sandblasting and surrounding area.
- Minimize the drift of dust and blast material as much as possible by keeping the blasting nozzle close to the surface.
- Discharges to waterways shall be reported to the Resident Engineer (RE) immediately upon discovery.

Other Considerations

- Direct water from blasting operations away from inlets and receiving waters to collection areas for removal (e.g., dewatering) as approved in advance by the RE and in accordance with applicable permits.
- When blast residue contains a potentially hazardous waste, refer to WM-6, “Hazardous Waste Management.”
- Implement WM-8, “Concrete Waste Management” in combination with this BMP.

Maintenance and Inspection

- At a minimum, inspect containment structures, if any, for damage or voids prior to use each day and prior to a likely forecasted storm event.
- At the end of each work shift, remove and contain the liquid and solid wastes from containment structures, if any, and from the general work area.
- Inspect concrete finishing areas at least weekly, prior to a forecasted rain event, daily during extended rain events, and post qualifying precipitation events.
- Inspection and maintenance of these areas must be properly documented and ensure no potential for discharges from these areas as part of the non-visible monitoring requirements.

SWPPP or WPCP

Concrete Finishing must be discussed in Section 600.2.1 of the SWPPP or Section 30.3.1 of the WPCP.

Structure Demolition/Removal Over or Adjacent to Water

Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☑
Materials and Waste Management	☑

Definition and Purpose

Procedures to protect water bodies from debris and wastes associated with structure demolition or removal over or adjacent receiving waters.

Appropriate Applications

- Full bridge demolition and removal projects.
- Partial bridge removal (e.g., barrier rail, edge of deck) associated with bridge widening projects.
- Projects that involve concrete channel removal.
- Any other project with structure removal that could potentially affect water quality.

Limitations

- Specific requirements may be included in the contract documents and permit documents associated with regulatory agencies such as the Regional Water Quality Control Board, U.S. Army Corps of Engineers, and California Department of Fish and Wildlife.

Standards and Specifications

General Requirements

- A plan summarizing material containment, collection, and handling may be required to be submitted and fully implemented with the SWPPP.

Structure Demolition/Removal Over or Adjacent to Water

NS-15

- Do not allow demolished material to enter storm drain systems and receiving waters. Use covers and platforms authorized by the Resident Engineer (RE) to collect debris.
- Collect and contain all demolished material within the containment system, including process water and visible dust produced during demolition and cleaning operations daily. Handle debris according to Standard Specifications Section 13-4.03D.
- Implement in combination with NS-13, “Material and Equipment Use Over Water” and WM-04 “Spill Prevention and Control” for handling of materials and equipment.
- Routinely sweep and vacuum work area to remove excess dust and debris in accordance with SC-07, “Street Sweeping.”
- Use inlet protection in accordance with SC-10, “Temporary Drainage Inlet Protection” to protect storm drain inlets.
- Refer to NS-5, “Clear Water Diversion” to direct water away from work areas.
- Stockpile accumulated debris and waste generated during demolition away from drainage inlets and receiving waters and in accordance with WM-3, “Stockpile Management.”
- For structures containing hazardous materials (e.g., lead paint or asbestos) refer to WM-6, “Hazardous Waste Management.” For demolition work involving soil excavation around lead-painted structures, refer to WM 7, “Contaminated Soil Management.”
- Discharges to drainage inlets and receiving waters shall be reported to the RE immediately upon discovery. A written discharge notification must follow.
- Keep adequate spill kit material on site in accordance with a spill response plan, if applicable. Ensure that staff are trained regarding the deployment of the spill response plan.
- Ensure safe passage of wildlife; refer to Standard Specifications Section 83-3 – “Concrete Barriers.”

Other Considerations

- Use attachments on construction equipment, such as backhoes and debris baskets, or barges to catch debris from demolition operations. Use plastic bibs to prevent hydraulic fuel leaks.
- Install perimeter controls and secondary containment to prevent leaks and spills from entering receiving waters. Perimeter controls and secondary containment may include sealed plywood and/or plastic sheeting, plastic liners and/or tarps, netting, silt fences, drip pans, containment booms and berms, and absorbent material.

Maintenance and Inspection

- Contractor must inspect demolition areas and containment systems over or adjacent receiving waters daily when operations are ongoing.
- Any debris-catching devices and containment systems shall be emptied daily. Collected debris shall be removed and stored away from the drainage inlets and receiving waters and protected from run-on and runoff.
- Inspect demolition and containment systems over or adjacent to waterbody for leaks and spills at least weekly (some operations require daily inspection), prior to a forecasted storm event, daily during extended rain events, and post qualifying precipitation events.

- Inspection and maintenance of these areas must be properly documented and ensure no potential for discharges from these areas as part of the non-visible monitoring requirements.

SWPPP or WPCP

Structure Demolition/Removal Over or Adjacent to Water must be discussed in Section 600.2.1 of the SWPPP or Section 30.3.1 of the WPCP.

Section 8

Waste Management and Materials Pollution Control BMPs

8.1 Waste Management and Materials Pollution Control

Like non-stormwater management, waste management and materials pollution control BMPs are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with stormwater. These BMPs also involve day-to-day operations of the construction site and are under the control of the Contractor, and are additional "good housekeeping practices" that involve keeping a clean, orderly construction site. These controls must be implemented for all applicable activities, material usage, and site conditions.

8.1.1 Waste Management BMPs

Waste management consists of implementing procedural and structural BMPs for handling, storing, and disposing of wastes generated by a construction project to prevent the release of waste materials into stormwater discharges.

8.1.2 Materials Pollution Control BMPs

Materials pollution control (also called materials handling) consists of implementing procedural and structural BMPs for handling, storing, and using construction materials to prevent the release of those materials into stormwater discharges. The objective is to reduce the opportunity for rainfall to come in contact with these materials.

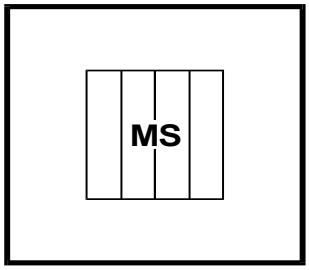
Table 8-1 lists the waste management and materials pollution control BMPs.

Table 8-1. Waste Management and Materials Pollution Control BMPs

ID	BMP Name
WM-1	Material Delivery and Storage
WM-2	Material Management
WM-3	Stockpile Management
WM-4	Spill Prevention and Control
WM-5	Solid Waste Management
WM-6	Hazardous Waste Management
WM-7	Contaminated Soil Management
WM-8	Concrete Residuals and Washout Wastes
WM-9	Sanitary and Septic Waste Management
WM-10	Liquid Waste Management

The remainder of this section shows the working details for each of the waste management and materials pollution control BMPs.

Material Delivery and Storage



Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☑

Definition and Purpose

Procedures and practices for the proper handling and storage of materials in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or to receiving waters.

Appropriate Applications

These procedures are implemented at all construction sites with delivery and storage of the following:

- Hazardous chemicals such as:
  - acids
  - lime
  - glues
  - adhesives
  - paints
  - solvents
  - curing compounds
- Soil stabilizers and binders
- Fertilizers
- Detergents
- Plaster

- Polymers
- Petroleum products such as fuel, oil, and grease
- Asphalt and concrete components
- Pesticides and herbicides
- Other materials that may be detrimental if released to the environment.

Limitations

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

Standards and Specifications

General

- Train employees and subcontractors on the proper material delivery and storage practices.
- Temporary storage area shall be located away from vehicular traffic.
- Safety Data Sheets shall be supplied to the Resident Engineer for all materials stored. This can be done at any time but at least 5 days prior to material being used or stored on site.
- Must comply with Caltrans Standard Specifications Section 13-4, “Job Site Management,” and 14-11, “Hazardous Waste and Contamination.”

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall be placed in temporary containment facilities for proper storage.
- Each temporary containment facility shall have a permanent cover and side wind protection, or be covered during non-working days and whenever a storm event is forecasted.
- A temporary containment facility shall provide for a spill containment volume able to contain precipitation from a 24-hour, 25-year storm event, plus the greater of 10 percent of the aggregate volume of all containers or 100 percent of the capacity of the largest container within its boundary.
- A temporary containment facility shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids shall be sent to an approved disposal site.
- Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.

- Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.
- Materials shall be stored in their original containers. The original product labels shall be maintained in place in a legible condition. Damaged or otherwise illegible labels shall be replaced immediately.
- Bagged and boxed materials shall be stored on pallets and shall not be allowed to accumulate on the ground. To provide protection from wind and rain, bagged and boxed materials shall be covered during non-working days and prior to rain events.
- Stockpiles shall be protected in accordance with WM-3, “Stockpile Management.”
- Have proper storage instructions posted at all times in an open and conspicuous location and include it as an informal training component of the tailgates and ongoing WPC training.
- Do not store hazardous chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet, under cover, and in secondary containment.
- Keep ample supply of appropriate spill clean-up material near storage areas.
- Also, see WM-6, “Hazardous Waste Management” for storing of hazardous materials.

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 shall be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- 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

- Storage areas shall be kept clean, well organized, and equipped with ample clean-up supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.
- Inspect storage areas before, during, and after rainfall events, and at least weekly during other times. Collect and place into drums any spills or accumulated rainwater and dispose properly.
- Material delivery and storage areas must be shown on the WPCDs and reflect current site conditions.

SWPPP or WPCP

Material delivery and storage must be discussed in Section 600.2.2 of the SWPPP or Section 30.3.2 of the WPCP.

Material Management

Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☑

Definition and Purpose

These are procedures and practices for use of construction materials in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or to receiving waters.

Appropriate Applications

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

- Hazardous chemicals such as:
  - acids
  - lime
  - glues
  - adhesives
  - paints
  - solvents
  - curing compounds
- Soil stabilizers and binders
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease

- Asphalt and concrete components
- Pesticides and herbicides
- 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

- Safety Data Sheets shall be supplied to the Resident Engineer for all materials.
- Latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry, and are no longer hazardous and may be disposed with other construction debris.
- Do not remove the original product label as it contains important safety and disposal information. Use the entire product before disposing the container.
- Mix paint indoors or in a containment area. Never clean paint brushes or rinse paint containers into a street, gutter, or storm drain, or near a water body. Dispose any paint thinners, residue, and sludge(s) that cannot be recycled as hazardous waste.
- For water based paint, clean brushes to the extent practical and rinse to a drain leading to a sanitary sewer where permitted, or into a concrete washout pit. For oil-based paints, clean brushes to the extent practical and filter and reuse thinners and solvents.
- Use recycled and less-hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible.
- Do not over-apply fertilizers and pesticides. Prepare only the amount needed. Strictly follow the recommended usage instructions.
- Application of herbicides and pesticides shall be performed by a licensed applicator. Document the location, chemicals applied, and applicant's name and qualifications.
- Contractors are required to complete the "Report of Chemical Spray Forms" when spraying herbicides and pesticides.
- Keep an ample supply of spill clean-up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.

Maintenance and Inspections

- Inspect storage areas before, during, and after rainfall events, and at least weekly during other times. Collect and place into drums any spills or accumulated rainwater and dispose properly.
- Spot-check employees and subcontractors throughout the job; include appropriate practices as part of the informal tailgate training.

SWPPP or WPCP

Material Management must be discussed in Section 600.2.2 of the SWPPP or Section 30.3.2 of the WPCP. Material storage areas should be included in the WPCDs.

Stockpile Management

Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☑

Definition and Purpose

Stockpile management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, and paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), AC rubble, aggregate base, aggregate subbase or pre-mixed aggregate, asphalt binder (so called “cold mix” asphalt) and pressure-treated wood.

Appropriate Applications

Implemented in all projects that stockpile soil and other materials.

Limitations

Use of plastic cover might be restricted depending on the location of the site and regulatory permits.

Standards and Specifications

Stockpiles must comply with Standard Specifications Section 13-4.03C(3) – “Stockpile Management.”

- Stockpile protection is a year-round requirement.
- Locate stockpiles a minimum of 50 feet from concentrated flows of storm water, drainage courses, and inlets.
- Use run-on and runoff BMPs to ensure stockpile materials are protected and do not have the potential to discharge material.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, “Wind Erosion Control.”

- Stockpiles of contaminated soil shall be managed in accordance with WM-7, “Contaminated Soil Management.”
- Bagged materials should be placed on pallets and under cover.

Protection of Inactive Stockpiles

Inactive stockpiles of the identified materials shall be protected further as follows:

- Soil stockpiles:
  - shall be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times. If no longer needed, they should be removed and disposed properly.
- Stockpiles of PCC rubble, AC, AC rubble, aggregate base, or aggregate subbase:
  - shall be covered or protected with a temporary perimeter sediment barrier at all times. If no longer needed, they should be removed and disposed properly.
- Stockpiles of “cold mix”:
  - shall be placed on and covered with plastic or comparable material at all times and surround by a berm.
- Stockpiles/Storage of pressure-treated wood with copper, chromium, and arsenic or ammoniacal, copper, zinc, and arsenate:
  - shall be covered with plastic or comparable material and placed on pallets.

Protection of Active Stockpiles

Active stockpiles shall be protected further as follows:

- All stockpiles shall be covered, stabilized, or protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of “cold mix” shall be placed on and covered with plastic or comparable material prior to the onset of precipitation.
- All stockpiles should be removed from the site and disposed properly.
- At no time should stockpiles be allowed to commingle with stormwater run-on or runoff.

Maintenance and Inspections

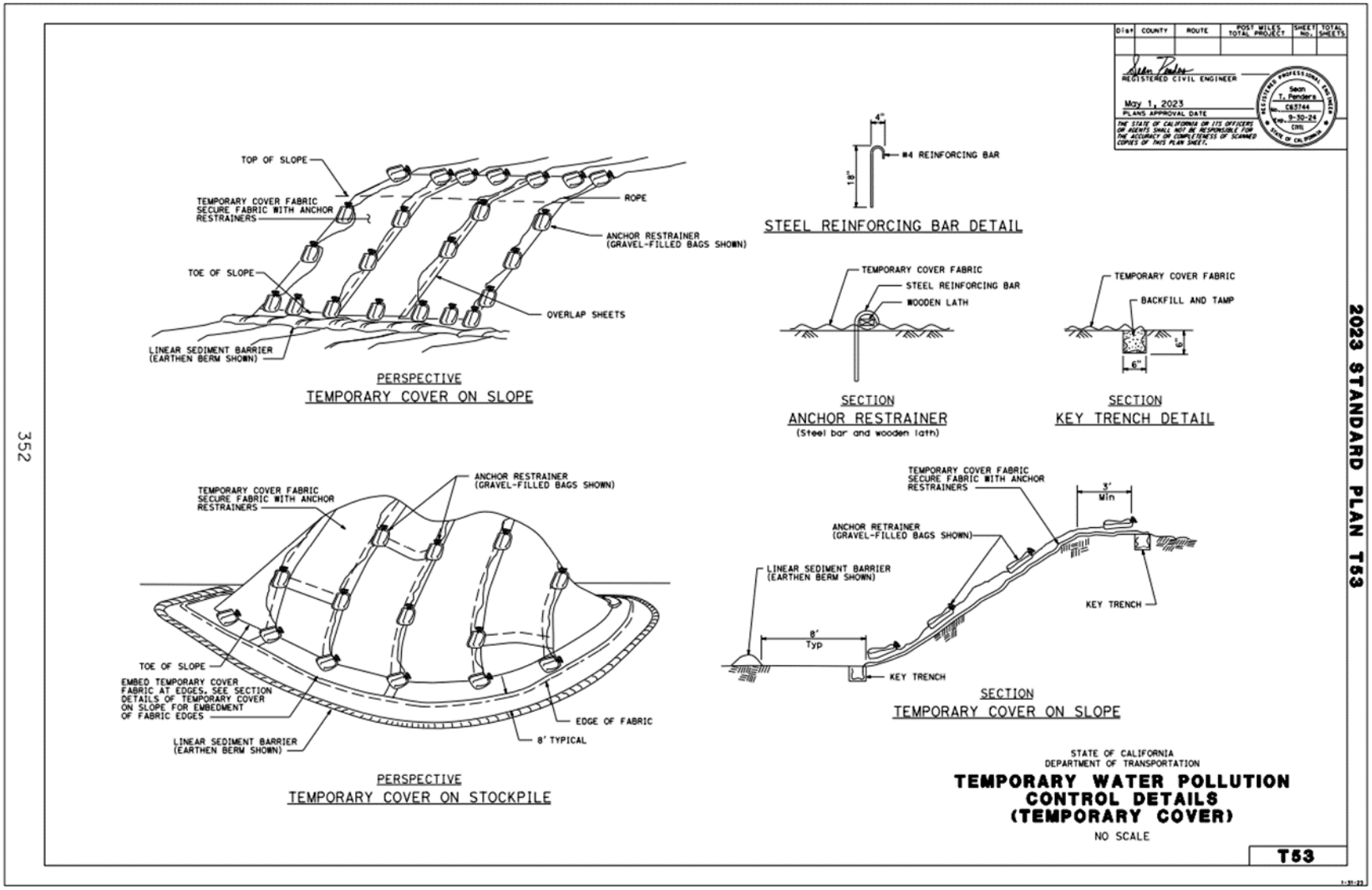
- Inspect stockpile management areas before, during, and after rainfall events, and at least weekly during other times.
- Repair and/or replace perimeter controls and covers to keep stockpile management functioning properly.
- Stockpile management areas must be shown on the WPCDs and reflect site conditions.

SWPPP or WPCP

Stockpile management must be discussed in Section 600.2.2 of the SWPPP or Section 30.3.2 of the WPCP.

Stockpile Management

WM-3



Spill Prevention and Control

Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☑

Definition and Purpose

These procedures and practices are implemented to prevent and control spills in a manner that minimizes or prevents the discharge of spilled material to the drainage system or watercourses.

Appropriate Application

- This BMP applies to all construction projects. Spill control procedures are implemented any time chemicals and/or hazardous substances are stored. Substances may include, but are not limited to:
  - Soil stabilizers/binders
  - Dust palliatives
  - Herbicides
  - Growth inhibitors
  - Fertilizers
  - Deicing/anti-icing chemicals
  - Fuels
  - Lubricant
  - Other petroleum distillates
- To the extent that the work can be accomplished safely, spills of oil; petroleum products; substances listed under 40 CFR parts 110, 117, and 302; and sanitary and septic wastes shall be contained and cleaned up immediately.

Spill Prevention and Control

WM-4

Limitations

- This BMP only applies to spills caused by the Contractor. Other spills or discharges observed or discovered must be reported to the RE.
- Procedures and practices presented in this BMP are general. Contractor shall identify appropriate practices for the specific materials used or stored on site and follow the appropriate Safety Data Sheet(s).

Standards and Specifications

- Must comply with Caltrans Standard Specifications Section 13-4.03B – "Spill Prevention and Control."
- To the extent that it doesn't compromise clean -activities, spills shall be covered and protected from stormwater run-on.
- Spills shall not be buried or washed with water. Potable water has chlorine, and therefore should not be allowed to be discharged off the project site.
- Used clean-up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose shall be stored and properly disposed.
- Water used for cleaning and decontamination shall not be allowed to enter storm drains or watercourses and shall be collected and disposed in accordance with WM-10, "Liquid Waste Management."
- Water overflow or minor water spillage shall be contained and shall not be allowed to discharge into drainage facilities or watercourses.
- Proper storage, clean-up, and spill reporting instruction for hazardous materials stored or used on the project site shall be posted at all times in an open, conspicuous, and accessible location.
- Waste storage areas shall be kept clean, well-organized, and equipped with ample clean-up supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.

Education

- Educate employees and subcontractors on what a "significant spill" is for each material they use, and what the appropriate response is 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.
- The WPC Manager shall oversee and enforce proper identification of stormwater pollution potential, spill prevention, response, control measures and spill reporting.
- The list of reportable quantities can be found at https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-117/subpart-A/section-117.3.

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 properly.
  - The practice commonly followed for a minor spill is:
  - Contain the spread of the spill.
  - Recover spilled materials.
  - Clean the area and/or properly dispose 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:
  - Notify the WPC Manager immediately. The WPC Manager shall notify the RE and prepare the proper notifications as required.
  - Contain spread of the spill.
  - 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.
  - If the spill occurs in dirt areas, immediately contain the spill. Dig up and properly dispose contaminated soil.
  - If the spill occurs during rain, cover spill with tarps 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:
  - Notify the RE immediately and follow up with a written report.
  - 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.
  - Notify the Governor's Office of Emergency Services Warning Center, (800) 852-7550 or 1-(916) 845-8911.
  - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the Contractor shall notify the National Response Center at (800) 424-8802.

- Notification shall first be made by telephone and followed up with a written report. The reporting form is located at: https://www.caloes.ca.gov/wp-content/uploads/Fire-Rescue/Documents/304-Written-Report-Form.pdf
- The services of a spill contractor or a Haz-Mat team shall be obtained immediately. Construction personnel shall not attempt to clean up the spill until the appropriate and qualified staff have arrived at the job site.
- Other agencies that may need to be consulted include, but are not limited to, the Fire Department, Public Works Department, the Coast Guard, Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, RWQCB, etc.

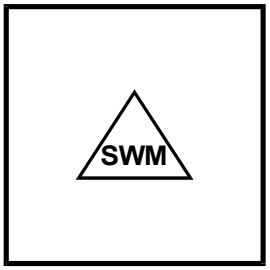
Maintenance and Inspection

- 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 when changes occur in the types of chemicals used or stored onsite.
- Improper cleanup might trigger the need for water quality or soil testing. The WPC manager should be proactive in ensuring controls are in place and adequate to contain and prevent further issues.

SWPPP or WPCP

Spill Prevention and Control must be discussed in Section 600.2.2 of the SWPPP or Section 30.3.2 of the WPCP.

Solid Waste Management



Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☑

Definition and Purpose

Solid waste management procedures and practices are designed to minimize or eliminate the discharge of pollutants to the drainage system or to water bodies as a result of the creation, stockpiling, or removal of construction site wastes.

Appropriate Applications

Solid waste management procedures and practices are implemented on all construction projects that generate solid wastes.

Solid wastes include but are not limited to:

- Construction wastes, including brick, mortar, timber, steel and metal scraps, sawdust, pipe and electrical cuttings, non-hazardous equipment parts, and Styrofoam and other materials used to transport and package construction materials.
- Highway planting wastes, including vegetative material, plant containers, and packaging materials.
- Litter, including food containers, beverage cans, coffee cups, paper bags, plastic wrappers, and smoking materials, including litter generated by the public.

Limitations

None identified.

Solid Waste Management

WM-5

Standards and Specifications

Education

- The WPC Manager shall 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 and tailgate sessions).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prevent debris or trash from being transported by wind or runoff.
- Prohibit littering by employees, subcontractors, and visitors.
- Wherever possible, minimize production of solid waste materials.
- Must comply with Standard Specifications Section 14-10 – “Solid Waste Disposal and Recycling” and 13-4 – “Job Site .”Management.

Collection, Storage, and Disposal

- Dumpsters of sufficient size and number shall be provided to contain the solid waste generated by the project, and be properly serviced. Must ensure that containers are watertight and have a cover.
- Littering on the project site shall be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines shall be a priority.
- Trash receptacles shall be provided in the Contractor’s yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Construction debris and litter from work areas within the construction limits of the project site shall be collected and placed in watertight dumpsters at least weekly regardless of whether the litter was generated by the Contractor, the public, or others. Collected litter and debris shall not be placed in or next to drain inlets, storm water drainage systems, or watercourses.
- Full dumpsters shall be removed from the project site and the contents shall be disposed outside the highway right-of-way in conformance with the provisions in Standard Specifications Section 14-10 – “Solid Waste Disposal and Recycling.”
- Litter stored in collection areas and containers shall be handled and disposed by trash hauling contractors.
- Stormwater run-on shall be prevented from contacting stored solid waste by berms, dikes, or other temporary diversion structures, or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas shall be located at least 50 feet from drainage facilities and watercourses and shall not be located in areas prone to flooding or ponding.

- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters shall be securely covered from wind and rain by covering the waste with tarps or plastic sheeting.
- Dumpster wash on the project site is not allowed.
- Notify trash hauling contractors that only watertight dumpsters are acceptable for use on site.
- Plan for additional containers during the demolition phase of construction.
- Plan for more frequent pickup during the demolition phase of construction.
- Construction waste shall be stored in a designated area and shown in the WPCDs.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Keep the site clean of litter debris.
- Make sure that toxic liquid wastes (e.g., used oils, solvents, and paints) and chemicals (e.g., acids, pesticides, additives, curing compounds) are not disposed in dumpsters designated for construction debris.
- Dispose non-hazardous waste in accordance with Standard Specifications Section 14-10 – "Solid Waste Disposal and Recycling."
- For disposal of hazardous waste, see BMP WM-6, "Hazardous Waste Management." Have hazardous waste hauled 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 converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

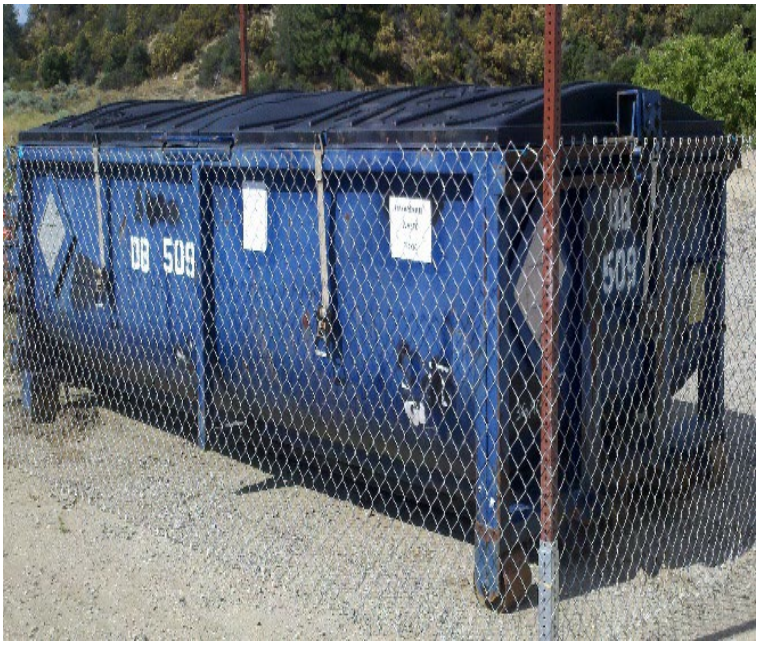
Maintenance and Inspection

- The WPC Manager shall monitor on-site solid waste storage and disposal procedures.
- Specific locations for solid waste storage or containment must be shown in the WPCDs and must be inspected and maintained regularly.
- Cover waste disposal containers at the end of every business day and during a precipitation event for SWPPP projects.

SWPPP or WPCP

- Solid Waste Management must be discussed in Section 600.2.2 of the SWPPP or Section 30.3.2 of the WPCP.

Hazardous Waste Management



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☑

Definition and Purpose

These are procedures and practices to minimize or eliminate the discharge of pollutants from construction site hazardous waste to the storm drain systems or to watercourses.

Appropriate Applications

- This BMP applies to all construction projects.
- Hazardous waste management practices are implemented on construction projects that generate waste from the use of:
  - Petroleum products
  - Asphalt products
  - Concrete curing compounds
  - Pesticides
  - Palliatives
  - Acids
  - Paints
  - Stains
  - Solvents
  - Septic wastes
  - Wood preservatives

- Roofing tar
- Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302.

Limitations

- Nothing in this BMP relieves the Contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.
- This BMP does not cover aerially deposited lead (ADL) soils. For ADL soils, refer to WM-7, "Contaminated Soil Management" and the project special provisions.

Standards and Specifications

Education

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on 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 hazardous waste management procedures (incorporate into regular safety meetings and tailgate sessions).
- The WPC Manager must oversee and enforce proper hazardous waste management procedures and practices.
- Make sure that hazardous waste is collected, removed, and disposed only at authorized disposal areas.

Storage Procedures

- Wastes shall be stored in sealed containers constructed of a suitable material and shall be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172,173, 177 and 178, 179.
- All hazardous waste shall be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers shall be stored in temporary containment facilities that shall comply with the following requirements:
  - Temporary containment facility shall provide for a spill containment volume able to contain precipitation from a 24-hour, 25-year storm event, plus the greater of 10 percent of the aggregate volume of all containers or 100 percent of the capacity of the largest tank within its boundary.
  - Temporary containment facility shall be impervious to the materials stored there for a minimum contact time of 72 hours.

  - Temporary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be placed into drums after each rainfall. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids shall be sent to an approved disposal site.
  - Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.
  - Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.
  - Temporary containment facilities shall be covered during non-working days and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs. A storage facility having a solid cover and sides is preferred to a temporary tarp. Storage facilities shall be equipped with adequate ventilation.
- Drums shall not be overfilled and wastes shall not be mixed.
- Unless watertight, containers of dry waste shall be stored on pallets.
- Paint brushes and equipment for water and oil-based paints shall be cleaned within a contained area and shall not be allowed to contaminate site soils, watercourses, or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused shall be disposed as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths shall be disposed as solid waste.
- Ensure that adequate hazardous waste storage volume is available.
- Ensure that hazardous waste collection containers are conveniently located.
- To prevent accidental spills, designate hazardous waste storage areas on site away from storm drains or watercourses and away from moving vehicles and equipment.
- Minimize production or generation of hazardous materials and hazardous waste on the job site.
- Use containment berms in fueling and maintenance areas and where the potential for spills is high.
- Segregate potentially hazardous waste from non-hazardous construction site debris.
- Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.
- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- Place hazardous waste containers in secondary containment.
- Do not allow potentially hazardous waste materials to accumulate on the ground.
- Do not mix wastes.

Disposal Procedures

- Waste shall be disposed outside the highway right of way within 90 days of being generated, or as directed by the Resident Engineer. In no case shall hazardous waste storage exceed requirements in Title 22 CCR, Section 66262.34.
- Waste shall be disposed by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility using properly completed Uniform Hazardous Waste Manifest forms.
- An Environmental Laboratory Accreditation Program (ELAP)-accredited laboratory shall sample waste and analyze it to determine the appropriate disposal facility.
- Make sure that toxic liquid wastes (e.g., used oils, solvents, paints) and chemicals (e.g., acids, pesticides, additives, curing compounds) are not disposed in dumpsters designated for solid waste construction debris.
- Properly dispose of rainwater that may have mixed with hazardous waste in secondary containment.
- Recycle any useful material such as used oil or water-based paint when practical.
- Attention is directed to “Hazardous Material,” “Contaminated Material,” and “Aerially Deposited Lead” of the Contract documents regarding the handling and disposal of hazardous materials.

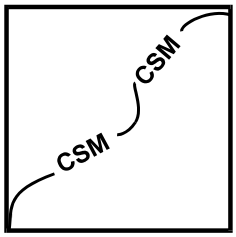
Maintenance and Inspection

- The WPC Manager or QSP shall monitor on-site hazardous waste storage and disposal procedures.
- Waste storage areas shall be kept clean, well-organized, and equipped with ample clean up supplies as appropriate for the materials being stored.
- Storage areas shall be inspected in conformance with the provisions in the Contract Documents. At a minimum, storage areas must be inspected before, daily during extended storm events, after every storm event, and weekly year-round. Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.
- Hazardous spills shall be cleaned up and reported in conformance with the applicable Safety Data Sheet and the instructions posted at the project site.
- The National Response Center, at (800) 424-8802, shall be notified of spills of federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302.
- Copies of the hazardous waste manifests shall be provided.

SWPPP or WPCP

- Hazardous Waste Management must be discussed in Section 600.2.2 of the SWPPP or Section 30.3.2 of the WPCP.

Contaminated Soil Management



Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☑

Definition and Purpose

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

Appropriate Applications

- Contaminated soil management is implemented on construction projects where soil contamination may have occurred due to spills, illicit discharges, or leaks from underground storage tanks.
- It may also apply to highway widening projects in older areas where median and shoulder soils may have been contaminated by aerially deposited lead (ADL).

Limitations

- The procedures and practices presented in this BMP are general. The Contractor shall identify appropriate practices and procedures consistent with the plans and specifications for the specific contaminants known to exist or discovered on site.

Standards and Specifications

Identifying Contaminated Areas

- Contaminated soils are often identified during project planning and development with known locations identified in the plans and specifications. The Contractor shall review applicable reports and examine applicable call-outs in the plans and specifications.

- The Contractor may discover contaminated soils not identified in the plans and specifications by observing spills and leaks, discoloration, odors or abandoned underground tanks or pipes.
- Spills and leaks caused by the Contractor are the Contractor's responsibility for removal, testing, and disposal.
- If unanticipated asbestos or hazardous substances are discovered that were not released by the Contractor, the Contractor shall stop work in that area and immediately notify the Resident Engineer (RE). The Contractor shall not resume work in the area until directed to do so.

Education

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

Handling Procedures for Material with Aerially Deposited Lead (ADL)

- Materials from areas designated as containing ADL may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.
- Must comply with Standard Specifications Section 14-11 – "Hazardous Waste and Contamination."
- Must comply with the DTSC ADL agreement for specific requirements regarding handling, stockpiling, and hauling of material.
- Excavation, transportation, and placement operations shall result in no visible dust.
- Use caution to prevent spillage of lead-containing material during transport.
- Monitor the air quality during excavation of soils contaminated with lead.

Handling Procedures for Contaminated Soils

- Contaminated soil shall be disposed properly in compliance with the specifications and all applicable regulations in Title 22, CCR, Division 4.5 and Standard Specifications Section 14-11.
- If required by the specifications, test contaminated soils at a SWRCB Environmental Laboratory Accreditation Program (ELAP) 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 allowed by the specifications, place plastic sheeting or tarps underneath material and cover the stockpile with plastic sheeting or tarps, if required by the specifications.
- Install a berm around the stockpile to prevent run-on or runoff from leaving the area.

- Do not stockpile in or near storm drains or receiving water.
- Install berms or run-on controls to prevent stormwater from commingling with contaminated areas.
- 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 during excavation operations if required.
- Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.
- Collect water from decontamination procedures and treat and/or dispose it at an appropriate disposal site.
- Collect non reusable protective equipment once used by any personnel, and dispose at an appropriate disposal site.
- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.
- Excavation, transport, and disposal of contaminated material and hazardous material shall be in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):
  - 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).
  - Local regulatory agencies.

Procedures for Underground Storage Tank Removals

- If an unknown underground storage tank is discovered, the Contractor shall stop work in that area and immediately notify the RE. The Contractor shall not resume work in the area until directed to do so.
- If tank removal operations are required by the contract, follow the contract requirements for obtaining permits and approval from the federal, state, and local agencies, which have jurisdiction over such work.
- If tank removal operations are required by the contract, the underground storage tank, any liquid and/or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal shall be transported to disposal facilities as required by the contract specifications.

Water Control

- Take all necessary precautions and preventive measures to prevent the flow of water, including ground water, from mixing with contaminated or hazardous materials or entering contaminated soil excavations. Such preventative measures may consist of, but are not limited to, berms, cofferdams, grout curtains, freeze walls, seal course concrete, or any combination thereof.
- If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, shall be dewatered consistent with NS-2, “Dewatering” and the Caltrans Field Guide to Construction Site Dewatering Manual, and in compliance with the specifications.

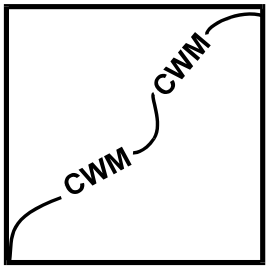
Maintenance and Inspection

- The WPC Manager shall monitor on-site contaminated soil storage and disposal procedures.
- Monitor the air quality during excavation operations if required
- Manage contaminated soils and hazardous substances/waste under the appropriate federal, state, and local requirements.
- Inspect stockpiles, hazardous waste receptacles, and storage areas regularly.

SWPPP or WPCP

Contaminated Soil Management must be discussed in Section 600.2.2 of the SWPPP or Section 30.3.2 of the WPCP.

Concrete Waste Management



Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☑

Definition and Purpose

These are procedures and practices that are designed to minimize or eliminate the discharge of concrete waste materials to the storm drain systems or watercourses.

Appropriate Applications

- Where concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Where slurries containing portland cement concrete (PCC) or asphalt concrete (AC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition.
- Where concrete trucks and other concrete-coated equipment are washed on site, when approved by the Resident Engineer (RE). See also NS-8, “Vehicle and Equipment Cleaning.”
- Where mortar-mixing stations exist.

Limitations

- None identified.

Standards and Specifications

Education

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.
- The WPC Manager shall oversee and enforce concrete waste management procedures.

Concrete Demolition Wastes

- Stockpile concrete demolition wastes in accordance with BMP WM-3, “Stockpile Management.”
- Disposal of hardened PCC and AC waste shall be in conformance with Standard Specifications Section 14-10 – “Solid Waste Disposal and Recycling.”

Concrete Slurry Waste Management and Disposal

- PCC and AC waste shall not be allowed to enter storm drainage systems or watercourses.
- A sign shall be installed adjacent to each temporary concrete washout facility to inform concrete equipment operators to use the proper facilities.
- The WPC manager must ensure that on-site concrete working tasks are being monitored, such as saw cutting, coring, grinding, and grooving to ensure proper methods are implemented.
- Residue from saw cutting, coring, and grinding operations shall be picked up by means of a vacuum device. Residue shall not be allowed to flow across the pavement and shall not be left on the pavement surface. See also NS-3, “Paving, Sealing, Saw Cutting, Grooving, and Grinding Operations.”
- Vacuumed slurry residue shall be disposed in accordance with WM-5, “Solid Waste Management” and Standard Specifications Section 13-4.03D – “Waste Management.” Slurry residue shall be temporarily stored in a facility as described below in “On-site Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures,” or within an impermeable containment vessel or bin.
- Collect and dispose all residues from grooving and grinding operations in accordance with Standard Specifications Section 14-10, – “Solid Waste Disposal and Recycling” and 14-11, “Hazardous Waste and Contamination.”

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

- Temporary concrete washout facilities shall be located a minimum of 50 feet from storm drain inlets, open drainage facilities, and watercourses unless determined infeasible by the RE. Each facility shall be located away from construction traffic or access areas to prevent disturbance or tracking.
- A sign shall be installed adjacent to each washout facility to inform concrete equipment operators to use the proper facilities. The sign shall be installed as shown on the plans and in conformance with the provisions in Standard Specifications Section 56 2 – “Overhead Sign Structures.”
- Temporary concrete washout facilities shall be constructed above grade or below grade at the option of the Contractor. Temporary concrete washout facilities shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.
- Temporary washout facilities shall have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- Perform washout of concrete mixers, delivery trucks, and other delivery systems in designated areas only.

- Wash concrete only from mixer chutes into approved concrete washout facility. Washout may be collected in an impermeable bag or other impermeable containment devices for disposal.
- Pump excess concrete in concrete pump bin back into concrete mixer truck.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area, or properly disposed offsite.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed, and disposed in conformance with the provisions in Standard Specifications Section 13-4.03D(3), ") Concrete Waste;" 13-9, " Temporary Concrete Washouts;" 15-1.03B, "Removing Concrete;" and 14-10, "Solid Waste Disposal & Recycling."

Temporary Concrete Washout Facility Type "Above Grade"

- Temporary concrete washout facility type "Above Grade" shall be constructed as shown on Page 6, with a recommended minimum length and width of 10 feet, but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations. The length and width of a facility may be increased, at the Contractor's expense, upon approval from the RE.
- Straw bales, wood stakes, and sandbag materials shall conform to the provisions in SC-9, "Temporary Straw Bale Barrier."
- Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears, or other defects that compromise the impermeability of the material. Liner seams shall be installed in accordance with manufacturers' recommendations.
- Portable delineators shall conform to the provisions in Standard Specifications Section 12 3.04 – "Portable Delineators." The delineator bases shall be cemented to the pavement in the same manner as provided for cementing pavement markers to pavement. Portable delineators shall be applied only to a clean, dry surface.

Temporary Concrete Washout Facility Type "Below Grade"

- Temporary concrete washout facility type "Below Grade" shall be constructed as shown on page 6, with a recommended minimum length and width of 10 feet. The quantity and volume shall be sufficient to contain all liquid and concrete waste generated by washout operations. The length and width of a facility may be increased, at the Contractor's expense, upon approval of the RE. Lath and flagging shall be commercial type.
- Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears, or other defects that compromise the impermeability of the material. Liner seams shall be installed in accordance with manufacturers' recommendations.
- The soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.
- Temporary washout facilities shall implement BMPs to prevent run-on and runoff from the facility.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, as determined by the RE, the hardened concrete shall be removed and disposed. Disposal of PCC dried residues, slurries, or liquid waste shall be disposed outside the highway right-of-way in conformance with provisions of Standard Specifications Section 14-10. Materials used to construct temporary concrete washout facilities shall become the property of the Contractor, shall be removed from the work site, and be disposed outside the highway right-of-way.
- Holes, depressions, or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and repaired in conformance with the provisions in Standard Specifications Section 5 –"Control of Work."

Maintenance and Inspection

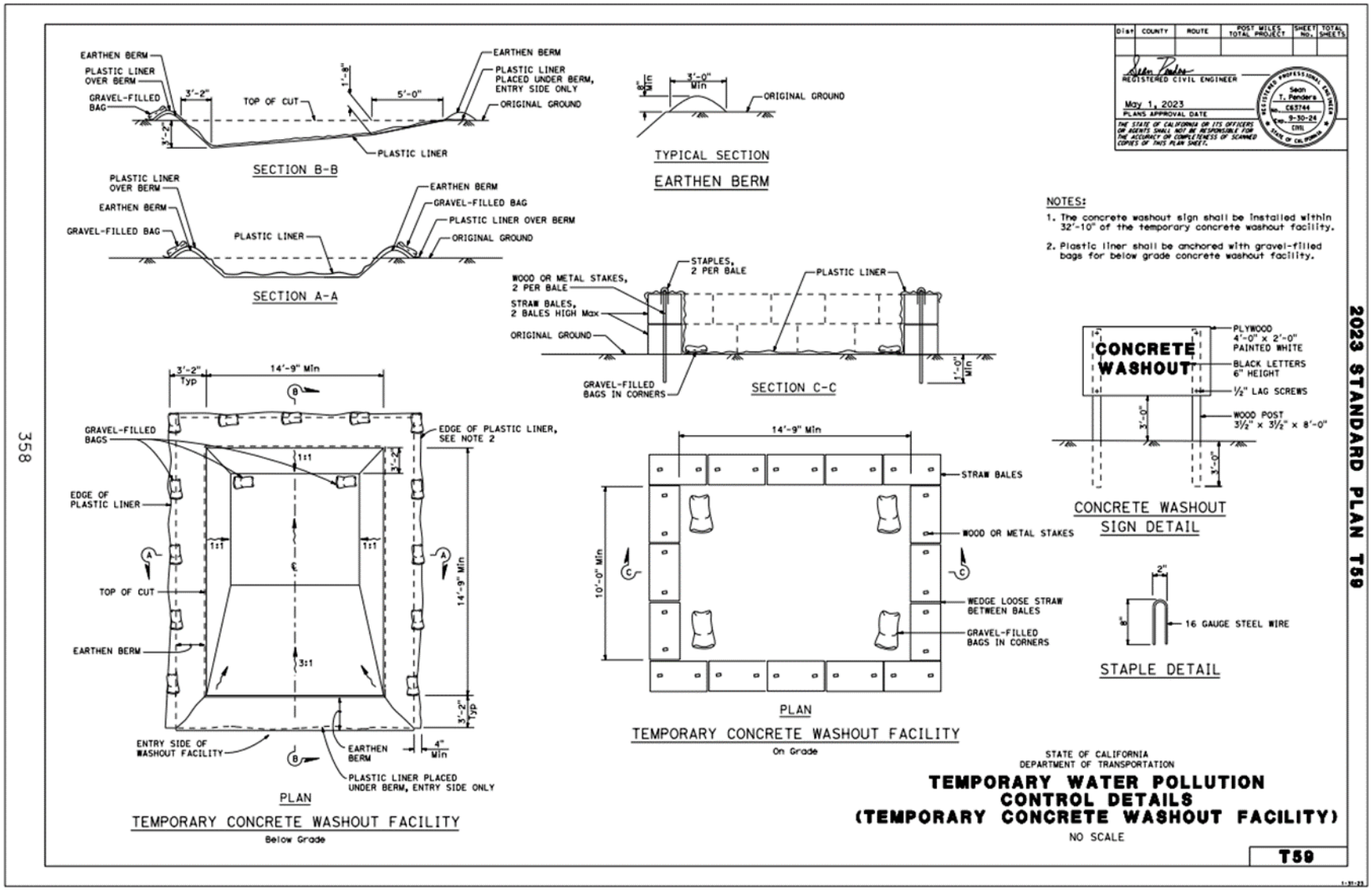
- Inspect concrete waste management areas before, during, and after rainfall events, and at least weekly during other times.
- The WPC manager shall monitor concrete working tasks, such as saw cutting, coring, grinding and grooving daily to ensure proper methods are employed or as directed by the RE.
- Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 4 inches for above-grade facilities and 12 inches for below-grade facilities.
- Maintaining temporary concrete washout facilities shall include removing and disposing hardened concrete and returning the facilities to a functional condition.
- Hardened concrete materials shall be removed and disposed in conformance with the provisions in Standard Specifications Section 13-4 and 14-10.
- Existing facilities must be cleaned, or new facilities must be constructed and ready for use, once the washout is 75% full.
- Temporary concrete washout facilities shall be inspected for damage (e.g., tears in polyethylene liner, missing sandbags, etc.).
- Inspection and maintenance of these areas must be properly documented and ensure no potential for discharges from these areas occur as part of the non-visible monitoring requirements.

SWPPP or WPCP

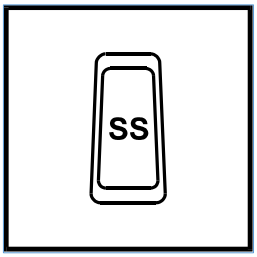
Concrete waste management must be discussed in Section 600.2.2 of the SWPPP or Section 30.3.2 of the WPCP.

Concrete Waste Management

WM-8



Sanitary and Septic Waste Management



Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☑

Definition and Purpose

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

Appropriate Application

Sanitary/septic waste management practices are implemented on all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Standards and Specifications

Education

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary/septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary/septic waste.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings and tailgates).
- Establish a continuing education program to indoctrinate new employees.

Sanitary and Septic Waste Management

WM-9

Storage and Disposal Procedures

- Temporary sanitary facilities shall be located away from drainage facilities, receiving waters, and traffic circulation.
- When subjected to high winds or risk for overtopping, temporary systems must be properly secured.
- Wastewater shall not be discharged or buried within the highway right of way.
- Sanitary facilities require secondary containment to prevent discharges of pollutants to the stormwater drainage system or receiving water.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, shall comply with the local health agency, city, county, and sewer district requirements.
- If using an on-site disposal system, such as a septic system, comply with local health agency requirements.
- Properly connect temporary sanitary facilities that discharge to the sanitary sewer system to avoid illicit discharges.
- Ensure that sanitary and septic facilities are maintained in good working order by a licensed service.
- Use only reputable, licensed sanitary/septic waste haulers.

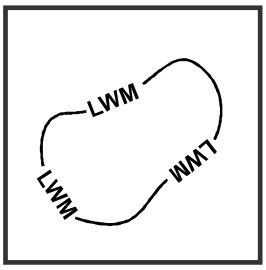
Maintenance and Inspection

- Inspect on-site sanitary and septic waste storage and disposal procedures at least weekly, prior to a forecasted rain event, daily during extended rain events, and post storm events.
- Locations for portable sanitary systems must be shown on the WPCDs and reflect current site conditions.

SWPPP or WPCP

Sanitary and Septic Waste Management must be discussed in Section 600.2.2 of the SWPPP or Section 30.3.2 of the WPCP.

Liquid Waste Management



Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☑

Definition and Purpose

Procedures and practices to prevent discharge of pollutants to the storm drain system or to receiving waters 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 by-products, residuals, or wastes:

- Drilling slurries and drilling fluids
- Grease-free and oil-free wastewater and rinse water
- Dredgings
- Other non-storm water liquid discharges not permitted by separate permits

Limitations

- Disposal of some liquid wastes may be subject to specific laws and regulations, or to requirements of other permits secured for the construction project (e.g., NPDES permits, Army Corps permits, Coastal Commission permits, etc.).
- Does not apply to dewatering operations (see NS-2, “Dewatering”), solid waste management (see WM-5, “Solid Waste Management”), hazardous wastes (see WM-6, “Hazardous Waste Management”), or concrete slurry residue (see WM-8, “Concrete Waste Management”).

- 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 firefighting activities. See SWMP for a complete list of permitted non-stormwater discharges.

Standards and Specification

General Practices

- Must comply with Standard Specifications Section 13-4.03B – "Spill Prevention and Control."
- Instruct employees and subcontractors on 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 structure, 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 and tailgates).
- Verify which non-stormwater discharges are permitted by the Caltrans NPDES permit; different regions might have different requirements not outlined in this permit. Some listed discharges may be prohibited if Caltrans determines the discharge to be a source of pollutants.
- Apply the NS-8, "Vehicle and Equipment Cleaning" BMP for managing wash water and rinse water from vehicle and equipment cleaning operations.

Containing Liquid Wastes

- Drilling residue and drilling fluids shall not be allowed to enter storm drains and receiving waters and shall be disposed outside the highway right of way in conformance with the provisions in the Standard Specifications.
- If an appropriate location is available, as determined by the Resident Engineer, drilling residue and drilling fluids that are exempt under California Code of Regulations (CCR) Title 23 §2511(g) may be dried by infiltration and evaporation in a containment facility constructed in conformance with the provisions concerning the temporary concrete washout facilities detailed in WM-08, "Concrete Waste Management."
- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, shall be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.
- Contain liquid wastes in a controlled area, such as a holding pit, sediment basin, roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.

- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.
- Take precautions to avoid spills or accidental releases of contained liquid wastes. Apply the education measures and spill response procedures outlined in WM-4, “Spill Prevention and Control.”
- Do not locate containment areas or devices where accidental release of the contained liquid can threaten health or safety, or discharge to water bodies, channels, or storm drains.

Capturing Liquid Wastes

- Capture all liquid wastes running off a surface, which has the potential to affect the storm drainage system, such as wash water and rinse water from cleaning walls or pavement.
- Do not allow liquid wastes to flow or discharge uncontrolled. Use temporary dikes or berms to intercept flows and direct them to a containment area or device for capture.
- If the liquid waste is sediment laden, use a sediment trap (see SC-3, “Sediment Trap/Curb Cutback”) 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 NS-2, “Dewatering Operations” and SC-2, “Sediment/Desilting Basin.” Dispose resulting solids per WM-5, “Solid Waste Management.”
- Method of disposal for some liquid wastes may be prescribed in water quality reports, NPDES permits, Environmental Impact Reports, 401 Water Quality Certifications 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 WM-6, “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. At a minimum, liquid waste containment areas must be inspected before, during, and after rain events. Findings must be properly documented, and any deficiencies timely corrected.
- Remove deposited solids in containment areas and capturing devices as needed, and at the completion of the task. Dispose any solids as described in WM-5, “Solid Waste Management.”
- Inspect containment areas and capturing devices frequently for damage and repair as needed.
- Improper storage, containment, or disposal might trigger sampling requirements per section 1000 of the SWPPP.
- Locations for liquid waste management must be shown on the WPCDs and reflect current site conditions.

SWPPP or WPCP

Liquid Waste Management must be discussed in Section 600.2.2 of the SWPPP or Section 30.3.2 of the WPCP.

Section 9
TMDL Implementation Requirements

9.1 Introduction

A TMDL, or total maximum daily load, is a regulatory term used by the SWRCB to establish water quality management regulations. TMDLs serve as regulatory instruments that establish the upper allowable limit of a pollutant that a water body within a watershed can receive while still maintaining compliance with water quality standards. The 2022 CGP introduces new provisions related to TMDL monitoring and reporting. These TMDL implementation criteria are applicable to projects that meet two conditions:

1) they discharge into a water body or watershed for which the EPA has established a TMDL, and
2) they possess on-site sources of the specific TMDL pollutant, as determined through a pollutant source assessment.

Construction projects within a TMDL watershed can be subject to the following requirements (depending on watershed, applicability can be one or all of the following):

1) non-visible pollutant sampling
2) RUSLE2 modeling
3) Representative flow rate of discharge (Peñasquitos Lagoon TMDL)
4) QSP Training (Bacteria TMDL)
5) TMDL-related NAL/NELs
6) Soil screening (post-2032)

9.2 Waste Load Allocations

Some TMDL watersheds have assigned waste load allocations (WLAs) as listed in Attachment H of the CGP. The following Water Board regions have WLAs for the listed TMDLs:

- Region 1 (North Coast Regional Water Quality Control Board) – Sediment TMDLs
- Region 4 (Los Angeles Regional Water Quality Control Board) – Metals and Toxics TMDLs
- Region 8 (Santa Ana Regional Water Quality Control Board) – Metals and Toxics TMDLs, Nutrients TMDLs

Under Attachment H of the CGP, RUSLE2 modeling is required to demonstrate compliance with these TMDL WLAs. This is because the primary transport mechanism for most Caltrans TMDLs is the mobilization and discharge of sediment.

The need for sampling TMDL pollutants arises when there is a risk of pollutant discharge due to:

- The failure to implement BMPs or
- a spill or leak from a container, or a.
- a BMP breach, malfunction, or failure.

The SWPPP Template Section 300 includes the specifics for the pollutant source assessment; Section 1000 deals with sampling for non-visible (including TMDLs).

9.2.1 Additional TMDL Requirements

In addition to meeting the general requirements of the CGP, a Responsible Discharger that is assigned a mass-based WLA of zero shall install erosion and sediment controls that will result in predicted erosion rates that are as protective as pre-construction conditions (e.g., undisturbed vegetation for the area). The calculated RUSLE2 soil loss and sediment delivery rates for the selected BMPs and controls shall be equal to, or less than, the soil loss and sediment delivery rates for pre-construction conditions during each phase of the construction project.

Section 1900 of the SWPPP Template addresses RUSLE2 modeling with respect to TMDLs.

Section 10

Post-construction Treatment BMPs

10.1 Regulatory Environment

The Caltrans Permit under section 402 of the CWA, and Section 401 Water Quality Certifications and 404 (through the Army Corps of Engineers) requires implementation of permanent stormwater treatment best management practices (TBMP) for projects within Caltrans right-of-way to capture pollutants from roadway runoff.

Caltrans projects during the initial Project Initiation Documentation (PID) phase undergo an assessment to determine TBMP applicability. The assessment is refined during the Plans, Specification and Estimate phase; treatment BMP plans, specifications and estimates for TBMPs are then incorporated into the project. This process is described in the Project Planning and Design Guide (PPDG).

10.2 List of Approved TBMPs

TBMPs are permanent measures to improve stormwater quality after construction is completed, though there are instances when construction might use the footprint area or the TBMP as well. The TBMPs listed in Table 10-1 are Caltrans-approved. TBMPs are selected and developed to best meet water quality objectives using a prioritization process described in the PPDG.

Table 10-1. Approved TBMPs

TBMP Name
Biofiltration Systems
Design Pollution Prevention Infiltration Areas
Infiltration Devices
Detention Devices
Traction Sand Traps
Dry Weather Flow Diversion
Full-capture Trash Devices
Media Filters
Multi-chamber Treatment Train
Wet Basins
Bioretention
Open Graded Friction Course
Porous Pavement (Non-Highway Facilities Only)

10.3 Construction Implementation Checklist

TBMPs must be implemented in accordance with the contract plans in order to fulfill permit obligations. The following checklist should be used by construction staff as general guidelines for TBMP inspections:

Layout (before starting excavation)

- Square footage of the facility meets or exceeds minimum shown in approved plans.
- Site grading and grade breaks are consistent with the boundaries of the contributing drainage areas shown in the approved plans.
- Facility inlet elevation is low enough to receive drainage from the entire contributing drainage area.
- Locations and elevations of overland flow or piping from impervious areas to the facility have been laid out and any conflicts resolved.;
- Facility rim elevation is laid out to be level all the way around, or elevations are consistent with a detailed cross-section.;
- Locations for vaults, utility boxes, and light standards have been identified so they will not conflict with the facility.; and
- Facility is protected as needed from construction-phase (sediment-laden) runoff.

Excavation (prior to backfilling or pipe installation)

- No work in heavy precipitation.
- Excavation conducted with materials and techniques to minimize soil compaction within the TBMP footprint if TBMP is not hardscape-based.
- Slopes or side walls protect against sloughing of native soils into the facility.
- Vertical moisture barrier, if specified, has been added to protect adjacent pavement or structures.
- Native soils at bottom of excavation are protected from compaction attributable to construction equipment and are ripped or loosened to promote infiltration, if specified.
- No groundwater seepage or standing water encountered.

Overflow or Surface Connection to Storm Drainage (prior to backfilling with any materials)

- Overflow is at specified elevation.
- No knockouts or side inlets are in overflow riser.
- Overflow location selected to minimize surface flow velocity (near, but offset from, inlet recommended).
- When specified, overflow is connected to storm drain via appropriately sized piping.

Materials

- Source is listed on tags as specified.
- Dimensions match specification
- Delivery amounts and dates are recorded.
- Sieve analysis from quarry and general appearance of subbase, base, bedding, jointing aggregates, aggregate topsoil, and soil components conforms to specifications.
- Geotextile and geomembrane matches specification (if applicable).

Drain Rock/Underdrain

- Aggregate/rock is installed as specified.

- Aggregate/rock is smoothed to a level top elevation; depth and top elevation are as shown in plans.
- Slopes or side walls protect against sloughing of native soils into the facility.
- No filter fabric is installed between the subdrain and soil mix layers, unless specified.
- Size, perforations, locations, slope, and outfalls meet specifications and drawings.

Backfilling with Biofiltration Soil, Aggregate Topsoil or other Specialized Treatment Media

- Imported aggregate, aggregate topsoil, biofiltration soil, or other media matches specification.
- Soil is placed in lifts not exceeding 12 inches and is spread evenly.;
- Media is not compacted during installation but may be thoroughly wetted to encourage consolidation.
- Mix is smoothed to a level top elevation. Depth of mix and top elevation are as shown in plans, accounting for depth of mulch to follow and required reservoir depth.
- Biofiltration soil or other non-structural media is not placed within the Clear Recovery Zone unless shown in the plans.

Planting

- Plants are installed consistent with approved planting plan.
- Any trees and large shrubs are staked securely.
- No fertilizer is added unless specified.
- No native soil or clayey material is imported into the facility with plantings.
- 1-inch to 2-inch mulch may be applied following planting to avoid floating.
- Final elevation of soil mix is maintained following planting.
- Curb openings are free of obstructions.

Final Inspection

- Contributing Drainage Area(s) are free of construction sediment, and landscaped areas are stabilized.
- Inlets are installed to ensure entry of runoff from adjoining pavement, have sufficient reveal (drop from the adjoining pavement to the top of the mulch or soil mix), and are not blocked.
- Rock or other energy dissipation at piped or surface inlets is adequate.
- Temporary flow diversions are removed.
- Overflow outlets are configured to allow the facility to flood and fill to near rim before overflow.
- Plantings are healthy and becoming established.
- Irrigation is operable (if applicable).
- Facility drains. No surface ponding is evident.
- Accumulated construction debris, trash, and/or sediment is removed from the facility.
- Permanent signage is installed and is visible to site users and maintenance personnel (typically referred to as TBMP Paddles).

Caltrans Division of Environmental Analysis has created TBMP certification forms. These certification forms are required at various phases of project development, such as Ready To List, Construction Contract Acceptance, and Project Closeout. This is in addition to the Division of Maintenance transfer of TBMPs where the MTCE-0023 form is completed and certified by Construction and Maintenance.

10.4 TBMP Maintenance Indicators

Maintenance indicators are provided below for each type of TBMP. While these indicators are typically applied to established TBMPs after construction is complete and maintenance has begun, their presence prior to construction completion may indicate a problem that needs to be remedied before the TBMP is transfer to the Division of Maintenance. The Contractor can use TBMP areas during the construction phase so long as the areas are either restored or not allowed to erode, accumulate sediment, or modify the proposed soil type, drainage, or infiltration capacity.

Biofiltration Systems

- No evidence of significant channeling, erosion, seeps, or ponding
- The Average vegetation height does not exceed 12 inches, no emergence of trees, or woody vegetation
- There is more than 70 percent background coverage of vegetation in swale invert and swale side slope
- No debris/trash is present
- Sediment is not at or near vegetation height, there is no channeling of flow within swale and energy dissipaters, no inhibited flow due to change in slope
- No evidence of burrows, holes, or mounds
- Water has not accumulated in spreader ditch and/or collector ditch for more than 72 hours
- No evidence of inlet structures, outlet structures, side slopes, or other features being hindered by debris or being damaged; no evidence of, significant erosion, fence damage, graffiti, vandalism, etc.

Design Pollution Prevention Infiltration Areas

- Drain time does not exceed 96 hours after end of rain event
- No debris/trash is present
- No evidence of erosion
- No evidence of burrows, holes, or mounds
- Sediment depth does not exceed marker on staff gage; no sediment interferes with gravity drainage
- No evidence of inlet structures, outlet structures, side slopes, or other features being hindered by debris or being damaged; no evidence of, significant erosion, fence damage, graffiti, vandalism, etc.

Infiltration Devices

- No standing surface water for more than 72 hours
- No standing water for more than 96 hours
- No debris/trash is present
- No visible sediment
- No evidence of inlet structures, outlet structures, filter fabric, or other features hindered by debris or being damaged
- No emerging trees or woody vegetation, graffiti or vandalism, fence damage, etc.

Detention Devices

- No emerging trees or woody vegetation
- No debris/trash is present
- No evidence of erosion
- No standing water for more than 96 hours
- Sediment depth does not exceed marker on staff gage (average 18 inches)
- No evidence of burrows, holes, or mounds
- No evidence of inlet structures, outlet structures, side slopes, or other features being hindered by debris or being damaged; no significant erosion, graffiti or vandalism, fence damage, etc.
- Average plant height is greater than 12 inches

Traction Sand Traps

- Sediment volume does not exceed design capacity
- Inlet/outlet structural integrity is not compromised; no evidence of damaged structures, graffiti or vandalism, etc.
- No standing water in structure 72 hours after any storm.

Full Capture Trash Devices

- No evidence of inlet structures, outlet structures, or other features being hindered by debris or being damaged. Check for graffiti or vandalism.
- No presence of gross solids (trash and debris)
- No standing water in structure 72 hours after any storm
- No standing water for more than 96 hours (vector monitoring and abatement may be done through agreement with the local vector control authority)
- Screens are in working order and are not clogged, damaged, or loose, and open/ close properly.

Media Filters

- Drain time does not exceed 72 hours (in the filter chamber for Delaware Sand Filter)
- No standing water for more than 96 hours
- Sediment depth does not exceed marker on staff gage in sedimentation basin; no sediment interferes with gravity drainage in standpipe and/or orifice plate (for Austin Sand Filter)
- No debris/trash present
- No evidence of burrows, holes, mounds
- No water accumulation in any structure or other location within the filter
- No evidence of inlet structures, outlet structures, filter fabric, or other features being hindered by debris or being damaged; no signs of emerging vegetation, graffiti or vandalism, fence damage, etc.
- No valve leakage (for Delaware Sand Filter)

Bioretention

- Drain time does not exceed 96 hours after end of rain event
- No debris/trash present
- No signs of erosion
- No evidence of burrows, holes, or mounds

- Sediment depth does not exceed marker; sediment does not interfere with gravity drainage in standpipe and/or orifice plate,
- No evidence of inlet structures, outlet structures, filter fabric, or other features being hindered by debris or damaged; no emerging vegetation, graffiti or vandalism, fence damage, etc.
- No underdrain sediment accumulation and/or broken caps or corrosion of pumps (if present).

Open Graded Friction Coarse

- Check for cracking, raveling, delamination, clogging, and other failure of the overlay.

Porous Pavement

- Paving surface is draining properly after storm,
- No evidence of surface deterioration, including cracking, raveling, delamination, and other failures.

Appendix A:
Definition of Terms

Appendix A

Definition of Terms

Active Areas. An area where soil-disturbing activities have occurred at least once within 14 days.

Areas of Construction. All areas subject to land surface disturbance activities related to the project, including, but not limited to, project staging areas, immediate access areas, and storage areas.

Active Treatment System (ATS). A treatment system that employs chemical coagulation, chemical flocculation, or electrocoagulation to help reduce turbidity caused by fine suspended sediment.

Air Deposition. Airborne particulates from construction activities.

Best Available Technology Economically Achievable (BAT). As defined by USEPA, BAT is a technology-based standard established by the CWA as the most appropriate means available on a national basis for controlling the direct discharge of toxic and non-conventional pollutants to navigable waters. The BAT effluent limitations guidelines, in general, represent the best existing performance of treatment technologies that are economically achievable within an industrial point source category or subcategory.

Best Conventional Pollutant Control Technology (BCT). As defined by USEPA, BCT is a technology-based standard for the discharge from existing industrial point sources of conventional pollutants, including biochemical oxygen demand, total suspended sediment, fecal coliform, pH, oil and grease.

Best Management Practice (BMP). BMPs are scheduling of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants. BMPs also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Caltrans Permit. The Caltrans Statewide National Pollution Discharge Elimination System (NPDES) Permit for discharges from Caltrans properties, facilities, and activities (Order No. 2022-0033-DWQ, NPDES No. CAS000003), issued by the SWRCB.

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.

Construction Site BMPs. Temporary control practices (BMPs) that are required only temporarily to address a short-term stormwater contamination threat as a result of construction activities. For example, silt fences are located near the base of newly graded slopes that have a substantial area of exposed soil. During rainfall, the silt fences capture sediment from slope erosion.

Contractor. Party responsible for carrying out the contract per plans and specifications. The Standard Specifications and contract special provisions contain stormwater protection requirements the Contractor must address.

Contractor-Support Facilities. Contractor-support facilities include staging areas, storage yards for equipment and materials, mobile operations, batch plants for Portland cement concrete and hot mix asphalt, crushing plants for rock and aggregate, and other facilities installed for Contractor convenience such as haul roads.

Debris. Litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic waste.

Direct Discharge. Surface runoff that directly enters the surface water body without first flowing through a municipal separate storm sewer system (MS4).

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

Disturbed Soil Area (DSA). Area of exposed, erodible soil, including stockpiles, that are within the construction limits and that result from construction activities.

Drainage Area. The area of land that drains water, sediment, pollutants, and dissolved materials to a common outlet.

Effluent. Any discharge of water by a discharger either to the receiving water or beyond the property boundary controlled by the discharger.

Environmental Protection Agency (EPA). Agency that issues the regulations to control pollutants in stormwater runoff discharges (e.g., CWA and NPDES permit requirements).

Erosion. The process by which soil particles are detached and transported by the actions of wind, water, or gravity.

Erosion Control BMPs. Vegetation, such as grasses and wildflowers, and other materials, such as straw, fiber, stabilizing emulsion, protective blankets, etc., placed to stabilize areas of disturbed soils, reduce loss of soil due to the action of water or wind, and prevent water pollution.

Exempt Construction Activities. Activities exempt from the CGP, 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.

Expenditure Authorization. A Caltrans expenditure authorization (EA) is a unique identifier assigned to transportation projects that are financed with federal and/or state funds.

Final Stabilization. Indicates all soil-disturbing activities at each individual parcel within the site have been completed in a manner consistent with the requirements in this General Permit.

Forecasted Storm Event. A storm that produces or is forecasted to produce at least 0.10 inches of precipitation within a 24-hour period.

General Permit. The Construction General Permit for Stormwater Discharges Associated with Construction Activity (Order No. 2022-0057-DWQ, NPDES Permit CAS000002) issued by the SWRCB.

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

Good Housekeeping BMPs. BMPs designed to reduce or eliminate the addition of pollutants to construction site runoff through analysis of pollutant sources, implementation of proper handling/disposal practices, employee education, and other actions. The grading (part of the Grading and Land Development Phase) includes reconfiguring the topography and slope, including alluvium removals; canyon cleanouts; rock undercuts; keyway excavations; landform grading; and stockpiling of select material for capping operations.

Illegal Connection. Discarding or disposal within the Caltrans right-of-way, properties, or facilities, either intentionally or unintentionally, of trash or other wastes in non-designated areas that may contribute to stormwater pollution.

Illegal Dumping. An engineered conveyance that is connected to an MS4 without authorization by local, state, or federal statutes, ordinances, codes, or regulations.

Illicit Discharge. Any discharge to an MS4 that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations. It includes all non-stormwater discharges except conditionally exempt non-stormwater discharges.

Inactive Construction Area. Any active construction area at which construction activities are expected to be discontinued for 14 days or longer.

Indirect Discharge. Surface runoff that enters the surface water body through an MS4 stormwater conveyance system or unlisted tributary before reaching the surface water.

Middle-Mile Broadband Network. Middle-Mile Broadband Network (MMBN) is a collection of anticipated linear underground/overhead projects initiated by Governor's Executive Order N-73-20. It is regulated under Section III.B.4 of the CGP. MMBN is a statewide program, and all projects will share one common waste discharge identification number. See MMBN Guidance.

National Pollutant Discharge Elimination System (NPDES) Permit. A permit issued pursuant to the CWA that requires control of pollutant discharges from stormwater to Waters of the United States.

Non-Stormwater Discharges. Discharges that do not originate from forecasted storm events. They can include, but are not limited to, discharges of process water, air conditioner condensate, non-contact cooling water, vehicle wash water, sanitary wastes, concrete washout water, paint wash water, irrigation water, or pipe testing water.

Non-visible Pollutants. Pollutants associated with a specific site or activity that can have a negative impact on water quality but cannot be seen though observation (e.g., chlorine). Such pollutants being discharged are not authorized.

Notice of Non-applicability. Construction projects that exceed 1 acre of DSA and are not hydrologically connected to Waters of the United States. NONA projects must be certified in SMARTS and a Technical Report must be submitted, see PPDG Section 1.4.4.

pH. Unit universally used to express the intensity of the acid or alkaline condition of a water sample. The pH of natural waters tends to range between 6 and 9, with neutral being 7. Extremes of pH can have deleterious effects on aquatic systems.

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

Post-Construction BMPs. Structural and non-structural controls that detain, retain, or filter the release of pollutants to receiving waters after final stabilization is attained.

Qualified SWPPP Developer (QSD). Individual who is authorized to develop and revise SWPPPs.

Qualified SWPPP Practitioner (QSP). Individual assigned responsibility for non-stormwater and stormwater visual observations, sampling and analysis, and responsibility to ensure full compliance with the permit and implementation of all elements of the SWPPP, including the preparation of the annual compliance evaluation and the elimination of all unauthorized discharges.

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

Regional Water Quality Control Board (RWQCB). California agencies that implement and enforce CWA 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 SWRCB.

Resident Engineer (RE). The Caltrans representative charged with construction contracts administration, 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 construction contract cancellation.

Routine Maintenance. Activities intended to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

Runoff Control BMPs. Measures used to divert run-on from off site and runoff within the site.

Runoff Effect. The effect that a particular soil stabilization product has on the production of stormwater runoff. Runoff from an area protected by a particular product may be compared to the amount of runoff measured for bare soil.

Run-on. Discharges that originate off site and flow onto the property of a separate project site.

Sediment. Solid particulate matter, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Sedimentation. Process of depositing suspended matter carried by water, wastewater, or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid below the point at which it can transport the suspended material.

Sediment Control BMPs. Practices that trap soil particles after they have been eroded by rain, flowing water, or wind. They include practices that intercept and slow or detain the flow of stormwater to allow sediment to settle and be trapped (e.g., silt fence, sediment basin, fiber rolls, etc.).

Sheet Flow. Flow of water that occurs overland in areas where there are no defined channels, which allows the water to spread out over a large area at a uniform depth.

Soil Amendment. Any material that is added to the soil to change its chemical properties, engineering properties, or erosion resistance that could become mobilized by stormwater.

State Water Resources Control Board (SWRCB). California agency that implements and enforces CWA 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 collecting, storing, transporting, or disposing of stormwater.

Stormwater. Rainfall runoff, snow melt runoff, and surface runoff and drainage. It excludes infiltration and runoff from agricultural land.

Stormwater Pollution Prevention Plan (SWPPP). A plan required by the CGP or the LTCGP that includes site map(s), an identification of construction/contractor activities that could cause pollutants in the stormwater, and a description of measures or practices to control these pollutants. It must be prepared and authorized before construction begins. A SWPPP prepared in accordance with the special provisions and the Handbooks will satisfy Standard Specifications Section 13 – "Water Pollution Control."

Temporary Construction Site BMPs. Construction Site BMPs that are required only temporarily to address a short-term stormwater 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.

Water Pollution Control Manager (WPC Manager). The person responsible for the implementation of the SWPPPP or WPCP, whichever is applicable for the project. The WPC Manager must be a QSP

whenever the project requires a WPCP. The WPC Manager must be a QSD whenever the project requires a SWPPP.

Water Pollution Control Program (WPCP). A plan that identifies water quality management practices to be implemented on all construction projects that do not require preparation of a SWPPP. For Caltrans projects disturbing more than 1 acre, a SWPPP satisfies the requirement for a WPCP.

Waters of the United States. Generally, refers to surface waters, as defined by the federal environmental water quality objectives in the California Water Code as limits or levels of water quality constituents or characteristics established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.

Appendix B:
Selection of Temporary Soil Stabilization Controls

Appendix B

Selection of Temporary Soil Stabilization Controls

Temporary Soil Stabilization BMPs (SS BMPs) are designed to eliminate or reduce the erosion of disturbed soil areas and to reduce the transport of sediment and pollutants by stormwater during construction. SS BMPs are used to bind soil particles together, or coat the disturbed soil surface area, thereby protecting the disturbed soil area from the erosive forces of water and wind.

Section 3 of this Manual provides guidance on the selection, limitations, installation, and maintenance for approved SS BMPs. This appendix provides additional details for Field Staff and Contractors on relevant factors to consider for selecting appropriate products for project specific construction sites/areas.

Caltrans has approved six types of SS BMPs (Standard Specifications Section 13-5) listed below. These BMPs are to be applied to disturbed soil areas to eliminate or reduce erosion and the potential transport and discharge of sediment and other pollutants from Caltrans right-of-way. The SS BMPs listed as sub bullets are acceptable alternatives because they have the same general function. For example, when a project requires the use of Mulch (SS-3) both Temporary Hydraulic Mulch or Temporary Bonded Fiber Matrix Hydraulic Mulch can be used to meet the requirement.

- Mulch (SS-3)
  - Temporary Hydraulic Mulch
  - Temporary Bonded Fiber Matrix Hydraulic Mulch
- Temporary Hydroseed (SS-4)
- Soil Binders (SS-5)
  - Temporary Cementitious Binder Hydraulic Mulch
  - Temporary Soil Binder
- Temporary Tacked Straw (SS-6)
  - Temporary Tacked Straw
- Temporary Rolled Erosion Control Products (SS-7)
  - Temporary Erosion Control Blanket
  - Erosion Control Blanket
  - Temporary Covers
- Temporary Wood Mulch (SS-8)
  - Temporary Mulch

Subsection B.1 includes general factors that should be considered when the SS BMPs listed above may be selected. Subsection B.2 includes a flowchart and tables that will guide the user through the site evaluation to optimize the selection of SS BMPs for the specific construction area. Subsection B.3 includes some general description of sediment control BMPs, as they should be used in conjunction with SS BMPs to optimize BMP coverage and comply with Permit requirements.

B.1 – General factors to consider for maximizing usage of Temporary Soil Stabilization BMPs

Understanding the characteristics of a construction site/area, including how it will impact stormwater and how stormwater will impact it, is important for SS BMP planning and selection. The following characteristics must be considered before selecting a SS BMP(s).

- Preparing soil to optimize SS BMP effectiveness
  - The proper application of SS BMPs can be improved by ensuring that the area(s) that will receive SS BMPs have adequate soil preparation, whether it is track walking the slope, imprinting, or using soil amendments, or to ensure long-term vegetation sustainability having seed testing done prior to seeding the area. These techniques, in conjunction with the selection of correct SS BMP, can prevent sediment-laden discharges, reduce the need for continuous maintenance, and increase establishment of permanent vegetative cover.
- Proper Timing for application of SS BMPs
  - Consider the timing of construction as it relates to the seasonal distribution of erosive rainfall and the climate regime that the construction site/area is located in. Large areas of California are located in a Mediterranean climate regime where summers are hot and dry and winters are cool and rainy. Simply timing the application of stabilization measures prior to the beginning of the rainy season in late fall makes a significant difference in erosion and sediment delivery rates. Construction during a period of high erosive potential requires a much shorter bare soil period and will influence the choice of sediment controls. Those sediment controls that provide instant protection will be preferred over those requiring germination and establishment of vegetation.
- Determining the Specific Soil Erosivity Potential
  - A proper evaluation of the soil erosive potential and sediment delivery rates for the project specific construction site/area during the planned construction period is crucial to preventing both multiple applications of SS BMPs and sediment-laden discharges. Caltrans has a variety of tools available, from their refined RUSLE, which conform to Caltrans construction sites and is more user friendly, to the Caltrans Landscape Architecture Toolbox which can be accessed via http://www.dot.ca.gov/hq/LandArch/16_la_design/guidance/roadside_safety_tb/index.htm The RUSLE assessment and the Landscape Toolbox can be used to evaluate soil conditions, erosivity potential, and proposed soil stabilization concepts for any construction sites/areas, even those that are less than an acre in size, and not subject to CGP or LTCGP.

B.2 Site Evaluation

The following flowchart and tables are an abridged and modified summary of the *Guidance for Temporary Soil Stabilization* (July 2003) and it is intended to be used to determine the most appropriate SS BMP to be deployed. All steps shown in Figure B-1 must be completed.

Step 1 – Start.

The Construction Field Staff or Contractor should use Figure B-1, the guidance provided in this section, and the tables that follow to determine the best option to stabilize the project specific construction site/area.

Continue to the next step.

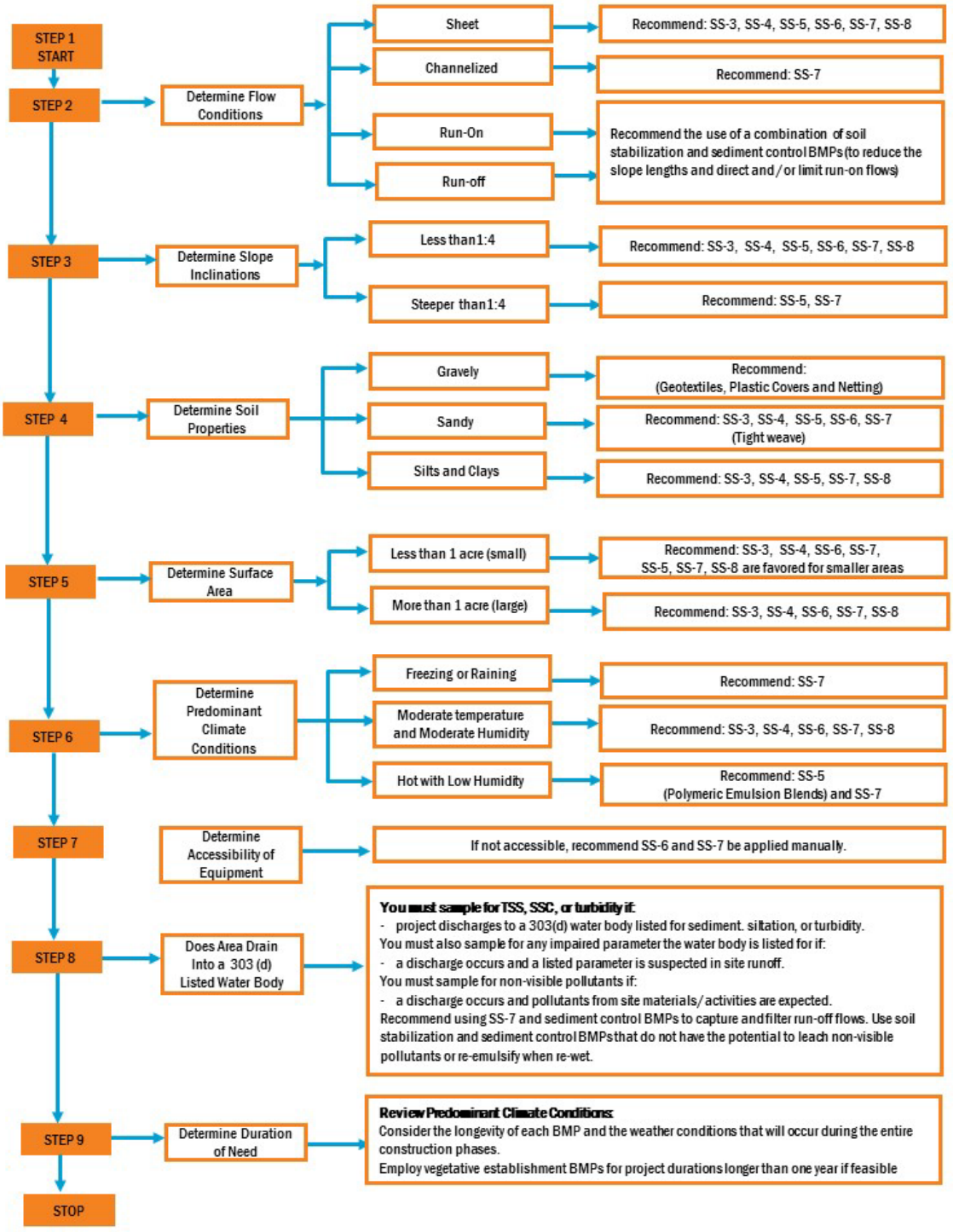


Figure B-1. Consideration of Temporary SS BMPs

Step 2-Assess the flow conditions for the area that will receive the SS BMP.

- Sheet Flow
- Channelized Flow
- Run-on Flow
- Run-off Flow

As velocities increase, the options for SS BMPs decrease. Areas that will receive direct run-on or run-off must be hydraulically evaluated to ensure there will be no additional sediment deposition. It is recommended to use a combination of SS BMPs and Temporary Sediment Control BMPs (SC BMPs) to control impacts due to run-on or run-off.

There are specific inspection requirements in the CGP or the LTCGP that must be complied with and documented by the QSP or QSD as noted in the flowchart.

Continue to the next step.

Step 3-Assess the Slope Inclination and Slope Length of area that will receive the SS BMP.

- Less than 1:4 (V:H)
- Greater than 1:2 (V:H)

The slope length is measured or calculated along the continuous inclined surface. A discrete slope can be measured between the following criteria:

- From the top of the slope to the toe of the slope (if there are no benches[1])
- From the top of the slope to the bench directly below within the slope.
- From a bench within the slope to the bench directly below within the slope.
- The lowest bench within the slope to the toe of the slope.

Continue to the next step.

Step 4-Assess the soil properties and erodibility for the area that will receive the SS BMP.

Soil properties relate to available soil moisture, available soil nutrients for plant growth, and depth and presence of rock fragments that hinder temporary and permanent seeding establishment. When choosing temporary measures on various soils, the larger concern is the erosion potential (erodibility) of the soil.

Soil erosion rates can be predicted by RUSLE2 on construction sites/areas. RUSLE2 uses USDA Soil Survey data which contains the soil erodibility or K factor for all mineral soils. RUSLE2 requires a K factor to run so in cases where the soil has been disturbed or when no soil K factors range from 0.01 to 0.64. The higher the k the higher the potential erosion rate.

Table B.2-1 provides the soil properties in relation to the Unified Soil Classification and USDA Texture.

[1] *A bench is a drainage feature or a Temporary Sediment Control BMP that intercepts surface flow and conveys the resulting concentrated flow away from the slope.*

Table B.2-1. Soil Properties						
USDA Texture	Unified Soil Classification	K factor Undisturbed Condition	General Erodibility	K factor Highly Disturbed Conditions	Hydrologic Class	General Runoff Classification
Gravely Clay	GC	0.17	Low	-	D	Highest
	GC	0.24	Moderately Low	-	D	Highest
Gravely Clay Loam	GC-GM	0.2	Low	-	C	Moderately High
	GC-GM	0.28	Moderately Low	-	C	Moderately High
Gravely Loam	GC-GM	0.2	Low	-	A	Lowest
	GC-GM	0.05	Very Low	-	A	Lowest
Gravely Sand	GW	0.02	Very Low	-	A	Lowest
	GP	0.05		-		
Gravely Sandy Clay Loam	GP-GC	0.2	Low	-	C	Moderately High
	GP-GC	0.28	Moderately Low	-	C	Moderately High
Gravely Sandy Loam	GP-GM	0.15	Low	-	B	Moderately Low
	GP-GM	0.2	Low	-	B	Moderately Low
Gravely Silt Loam	GW-GM	0.24	Moderately Low	-	C	Moderately High
	GW-GM	0.32	Moderate	-	C	Moderately High
Gravely Silty Clay	GW-GC	0.15	Low	-	D	Highest
	GW-GC	0.2	Low	-	D	Highest
Gravely Silty Clay Loam	GW-GM	0.24	Moderately Low	-	C	Moderately High
	GW-GM	0.32	Moderate	-	C	Moderately High
Clay	CH	0.32	Moderate	0.17	D	Highest
	CH	0.32	Moderate	0.11	D	Highest
	CH	0.28	Moderate	0.16	D	Highest
Clay Loam	CI	0.32	Moderate	0.23	C	Moderately High
	CL	0.24	Moderate	0.18	C	Moderately High
	CL	0.37	Moderately High	0.29	D	Highest
	CL	0.28	Moderate	0.18	C	Moderately High
	CL	0.32	Moderate	0.26	D	Highest
	CL	0.37	Moderately High	0.29	C	Moderately High
Loam	MI	0.32	Moderate	0.38	C	Moderately High
	ML	0.24	Moderate	0.29	C	Moderately High
	ML	0.37	Moderately High	0.43	D	Highest
	ML	0.28	Moderate	0.35	D	Highest
	ML	0.32	Moderate	0.4	D	Highest
	ML	0.37	Moderately High	-	D	Highest
Loamy Sand	SM	0.17	Low	0.13	A	Lowest
Loamy Coarse Sand	SM	0.2	Low	-	A	Lowest
Loamy Fine Sand	SM	0.19	Low	-	A	Lowest
Loamy Very Fine Sand	SM	0.2	Low	-	A	Lowest
Sand	SW-SP	0.15	Low	0.069	A	Lowest
Fine Sand	SW	0.11	Low	-	A	Lowest
Very Fine Sand	SW	0.11	Low	-	A	Lowest
Sandy Clay Loam	SW-SC, SP-SC	0.32	Moderate	0.18	C	Moderately High
	SW-SC, SP-SC	0.24	Moderate	0.13	C	Moderately High
	SW-SC, SP-SC	0.37	Moderately High	0.23	D	Highest
	SW-SC, SP-SC	0.28	Moderate	0.2	C	Moderately High
	SW-SC, SP-SC	0.32	Moderate	0.16	D	Highest

Table B.2-1. Soil Properties						
USDA Texture	Unified Soil Classification	K factor Undisturbed Condition	General Erodibility	K factor Highly Disturbed Conditions	Hydrologic Class	General Runoff Classification
	SW-SC, SP-SC	0.37	Moderately High	-	C	Moderately High
Sandy Loam	SW-SM, SP-SM	0.24	Moderate	0.33	B	Moderately Low
Coarse Sandy Loam	SW-SM	0.33	Moderate	-	B	Moderately Low
Fine Sandy Loam	SW-SM	0.33	Moderate	-	B	Moderately Low
Sandy Loam	SW-SM, SP-SM	0.28	Moderate	0.35	C	Moderately High
Sandy Loam	SW-SM, SP-SM	0.2	Low	0.23	B	Moderately Low
Sandy Loam	SW-SM, SP-SM	0.24	Moderate	0.3	C	Moderately High
Sandy Loam	SW-SM, SP-SM	0.28	Moderate	-	B	Moderately Low
Very Fine Sandy Loam	SW-SM	0.33	Moderate	-	B	Moderately Low
Silt	MI	0.57	Very High	0.57	C	Moderately High
Silt Loam	MI, CI	0.37	Moderately High	0.42	C	Moderately High
	ML, CL	0.28	Moderate	0.33	C	Moderately High
	ML, CL	0.43	Moderately High	-	C	Moderately High
	ML, CL	0.43	Moderately High	0.47	D	Highest
	ML, CL	0.37	Moderately High	0.44	D	Highest
	ML, CL	0.32	Moderate	0.39	C	Moderately High
Silty Clay	CI	0.28	Moderate	0.18	D	Highest
	CL	0.32	Moderate	0.18	D	Highest
	CL	0.28	Moderate	0.17	D	Highest
	CL	0.37	Moderately High	0.29	C	Moderately High
	CL	0.28	Moderate	0.2	C	Moderately High
Silty Clay Loam	CI	0.43	Moderately High	-	C	Moderately High
	CL	0.43	Moderately High	0.33	D	Highest
	CL	0.32	Moderate	0.26	C	Moderately High
	CL	0.37	Moderate	0.29	D	Highest

Continue to the next step.

Step 5-What is the total surface area that will receive the SS BMP?

Surface area is the amount of disturbed soil area on the construction site/area that will require protection from erosion with various SS BMPs. Surface area categories are grouped in the following way:

- Small: 1 acre or less
- Large: 1 acre or more

In order to maximize effectiveness, the field staff must ensure that the surface area to be stabilized is adequate for the stabilization crew to complete their application prior to onset of rain, and can be accessed as discussed in steps below

Continue to the next step.

Step 6-What is the Predominant Climate Atmospheric Condition on the day the soil stabilization will be installed?

Atmospheric conditions on the day of installation can limit the type of BMP that can be applied to the disturbed soil area because some SS BMPs are not effective in extreme weather conditions such as snow or heat. Other BMPs may require drying times and should not be applied to slopes while it is raining. Climate variations are caused primarily by distance from the coast and elevation. When selecting SS BMPs consider the temperature ranges, frequency and intensity of rainfall, wind, and humidity.

Continue to the next step.

Step 7- Any issues with Accessibility of Equipment?

The accessibility of equipment refers to whether a road or pad capable of supporting equipment for applying SS BMPs is within range of the disturbed soil area. If the construction site/area does not have vehicular access, only SS BMPs applied manually are applicable.

Continue to the next step.

Step 8-Where is the site discharging to, any 303(d) Listed Water Bodies?

Within the Clean Water Act regulations, Section 303(d) listed water bodies that are impaired by various pollutants and are designated for developing Total Maximum Daily Loads (TMDLs). If a construction site drains into a Section 303(d) listed water body, understanding and meeting the required TMDL is essential for compliance.

It is essential to understand site run-off dynamics and control needs. The limitations of the SS BMPs, with respect to their potential water quality impacts, must be clearly understood. Proper selection and installation of SS BMPs can facilitate compliance by eliminating pollutants that discharge into Section 303(d) listed water bodies.

Continue to the next step.

Step 9- What is the duration of need?

The timeframe for which SS BMPs are needed will depend on the construction schedule and has a direct correlation to the longevity of the temporary SS BMP selected. Longevity ranges are typically:

- Less than 3 months
- Between 3 and 12 months
- Greater than 12 months
  - Stop.

Construction site/area characteristics applicable to the SS BMPs are provided in Table B.2.2 while the timing and cost associated with the SS BMPs are provided in Table B.2.3.

Table B.2-2. Applicability of Temporary Soil Stabilization BMPs to Site Characteristics

Type	Method of Binding	Class	Flow Conditions	Max Slope Inclination (V:H) [1]	Surface Area	Atmospheric Conditions	Accessibility	Drains to 303(d)Listed Water Body	Duration of Need[6]	Initial Erosion Prevention Effectiveness [4]	Decomposition Rate per day [5]
Hydraulic Mulch	NA	Biodegradable	Sheet	1:2	large	A	B	C,D	3 to 12 months	87%	0.0039
Hydraulic Matrix	NA	Biodegradable				A	B	C,D	Less than 3 months	88%	0.0039
Bonded Fiber Matrix	NA	Biodegradable				A	B	C,D	3 to 12 months	91%	0.0039
Mechanically Bonded Fiber Matrix	NA	Biodegradable and Photodegradable				A	B	C,D	Greater than 12 months	90%	0.0058
Hydroseed (standalone)	NA	NA		1:3	small to large	A	B	D		17%	N/A
Hydroseed with Hydraulic Mulch	NA	NA		1:2		A	B	C		84%	0.0058
Hydroseed with Soil Binder	NA	NA				A	B	C		28%	0.023
Hydroseed with Straw Mulch Integrated	NA	NA				A	B	D		90%	0.008
Hydroseed - Straw Mulch and Soil Binder	NA	NA				A	B	C,D		91%	0.008
Hydroseed with Rolled Erosion Control Products	NA	NA	Channelized and Sheet	1:1	small	A	E	D		84%	0.0015
Guar	NA	Plant-Based Material (Short Lived)	Sheet	1:2	large	A	B	C,D	Less than 3 months	80%	0.046
Starch	NA					A	B	C,D		25%	0.046
Psyllium	NA					A	B	C,D	Between 3 and12 months	30%	0.023
Pitch & Rosin Emulsion	NA	Plant-Based Material (Long Lived)				A	B	C,D		70%	0.017
Liquid Polymers of Methacrylates& Acrylates	NA	Polymeric Emulsion Blends				A	B	C,D	Less than 3 months	unrated	unrated
Copolymers of Sodium Acrylates & Acrylamides	NA					A	B	C,D		unrated	unrated
Poly-Acrylamides & Copolymer of Acrylamides	NA		Sheet	1:2		A	B	C,D	Between 3 and12 months	30-60%	0.017
Hydro-Colloid Polymers	NA					A	B	C,D		unrated	unrated
Acrylic Copolymers & Polymers	NA					A	B	C,D	Greater than 12 months	unrated	unrated
Gypsum	NA	Cementitious-Based Binders				A	B	C,D	Between 3 and 12 months	80%	0.017
Wheat, Rice, or Barley	Integrated	NA			small to large	A	B	D		89%	0.008
	Soil Binder	NA				A	B	C,D		89%	0.008
	RECP	NA			small	A	E	D		89%	0.008
Geotextiles[2] - Woven	NA	Non-Biodegradable	Channelized and/or Sheet	1:1		all[F]	E	D		92%	0.0013
Plastic Covers[2] - Rolled Plastic Sheeting	NA	Non-Biodegradable				all[F]	E	D		98%	0.002
		Photodegradable	Sheet	1:2							
Plastic Mesh	NA					all[F]	E	D	Greater than 12 months	92%	0.0013
Erosion Control Blankets - Jute	NA	Biodegradable				all[F]	E	D	Between 3 and 12 months	65%	0.0039
Erosion Control Blankets - Straw Blanket	NA					all[F]	E	D		80%	0.008

Table B.2-2. Applicability of Temporary Soil Stabilization BMPs to Site Characteristics

Type	Method of Binding	Class	Flow Conditions	Max Slope Inclination (V:H) (1)	Surface Area	Atmospheric Conditions	Accessibility	Drains to 303(d)Listed Water Body	Duration of Need(G)	Initial Erosion Prevention Effectiveness (4)	Decomposition Rate per day (5)
Erosion Control Blankets - Coconut Fiber Blanket	NA					all[F]	E	D		85%	0.0015
Erosion Control Blankets - Coconut Fiber Mesh	NA			1:1.5		all[F]	E	D	Greater than 12 months	70-85%	0.0015
Erosion Control Blankets - Straw Coconut Fiber Blanket	NA					all[F]	E	D		85%	0.003
Erosion Control Blankets - Wood Fiber Blanket	NA		Sheet	1:2		all[F]	E	D		80%	0.0019
Erosion Control Blankets - Excelsior (Curled Wood Fiber)	NA	Biodegradable and Photodegradable	Sheet	1:2		all[F]	E	D	Between 3 and 12 months	70%	0.0019
Erosion Control Blankets - Biodegradable Fibers with Synthetic Netting	NA			1:1.5		all[F]	E	D		80%	0.0019
Mats(3) - Biodegradable Fibers with Synthetic Netting	NA			1:1.5		all[F]	E	D		85%	0.0039
Mats(3) - Synthetic Fiber with Synthetic Netting	NA	Non-Biodegradable	Channelized and/or Sheet	1:1		all[F]	E	D	Greater than 12 months	85%	0.0013
Mats(3) - Bonded Synthetic Fibers	NA			1:1		all[F]	E	D		85%	0.0013
Compost/Recycled Green Material	NA	NA		1:3	Small	A	B, E	C,D		67%	0.0069
Shredded Wood/Bark	NA	NA	Sheet	1:3		A	B, E	C,D	Between 3 and 12 months	71%	0.0023

Reference: *Guidance for Temporary Soil Stabilization (Caltrans, 2003)*

NA – Not Applicable

(1): Conservative Maximum Slope Inclination (V:H) recommended by Caltrans for product applicability, manufacturer may recommend greater slope inclinations

(2): Are not applicable with hydroseeding. Plastic materials should not be used for more permanent applications, near ESAs, or where prohibited by regulatory permits.

(3): Using hydroseed with turf reinforcement mats in channelized flow situations may have limited success due to potentially turbulent flows.

(4): Source RUSLE2 database value for product or RUSLE2 run comparing product to bare soil condition.

(5): Source RUSLE2 database value for product.

A: The BMP cannot be applied during a storm event or freezing conditions. Avoid applying in strong winds and over spraying.

B: The disturbed soil area must be accessible to equipment.

C: If disturbed soil area drains to 303(d) listed water body, potential non-visible pollutant.

D: If disturbed soil area drains to 303(d) listed water body, potential pollutants if breach or malfunction occurs.

E: The product is applied manually; therefore, road or pad proximity limitations do not affect their applicability.

F: May be difficult to insert pins into frozen ground.

G: Data obtained from the URS Greiner Woodward Clyde, Soil Stabilization for Temporary Slopes, 1999

Table B.2-3. Time and Cost Associated with Temporary Soil Stabilization BMPs					
Type		Delivery Time[y] days	Installation Time hours/acre	Time Until Effective days	Cost of Installation[x] $/acre
HYDRAULIC MULCH (SS-3)					
Hydraulic Mulch		3-7	4[1]	1 to 2	900 - 1,300
Hydraulic Matrix		3-7	4[1]	1 to 2	900 - 1,300
Bonded Fiber Matrix		3-7	4[1]	1 to 2	5,000 - 6,500
Mechanically Bonded Fiber Matrix		3-7	4[1]	1 to 2	5,000 - 6,500
HYDROSEEDING (SS-4)					
Stand Alone		3-14	4[1]	28[y]	870 - 2,170
Hydraulic Mulch		3-14	4[1]	28[y]	2,170 – 3,470
Soil Binder		3-14	4[1]	28[y]	1,570 – 3,670
Straw Mulch		3-14	6[2]	28[y]	2,670 – 4,270
Straw Mulch and Soil Binder		3-14	10[3]	28[y]	3,370 – 5,770
Rolled Erosion Control Products		3-14	43[4]	28[y]	6,870 – 57,170
SOIL BINDERS (SS-5)					
Guar		3-7	4[1]	12 - 18[y]	700 - 900
Starch		3-7	4[1]	9 - 12[y]	700 - 900
Psyllium		3-7	4[1]	12 – 18[y]	700 - 900
Pitch & Rosin Emulsion		3-7	4[1]	19 - 24[y]	1,200 -1,500
Liquid Polymers of Methacrylates & Acrylates		7-14	4[1]	12 - 18[y]	700 - 1,500
Copolymers of Sodium Acrylates & Acrylamides		7-14	4[1]	12 - 18[y]	700 - 1,500
Poly-Acrylamides & Copolymer of Acrylamides		7-14	4[1]	4 - 8[y]	700 - 1,500
Hydro-Colloid Polymers		7-14	4[1]	0 - 4[y]	700 - 1,500
Acrylic Copolymers & Polymers		3-7	4[1]	36 - 48[y]	700 - 1,500
Gypsum		3-7	4[1]	4 – 8[y]	800 - 1,200
STRAW MULCH (SS-6)					
Wheat, Rice, or Barley	integrated	3-5	2[1]	ASAA	1,800 - 2,100
	soil binder	3-5	6[5]	1 to 2	2,500 – 3,600
	Rolled Erosion Control Product	3-5	106[6]	ASAA	6,800 – 8,600
ROLLED EROSION CONTROL PRODUCTS (SS-7)					
Woven		3-5	15[1, z]	ASAA	12,000 - 28,000
Rolled Plastic Sheeting		3-5	15[1, z]	ASAA	0.19 – 0.28 ($/ft2)
Plastic Netting		7-14	15[1, z]	ASAA	5,000 - 6,500
Plastic Mesh		7-14	15[1, z]	ASAA	3,000 -3,500
Jute		3-5	15[1, z]	ASAA	6,000 - 7,000
Straw Blanket		3-5	15[1, z]	ASAA	8,000 - 10,500
Coconut Fiber Blanket		3-5	15[1, z]	ASAA	13,000 - 14,000
Coconut Fiber Mesh		3-5	15[1, z]	ASAA	30,000 - 33,000

Table B.2-3. Time and Cost Associated with Temporary Soil Stabilization BMPs				
	Delivery Time[Y]	Installation Time	Time Until Effective	Cost of Installation[X]
Type	days	hours/acre	days	$/acre
Straw Coconut Fiber Blanket	3-5	15[1, Z]	ASAA	10,000 - 12,000
Wood Fiber Blanket	3-5	15[1, Z]	ASAA	8,000 - 10,500
Excelsior (Curled Wood Fiber)	3-5	15[1, Z]	ASAA	8,000 - 10,500
Biodegradable Fibers with Synthetic Netting	7-14	15[1, Z]	ASAA	30,000 - 36,000
Biodegradable Fibers with Synthetic Netting	7-14	39[1, Z]	ASAA	30,000 - 36,000
Synthetic Fiber with Synthetic Netting	7-14	39[1, Z]	ASAA	34,000 - 40,000
Bonded Synthetic Fibers	7-14	39[1, Z]	ASAA	45,000 - 55,000
WOOD MULCH (SS-8)				
Compost/Recycled Green Material	3-5	130[1]	ASAA	900 - 1,200
Shredded Wood/Bark	3-5	130[1]	ASAA	4,000 - 9,000

Reference: *Guidance for Temporary Soil Stabilization (Caltrans, 2003)*

ASAA- As soon as applied

(1): Assumes a 2-man crew with one 3000-gallon water truck (or access to water) that can cover 2 acres per day. Actual installation time may vary depending on location and field conditions.

(2): Assumes installation of hydroseed is done by a 2-man crew with one 3000-gallon water truck (or access to water) that can cover 2 acres per day. Followed by the application of straw mulch that is bound to the soil by integration (crimped or punched). Also, assumes that the straw mulch is applied by a 6-man crew with 2 straw blowers that can cover 4 acres per day. Actual installation time may vary depending on location and field conditions.

(3): Assumes the application (first pass) of the hydroseed is done by a 2-man crew with one 3000-gallon water truck (or access to water) that can cover 2 acres per day. Followed by the application of straw mulch (second pass) that will be bound together by a soil binder. Assumes the straw mulch is applied by a 6-man crew with 2 straw blowers that can cover 4 acres per day. Followed by the application of the soil binder (third pass). Assumes the application of the soil binder is done by a 2-man crew with one 3000-gallon water truck (or access to water) that can cover 2 acres per day. Actual installation time may vary depending on location and field conditions.

(4): Assumes the application of the hydroseed is done by a 2-man crew with one 3000-gallon water truck (or access to water) that can cover 2 acres per day. Assumes the application of the rolled erosion control product is done by a 2-man crew. Actual installation time may vary depending on location and field conditions.

(5): Assumes the straw mulch (first pass) is applied by a 6-man crew with 2 straw blowers that can cover 4 acres per day. Followed by the application of the soil binder (second pass). Assumes the application of the soil binder is done by a 2-man crew with one 3000-gallon water truck (or access to water) that can cover 2 acres per day. Actual installation time may vary depending on location and field conditions.

(6): Assumes the straw mulch (first pass) is applied by a 6-man crew with 2 straw blowers that can cover 4 acres per day. Assumes the application of the rolled erosion control product is done by a 2-man crew. Actual installation time may vary depending on location and field conditions.

(X): Data obtained from the Caltrans, Erosion Control Manual (Draft), Training Materials, 2003

(Y): Data obtained from the URS Greiner Woodward Clyde, Soil Stabilization for Temporary Slopes, 1999.

(Z): Data obtained from RS Means, site work and Landscape Cost Data, 22nd ed. 2003

For current cost estimates for soil stabilization methods, the Caltrans Landscape Architecture Toolbox should be reviewed at: http://www.dot.ca.gov/hq/LandArch/16_la_design/guidance/roadside_safety_tb/index.htm

B.3 Additional BMPs Used with SS BMPs

SS BMPs are more effective when used in conjunction with Temporary Sediment Control BMPs (SC BMPs) and other SS BMPs. To properly stabilize slopes and remove sediment from stormwater, other conditions must be addressed such as, directing and/or slowing concentrated flow, reducing slope lengths, and capturing sediment entrained in stormwater. Therefore, it is required that SS BMPs and SC BMPs are used in conjunction to comply with the General Construction Permit rules regarding erosion and sediment control.

Slope inclination and slope length are the most important factors affecting the installation of combined stabilizations BMPs and SC BMPs, as these factors have the largest potential impact on erosion rates. A combined increase in slope inclination and slope length will require an increase in the use of SS BMPs and SC BMPs.

To limit the erosive effects of stormwater flow the slope lengths shall be broken up with SC BMPs such as fiber rolls or gravel bags as follows:

- If the slope inclination is 1:4 (V:H) or flatter, break up the slope length with sediment control BMPs at intervals no greater than 20 feet.
- If the slope length is between 1:4 (V:H) and 1:2 (V:H), break up the slope length with sediment control BMPs at intervals no greater than 15 feet.
- If the slope inclination is 1:2 (V:H) or greater, break up the slope length with sediment control BMPs at intervals no greater than 10 feet.

Listed below are the SC BMPs applied to compliment the SS BMPs that cover or bind the soil of the disturbed soil areas (Standard Specifications 13-6 and 13-10). The information below also includes a brief explanation of their purpose and applications. Refer Section 4 of this Manual for details regarding the Limitations, Standards and Specifications, and design of SC BMPs. SC BMPs are implemented on a project-by-project basis and with other SS BMPs.

- Temporary Earthen Berm
- Temporary Silt Fences
- Temporary Reinforced Silt Fences
- Temporary Large Sediment Barrier
- Temporary Check Dams
- Temporary Straw Bale Barrier
- Temporary Drainage Inlet Protection
- Temporary Fiber Rolls
- Temporary Gravel Bag Berms
- Compost Socks
- Flexible Sediment Barriers

Appendix C:
Active Treatment Systems

Appendix C

Active Treatment Systems

C.1 INTRODUCTION

Temporary Active Treatment Systems (ATS) apply conventional water treatment technologies, in use for over a century, to stormwater quality. Neither the CGP nor the LTCGP requires the use of an ATS, but for waters and sites where the reliability of the stormwater quality is of concern, these systems may be used. The information provided here is guidance only and the contractor must ensure the ATS Treatment Plan and its implementation complies with Attachment F of the CGP.

C.1.1 Overview

An ATS may be considered for a project under the following conditions:

- When necessary to meet water quality standards (WQS) of the receiving water.
- When necessary to meet the effluent limits of the CGP or LTCGP for turbidity and pH in stormwater.

Under the CGP and the LTCGP, an ATS is recommended for use at high risk work sites, including:

- Where space limits installation of properly-sized containment and detention facilities, such as a sediment trap (see SC-3 “Sediment Trap”) or sediment/desilting basin (see SC-2 “Sediment/Desilting Basin”).
- Where clay and/or highly erosive soils are present.
- Where the site has very steep slopes
- Where project work necessitates on-going and large amounts of disturbed soil area during the rainy season
- Where the project site is highly susceptible to stormwater run-on resulting in erosion and sediment-laden run-off.

An ATS uses a coagulant for the treatment of water with a sedimentation basin (or basins) for facilitating turbidity reduction. In addition, pH adjustment plus bag/cartridge/sand filters may be included. The exact configuration and sizing of the ATS will depend on the anticipated quantity and quality of the water to be treated, the amount of time needed for treatment, and receiving water requirements.

Coagulation can be used to destabilize suspended particles and remove them from suspension, which forms a byproduct referred to as floc or flocculant. There are many different coagulants for use; a coagulant may use different chemical properties and may be suited for different types of water conditions to be treated. Potential chemical residual (i.e., coagulant residual) in the treated effluent must be monitored and managed to attain applicable effluent limits prior to discharge.

An ATS is recommended to remove particles below 0.02 mm and may be warranted for locations that must meet strict turbidity requirements. Some receiving waters may be listed for other parameters of concern for which an ATS might be recommended; however, not all pollutants can be treated with readily available ATS technology.

An ATS does not eliminate the need to implement appropriate soil stabilization and sediment control BMPs.

C.1.2 CGP and LTCGP

An ATS, as covered by the CGP or the LTCGP, is used for the treatment of stormwater discharges generated from precipitation that falls on or runs through the construction area during a rain event. Other water generated from construction operations is considered non-stormwater.

In some cases, ATS designers may wish to include non-stormwater treatment as an aspect of, or supplement to, the ATS system. When doing so, any non-stormwater comingled with stormwater may both alter the performance values of the selected coagulant and place different or additional demands upon the other selected ATS components. These modifications of the system will need to be evaluated and if necessary, coverage under a supplemental NPDES Permit in addition to the CGP or LTCGP, may be required.

C.1.3 General Requirements

The following general requirements are applicable to projects that utilize an ATS:

1. Standard Specification Section 13-8 includes provisions for treating and discharging uncontaminated groundwater and accumulated stormwater from excavations or other areas with a temporary ATS.
2. Submit an ATS Plan to the RE within 20 days of contract approval. The ATS Plan must comply with Standard Specification Section 13-8.01C(2). At least 14 days prior to the planned operation of the ATS, the ATS Plan is required to be submitted electronically to the SWRCB and applicable RWQCB. Each element of the ATS Plan including but not limited to O&M Manual, Monitoring, Sampling & Reporting Plan including QA/QC, Health & Safety Plan, and Spill Prevention Plan must be assessed and evaluated to ensure compliance and functionality with the CGP or LTCGP operational requirements.
3. The design, installation, operation, and monitoring of the temporary ATS and monitoring of the treated effluent must comply with Attachment F of NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order No. 2022-0057-DWQ, NPDES No. CAS000002).
4. For a project within the Lake Tahoe Hydrologic Unit, the design, installation, operation, and monitoring of the temporary ATS and monitoring of the treated effluent must comply with Attachment E of the NPDES General Permit for General Waste Discharge Requirements and National Pollutant Discharge Elimination System Permit for Storm Water Discharges Associated with Construction Activity in the Lake Tahoe Hydrologic Unit, counties of Alpine, El Dorado, and Placer, (Order No. R6T-2016-0010, and NPDES No. CAG616002).
5. For a project within the Lake Tahoe Hydrologic Unit, the discharger must perform toxicity testing that complies with Standard Specification Section 13-8.01D(2) if operating a temporary ATS in batch-treatment mode.
6. Training must be provided to each operator of the ATS. The lead person must have the qualifications listed in A.3 of Attachment F.
7. The ATS must be designed for the site conditions and anticipated flow rate and must include (1) a treatment system, (2) a collection and conveyance system, and (3) a discharge method and location.
8. The ATS must be capable of capturing and treating within a 72-hour period a volume equal to the runoff from a 10-year, 24-hour rain event using a watershed coefficient of 1.0.
9. The control system must default to recirculation or shutoff during a power failure or catastrophic event.

10. The control system must control the amount of the coagulant to prevent overdosing. The coagulant must be mixed rapidly into the water to insure proper dispersion.
11. Pumps and piping must comply with Standard Specification Section 74-2.
12. Discharges may be made into a sanitary sewer system however; the effluent discharge must comply with the publicly-owned treatment works (POTW) requirements and must meet all criteria as set forth in any issued Batch Discharge Permit. The POTW Batch Discharge Permit should be secured as part of the ATS planning process to ensure access and feasibility of discharging expected water quantities. This option is frequently utilized for short term or low volume discharges. The Department does not pay for obtaining the municipal batch discharge permit or for discharging the water.
13. Submit documentation for the delivery and removal of ATS components.
14. If observations and measurements confirm that a residual chemical or water quality standard is exceeded, submit the notice of discharge within 24 hours after exceeding the limits per the requirements of the CGP or the LTCGP.
15. Water discharged from a temporary ATS must comply with the Numeric Effluent Limits (NEL) for discharge effluents and the receiving waters.
16. If an NEL is exceeded, notify the RE and submit a Numeric Effluent Limitation Violation Report- ATS Discharge (DOT CEM-2063SW[1]) within 6 hours. For a project in the Lake Tahoe Hydrologic Unit, the Numeric Effluent Limitation Violation Report- Lake Tahoe Hydrologic Unit – Lake Tahoe Hydrologic Unit (CEM-2063T[2]) must be submitted within 2 hours. The analytical results less than the method detection limits must be reported as less than the method detection limits. In compliance with the CGP or LTCGP, electronic filing of the exceedance report to the SWRCB and RWQCB shall occur within 24 hours of either obtaining the results or identifying the exceedance.
17. Calibrate the flow meter and devices for taking water quality measurements under the manufacturer's instructions as outlined in the ATS Plan.
18. Monitoring equipment must be interfaced with the control system of the ATS to provide shutoff or recirculation whenever effluent readings do not comply with the turbidity and pH limits.
19. Monitoring equipment for the ATS must record data at least once every 15 minutes and cumulative flow data daily. The recording system must have the capacity to record a minimum of 7 days of continuous data.

C.2 ATS SELECTION CRITERIA

In general, ATS selection is driven by the available area, and the soil type of the site. Each of these will drive the selection of an ATS that would reliably meet the requirements of the CGP or the LTCGP.

C.2.1 Risk Level

Generally, projects designated as Risk Level 1 under the CGP should implement typical Construction Site BMPs. Project designated as Risk Level 2 or 3 under the CGP should use the following factors to determine whether traditional BMPs are sufficient or an ATS is appropriate for use. The following factors should also be used for projects subject to the LTCGP.

C.2.2 Potential Storage Area and Peak Stormwater Flow

Project sites with enough potential storage area to detain the estimated quantity of stormwater from a rain event and allow sediment to settle out of suspension by gravity may be able to avoid using an ATS.

[1] This form can be found at: http://www.dot.ca.gov/hq/construc/forms/DOT CEM-2063SW.pdf

[2] This form can be found at: http://forms.dot.ca.gov/v2Forms/servlet/FormRenderer?frmid=CEM2063T

These areas can be used for storage of water with enough detention (dwell) time to settle significant quantities of particles prior to discharge. The minimum detention time can be determined by dividing the available storage by the peak flow expected from a 5 year-24-hour storm. If the minimum detention time of a sedimentation basin can meet the minimum compliance requirements for sedimentation, an ATS is generally not required for turbidity removal. Other considerations that may influence minimum detention time and should be evaluated include, but are not limited to:

- The time required to treat stormwater from successive rain events.
- The quantity of stormwater that may run-on into the project.
- Conditions caused by on-going construction activities.

The above listed conditions are examples that may trigger the need for an ATS.

Determine the area available for potential stormwater storage (A_p). This can include assigned stormwater treatment locations, existing storage areas, or space outside of the construction footprint which is available for use. Often, these areas will necessitate an engineered design and construction specific to the location used, plus a management understanding of detention time commitment and the need to use this dedicated space exclusively for stormwater detention and treatment.

C.2.3 Soil Type

The minimum detention time required for a construction site will depend on the predominant soil type. Fine soils, such as clay, will remain suspended for much longer times than coarser soils, such as sand. To determine the initial minimum detention time required, the composition of the soil within the construction site must be determined. Anticipating and estimating for changing soil conditions from construction activities that affect and change the soil dynamics (e.g., mixing of soil types, compaction, cut/fill areas) may complicate this calculation. Repetitive rain events will also affect the evaluation.

C.2.4 Settling Velocity and Required Settling Area

A calculation of the maximum area for potential treatment must be made. Initially calculate the peak stormwater flow from the site based upon disturbed soil area and the rainfall intensity from a 5 year – 24-hour rain event using the Rational Equation (though this peak flow does not need to be the design flow of a potential ATS). Next, determine the predominant soil type within the construction area. Conservative estimates will use the minimum particle diameter of each soil type (sand, silt, or clay) in conjunction with Stokes Law to determine the settling velocity of the sediment.

Other methods or models may be substituted for Stokes Law if more information is readily available for project soils. Dividing the peak stormwater flow by the settling velocity will determine the minimum area required (A_r) for settling without active treatment. Note that these calculations should take into consideration the changing soil conditions and dynamics based on the phase and stage of the project, scope of soil work being performed, and other issues related to scheduled soil work.

C.2.5 Determine Appropriate Device

Comparing the minimum area required (A_r) to the potential area available (A_p) will determine whether an ATS may be necessary. If the area available is significantly larger (>20 percent) than the area required, evaluate BMPs based upon site characteristics. If the area required is significantly larger than the area available (>20 percent), then an ATS must be considered. If the design can be refined, such as increasing potential storage area or improving the accuracy of the settling velocity calculation, re-evaluate the site. If no other options are available, an ATS is recommended.

The CGP contains direction for implementation of ATS. Risk level 2 projects do not have NELs for pH and turbidity, unless an ATS is used. Therefore, careful evaluation is necessary before selection; check with the District/Regional Design Stormwater Coordinator.

C.3 FACTORS AFFECTING PRELIMINARY DESIGN

C.3.1 Pollution Prevention/Sediment Mitigation

Actions to reduce the quantity of sediment in stormwater directed to storage should be implemented in the work area regardless of the decision to use an ATS. With an ATS these measures can lead to more efficient treatment and operational cost savings. Closing off or stabilizing unused portions of the site will reduce the quantity of stormwater that could be impacted by construction activities. Focused consideration should be given to evaluating and installing run-on control and bypass controls means to reduce and minimize the amount of stormwater that would require treatment. Minimizing sheet flow and concentrated flows from up-slope areas and/or drainages coming into the project is critical to reducing not only the quantity of water requiring treatment but also the causative effects of scouring or transport of sediment in run-on water.

To prevent significant sediment loading to an ATS all applicable Construction Site BMPs, especially those that provide erosion and sediment control at the source and within conveyances, should be implemented. If stormwater run-on cannot be prevented from entering the project, installation of lined drainage ditches, bypass piping, or other means, should be considered to direct flows away from disturbed soil areas and steep slopes. This can minimize treatment requirements for run-on. The use of plastic cover is often a significant and beneficial implementation control to prevent direct contact of stormwater with disturbed soil. With plastic cover, the clean run-off can be re-routed, preventing it from entering the ATS collection system. Sampling might be required for run-on to show the turbidity concentrations coming into the project.

To minimize stormwater treatment, evaluate and design for the temporary redirection and bypass of roadway runoff to prevent contact with project disturbed soil areas when feasible. If project plans call for the abandonment or removal of existing storm drain conveyances, outfalls, inlets, or lined drainages consider scheduling the work after the rainy season. Considering staging and phasing of project work, evaluate adjustments to the schedule to minimize the removal of existing constructed storm drain systems until the next dry season approaches.

C.3.2 Collection System/Discharge Piping

Collection piping is required to convey the water generated onsite to the treatment system (i.e., the ATS and its component systems). The size and quantity of piping will be determined by the layout and terrain of the disturbed construction area. It may be necessary to include pumps to move large quantities of water across the site. It is also possible for the site to implement multiple ATS systems. Discharge piping and pumps are required to convey treated effluent to the appropriate discharge location. Proper sizing is required to prevent flow backup or sedimentation within the pipe. Some considerations when designing for and installing collection systems include the following:

- Can the stormwater draining toward the ATS collection system be directed through a lined drainage ditch or conveyance piping by which scour will not create additional sediment?
- Can the stormwater draining toward the ATS collection system be filtered by perimeter barriers such as filter lined drainage rock, silt fence, gravel bag check dams, etc., before entering the conveyance?
- Can the conveyance sump (where the pumps are placed) be designed large enough to ensure enough area to handle the run-on water?
- Can the conveyance sumps be designed and situated to prevent direct intake of silt, sediment, or soils? Can filters, screens, or protective barriers be installed that surround the sumps and/or pumps to minimize the up-take of transported heavier fines, particulates or floating materials, vegetative detritus, etc.?

- Can the conveyance pump be so situated by which it can be easily accessed or withdrawn for maintenance or replaced if needed?
- Can the pumps and conveyance piping and/or hose leading to the ATS system from the conveyance sump-pumps be designed to maximize speed of conveyance thereby preventing the sump-pump locations from flooding during peak runoff?

C.3.3 Storage/Pre-Sedimentation

If it is necessary to store large quantities of water onsite during significant rain events, locations such as swales, basins, and other areas conducive for storage may be used to retain water prior to treatment. These locations provide an additional benefit of settling out some sediment before treatment with an ATS. Design of these storage locations should be in accordance with criteria for those BMPs.

Systems with a high sediment loading may necessitate pretreatment. Pretreatment typically consists of a pre-sedimentation basin such as a weir tank for the removal of easily settleable sediment loads. Pretreatment can improve coagulant usage and effectiveness, as well as reduce the quantity of flocculant sludge, thus minimizing costs. Systems with pre-sedimentation and storage can be sized to smaller peak flows as large storms can be stored and treated over longer durations. The trade-off will depend on both the amount of storage and design capacity of the system. Additional considerations related to storage and pre-sedimentation may include:

- Can existing long term excavations, or existing curbed and/or walled in areas be used for temporary storage?
- Can a retention basin be constructed and excavated deep enough (or have above ground walls constructed) to minimize the footprint of the required area needed for holding the estimated maximum quantity of collected stormwater prior to conveyance to the ATS? Are there natural, pre-existing areas in the construction work area where stormwater can be collected for holding prior to conveyance? Can the holding areas be lined to minimize the up-take of resident loose sediment or soils?

C.3.4 Treatment Components

Different components may be used within the ATS. These components interact with each other and need to be considered individually and as an integrated treatment system. Recirculation piping will be necessary to meet turbidity and pH discharge requirements. Table C-1 and C-2 summarize many of the components available for integration into a temporary ATS and associated materials.

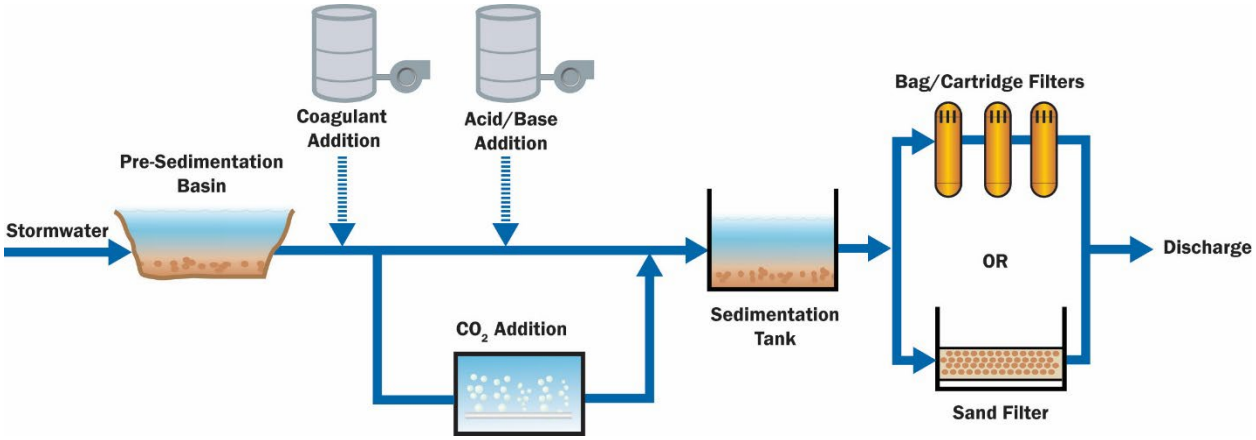


Figure C-1. Potential Treatment Schematic

Table C-1. Potential ATS Components	
Component	Use
Coagulant Dosing Equipment	Chemical for forming floc and removing turbidity
pH Adjustment Dosing Equipment	Chemical for adjusting pH within proper range
Sedimentation Tank (or Basin)	Gravity particulate removal and sludge removal/collection
Bag/Cartridge/Media Filters	Filters for particle removal

C.3.4.1 Coagulation and Flocculation

Different coagulants are available for use within an ATS system. The choice of a coagulant is an important consideration to achieve turbidity removal requirements. The anticipated water quality of the site based on existing soil/sediment conditions and scheduled contractor work will define which coagulants may be effective at forming floc and improving water quality. Coagulant dosing rates and usage will vary depending on the water quality, flow volumes, and coagulant selection. If evaluation and assessment of the performance values and parameters of a coagulant in relationship to the known and expected project conditions is required to achieve treated effluent quality values.

Some coagulants that have been used on past projects include Chitosan, Ferric Chloride, and Alum. Use of other coagulants/polymers may be more difficult for the RWQCB to approve due to uncertainties about potential effects on water quality. Regardless of the coagulant choice, monitoring of residual chemical in the discharge would likely be required.

Equipment such as a chemical feed pump, a rapid mixer (static or mechanical), and sufficient sedimentation will be necessary to properly dose any coagulant. A streaming current detector should be used to monitor and adjust coagulant dose.

A Coagulant-Handling Work Plan is required as part of the ATS Plan and should be prepared for any coagulant used to ensure protection from potentially toxic effects on both human and wildlife due to exposure from high concentrations of residue coagulant. At a minimum, the Coagulant-Handling Plan should include coagulant storage, monitoring, and disposal during the lifespan of the ATS.

When operating the ATS in a Batch Treatment Mode, the CGP requires acute toxicity testing and has specific criteria for testing methodology, laboratory analysis, and quality assurance. All toxicity testing data performed during ATS operation is required to be electronically uploaded to the State Water Boards Storm Water Multi-application and Reporting Tracking System (SMARTS).

Table C-2. Potential ATS Chemicals				
Class of Chemical	Chemical	Advantages	Disadvantages	Approximate Cost
pH Decrease	Hydrochloric Acid (HCl)	Low Dose	Safety Concerns	
pH Decrease	Sulfuric Acid (H_2SO_4)	Low Dose	Safety Concerns	
pH Decrease	Carbon Dioxide (CO_2)	Inert, Self-Buffering	Mechanically Intensive, Requires Diffuser/Basin	
pH Increase	Sodium Hydroxide (NaOH)	Low Dose	Safety Concerns	
Coagulant	Alum	Lower Cost	Drops pH, Can Require High Dose	
Coagulant	Ferric (Chloride/Sulfate)	Lower Cost	Drops pH, Can Require High Dose	
Coagulant	Chitosan	Low Dose	May Not Work Well for Certain Soils	$2,500 per Tote

C.3.4.2 pH Adjustment

For certain systems, pH adjustment may be necessary to maintain receiving water integrity. Certain site conditions may adversely affect pH and certain coagulant choices can alter pH and should be considered. There are multiple methods for pH adjustment depending on the water quality of the site and each method has inherent strengths and weaknesses dependent upon the condition under which it is used. Each option considered for use should be evaluated for its potential affect upon other aspects and components of the treatment system, both from a physical and chemical perspective. The nature of pH adjustment can not only be highly corrosive to the ATS equipment, but may also present a heightened risk to occupational health of the ATS operator or maintenance technician.

Carbon Dioxide (CO_2) can be used to lower the pH. CO_2 gas is bubbled through water forming carbonic acid (H_2CO_3) and thereby reducing pH. Carbon dioxide is mechanically more intensive, but the gas is much safer to store onsite. The CO_2 system requires a bubble diffuser and a separate basin for proper implementation.

Strong acids and bases may also be used; dosing generally occurs alongside coagulant addition. Dosing rates will vary depending on water quality, receiving water quality, and acid/base selection. Strong acids/bases have safety concerns associated with storage and dosing. In addition, acid/base selection is important to prevent possible interactions with other treatment components. Strong acids (e.g., hydrochloric acid, sulfuric acid) and bases (e.g., sodium hydroxide) would provide rapid pH response for most waters; an advantage to all the acids and bases listed in the table below is that the corresponding counter-ions (e.g., sulfate, chloride, sodium) are not expected to react with constituents in the treatment system. In contrast, some acids (e.g., citric acid) introduce counter ions (citrate) that can have undesirable side-effects, such as promoting bacterial growth or inhibiting floc formation.

Table C-3. Suggested pH Adjustment Chemicals

Acids	Bases
Carbon Dioxide (CO_2) – Bubble Carbon Dioxide will form carbonic acid and drop pH	Sodium Hydroxide (NaOH)
Sulfuric Acid (H_2SO_4) – strong acid	Sodium Hydroxide (NaOH)
Hydrochloric Acid (HCl)	Sodium Hydroxide (NaOH)

C.3.4.3 Sedimentation Tanks

Sedimentation tanks are required to settle floc formed from coagulation. Sedimentation tanks must provide sufficient area and retention time to allow adequate settling of solids. Sedimentation tanks as opposed to weir tanks are recommended for use with high sediment loads. Weir tanks may be used for systems that have minimal influent sediment loading. Higher sediment loads will quickly fill weir tanks and would require sludge removal at higher frequencies compared to sedimentation tanks. Calculating accurate coagulant dosing rates based on site conditions should allow more accurate estimates of sedimentation tank(s) loading of settled floc and therefore lead to selection of the right size tanks. It is important to provide sufficient area for the settling of solids because accumulated floc increases treatment times and therefore reduces the amount of water that can be treated during rain events. In some cases, it may be more desirable to over-estimate the required area.

Figure C-2. Sedimentation Tank

C.3.4.4 Bag/Cartridge/Media Filter

Bag, cartridge, or media filters provide additional particle removal prior to discharge. Bag and cartridge filters pass water through mesh filters reducing particle sizes to a predetermined size. Media filters use sand or other granular media to remove particles. Bag and cartridge filters are removed, changed out and discarded. Media filters use treated water to backwash the filter and remove particles.

It may be necessary to reduce turbidity to approximately 25 NTU or below prior to filtration to prevent excessive buildup on the filter. For bag and cartridge filters, higher turbidity levels passed to the filters will cause increased frequency of change-out and likely increase operational costs. For sand filters, more frequent backwashing will be required which will cause greater work, more chemical usage, and more clean water for backwashing. When backwashing is required the on-going affect upon the treatment process must be calculated into the required treatment rate. When backwashing occurs, less influent is treated in that time.

Figure C-3. Bag/Cartridge Filters

C.3.4.5 Power Sources

An uninterruptible power supply and standby electric generator is recommended for any ATS system. Storms can routinely interrupt power supply systems; thus, it is necessary to provide a backup in such circumstances. An audible or observable alarm should be an aspect of the ATS design to notify personnel in the event of a power outage. Consequences from a non-operable ATS during a critical time may lead to project site flooding and potentially to a discharge with exceedances.

C.3.4.6 SCADA Monitoring Equipment

Supervisory Control and Data Acquisition (SCADA) systems are standard technology used to monitor and control all monitoring and mechanical systems within an ATS. These systems can record and store all relevant data to the project. Remote operation of an ATS is possible through SCADA systems, but connection stability must be maintained to ensure proper operation.

ATS effluent discharges should meet the requirements of the CGP or LTCGP. Monitoring equipment must be installed. These include, but are not limited to, turbidimeter, pH meters, and flow meters. These meters must be calibrated as recommended by the manufacturer or regulator. The frequency of calibration and a documented process to retrieve and verify data should be specified to the contractor and may be required by the RWQCB. In addition, some water quality analysis will need to be conducted by outside labs for analysis such as total suspended solids (TSS), settleable solids (SS), or residual chemicals. Validate and maintain the sensors in the in-line ATS system that communicate values to the SCADA system regularly. If these sensors are not functioning properly, the SCADA data may be of limited value. Note: the CGP requires that all field recorded monitoring data including but not limited to turbidity, pH, residual chemical, flow rate, and volume be electronically uploaded every 30 days minimum to the State Water Board.

C.4 ACTIVE TREATMENT SYSTEM SIZING

The size of the treatment system will be dependent on the acreage of the active disturbed soil area. The system is required to be sized such that the runoff from a 10-year 24-hour rain event would be captured and treated within 72 hours. Storms that are greater than the design event may cause the ATS to exceed the CGP restrictions. In these circumstances, the RWQCB will still expect the contractor to make efforts for meeting the CGP or other requirements.

C.4.1 Construction Area

The area of the basin will be defined by the contributing drainage area of the disturbed construction site. The contributing drainage areas will be defined by the designer depending on the orientation of the construction site. For long or flat construction sites, it may be necessary to subdivide the site and set up separate ATS locations. The conveyance systems required to funnel stormwater to a central ATS location may be prohibitive for certain site orientations.

If multiple receiving waters are present in the site, each receiving water basin may require a separate ATS to maintain watershed integrity. For some receiving waters, BMPs may be sufficient to meet turbidity goals.

C.4.1.1 Flowrate

Peak flowrate can be calculated for each area by the Rational Formula:

$Q = C \times I \times A$ (Eqn. 1)

Q = Peak Runoff Rate, Cubic Feet per Second

C = Dimensionless Runoff Coefficient (use 1.0)

I = Rainfall intensity, Inches per Hour (10-year, 24-hour)

A = Basin Area, Acres

The rainfall intensity will vary by project location.

Per the Standard Specification Section 13-8, the designer shall use a runoff coefficient value of 1.0.

Basin area is the total contributing drainage area to the BMP or ATS.

C.4.1.2 Sedimentation Residence Time

Hydraulic Retention Time should be between 2 and 4 hours to allow sufficient floc settlement to meet turbidity requirements.

$HRT = V/Q$ (Eqn. 2)

HRT = Hydraulic Retention Time, Hours

V = Volume of Sedimentation Basin, Gallons

Q = Flowrate, Gallons per Hour

C.5 MAINTENANCE AND INSPECTION

The ATS requires regular maintenance to ensure it is properly functioning and to prevent leaks. Repair or replace any component of the dewatering equipment that is not functioning properly or as required by the operations and maintenance outlined in the ATS Plan. The detail in the ATS Plan should be of significant nature to clarify most aspects of ATS function and servicing. Each piece of equipment to be used in the ATS needs to be fully described including its purpose and its inter-relationship to the other equipment. Inclusion of manufacturer specification sheets in the ATS Plan is of high value and should be considered. Descriptions of how to assess the ATS components for performance values is instrumental in trouble-shooting deficient operation. A section within the ATS Plan on maintenance scenarios and trouble-shooting examples for commonly known conditions or operational failures is highly recommended. Trouble-shooting questions could include the following:

- Is increased time required because the holding tank is reduced in capacity due to accumulated floc?
- Is increased time required because not enough coagulant is being dosed which could be caused by a degraded sensor?

The inclusion of set procedural steps for bringing on-line each piece of equipment of the ATS system and determinants of how to balance the system is invaluable when attempting to maximize operation or solve a functional problem. These aspects of an ATS Plan, if not considered in the planning stage and left out of the ATS Plan, could lead to failures of the system and on-going repeat deficiencies.

Remove sediment from the storage or treatment cells as necessary to ensure the cells maintain their required water storage and treatment capability. Sediments removed from the uncontaminated areas during maintenance of the treatment system may be dried, distributed uniformly, and stabilized at a location within the project limits where authorized. Generally accumulated floc from treatment, and any associated captured sediment in the system, is disposed of at a landfill permitted to receive such a waste stream.

If observations and measurements determine that the water quality limits are exceeded, immediately stop the discharge, notify the ATS designer, and start corrective measures to change, repair, or replace the equipment and procedures used to treat the water. If a situation occurs in which the operational perimeters of the ATS are exceeded or the criteria for allowed discharges values are compromised, the information must be retained for recordkeeping and reporting purposes. All corrective actions taken including time periods of non-compliance, and/or time periods to institute corrective actions, should be recorded. Record the quantity of discharge that may have been non-compliant. All test reports and records may be included in the report to the RWQCB. If a piece of equipment failed, broke, or an operation process was not followed this information should be noted to allow assessment of reasons for failure and corrective measures to be implemented to prevent a reoccurrence.

After the designer inspects and authorizes your corrective measures, resume treatment and discharge activities under the startup-phase sampling requirements before resuming regular-phase sampling. Ensure that all required recordkeeping and reporting is completed including submittal of Monthly Monitoring Reports and Exceedance Reports, if applicable.

While the ATS is in operation, at a minimum the following must be monitored:

- Influent and effluent turbidity and pH
- Residual chemical
- Effluent flow rate and volume

If treatment is on-going with dosing and injection of chemicals, the retention of recordkeeping data of the monitored pH and turbidity values is critical for the time periods and is required by the CGP. Uploading and saving of the data regularly as an aspect of the SCADA system, with on-going back-up and downloading to retain the monitored information, is recommended. Use of a standard time-period to backup data, such as every 72 hours, is recommended. The ability to perform both assessment and determination of compliance with instantaneous maximum discharge limitations, in addition to daily 24-hour averaging for turbidity values, is only feasible if the monitoring data is captured and available for evaluation.

Field ATS operator visual monitoring of the system readouts is standard operating procedure with physical documentation on daily logs that validate the data read-outs. The retention of data for on-going pH monitoring and discharge is an aspect of the CGP compliance process of recordkeeping. Without this data, the ability to validate adherence to Permit criteria is limited and not easily defensible with the RWQCB.

If the ATS discharges treated effluent, prepare a daily inspection report including monitoring information and submit within 24 hours, or as required. The ATS Plan should describe the information to include in the reports. Prepare a template form to clarify the required report information in advance. Adjust the template accordingly to accommodate changing conditions, when required. The daily inspection report will at a minimum include:

- Discharge volumes
- Water quality monitoring records
- Quantities (generally in gallons) of dosed coagulants in addition to pH chemical adjustment additives
- Significant repair or maintenance performed on the ATS including but not limited to clean-out of tanks or treatment vessels, maintenance or replacement of sensors or electronic monitoring equipment or components, replacement of pipes, pumps, injection devices, etc. It is important to document the process of ATS upkeep to demonstrate due diligence in maximizing the system's operation effectiveness and efficiency. This will be important if the system has an accidental upset, failure, or improper discharge.

- Discharge point information that includes:
  - Date and time
  - Weather conditions, including wind direction and velocity
  - A notation describing if a rain event has been continuous is recommended. If the on-site rain gauge is accessible for measurement, including this information can assist in illustrating the demand for the ATS. NOAA weather report data can validate that the rain event exceeds the design capacity of the ATS therefore clarifying maximization of discharge limitations.
  - Presence or absence of water fowl or aquatic wildlife
  - Color and clarity of the effluent discharge
  - Erosion or ponding downstream of the discharge point
  - This is applicable if not discharging to a storm drain inlet or piped outfall
  - Photographs labeled with the time, date, and location

C.6 OTHER ATS CONSIDERATIONS

If an ATS will be utilized on a project site for multiple rainy seasons, there are critical elements to both maintaining the ATS and sustaining its operational lifetime including:

- Ensure the ATS designer is experienced in treatment processes and regulatory requirements, and that the assigned operator(s) of the system are required to have demonstrated experience, knowledge, and skills in ATS operation, maintenance, field testing, data recordkeeping, and reporting.
- Selection during planning of equipment and materials that will withstand weather and environmental degradation. For example, choose piping that is UV resistant and sufficiently flexible to withstand some movement, and choose the proper tank such as double lined or walled to minimize breakthrough and leaking.
- Design the ATS layout to minimize movement and or relocation during the lifetime of the project to minimize potential for breakage, misalignment, or disruption of functional operations. This extends to the pre-planning and construction of appropriate collection and conveyance systems based on the staging and phasing of the project. If a substantially sized collection basin is required to hold the stormwater prior to treatment, then the location must be determined beforehand. Commit space for ATS usage during the lifetime of the system and include space to allow access for maintenance and repair.
- If a substantial number of collection sump/pumps will be required to convey the stormwater from multiple locations throughout the project, then the locations, conveyance piping, and drainage ditches must be depicted on plans and must account for scheduled construction work to prevent conflict of alignment. This consideration is to prevent damage to collection apparatus and to ensure stoppage of non-compliant stormwater discharges during critical periods of forecasted rain.
- If a complex ATS is required, ensure that the ATS Plan is critically evaluated for all operational components including engineering, field work, and administrative controls. Securing all requisite water quality data relative to the anticipated treatment scope and planning will be instrumental to the ATS selection and successful operation. Resourcing available technical information from CASQA, or leading industry providers of such systems, will be helpful.
- Dependent upon the project location, site receiving water bodies, discharge locations, and outfalls storm drain systems may not be allowed to receive the ATS treated effluent. Occasionally a point of discharge will be found to be infeasible due to a sensitive receiving water body, local ecological system, or tidally influenced drainage. In this case, a different discharge option must be explored to allow ATS treated effluent disposal.

- Supplemental and extended piping and pumping layouts may be required to convey the effluent to an acceptable location or to facilitate a discharge to a POTW, when feasible. During the planning phase, the discharge limitations and the local conditions must be evaluated. Early confirmation that selected discharge options are acceptable is desirable.

C.7 TREATMENT CONSIDERATIONS FOR NON-STORMWATER AND GROUNDWATER

Most often construction projects require the management and treatment of stormwater. At times, construction projects may be required to consider management and treatment of groundwater and other non-stormwater due to the complexity and scheduling of different types of work. General site factors to consider in determining the most appropriate management or treatment strategy for the project site include but are not limited to project duration, location, size, affected waterbodies or sources, differing drainages and discharge points (natural and manmade), and pertinent historical and environmental protection considerations. A determination of whether water treatment (of any type) should be done together or as a separate treatment process must be made. These issues must be assessed and understood to achieve a successful treatment plan.

Project excavation work or ground disturbing activities may necessitate managing and treating groundwater in addition to managing construction impacted stormwater runoff. Previous fuel leaks, VOC spills, past chemical discharges, or introduction of hazardous contaminants during the construction phase will likely need management and treatment consideration.

A dual use stormwater/non-stormwater treatment system, if feasible, may be designed to treat and discharge the different water sources. Alternatively, separate treatment systems may be designed. When determining which system is most appropriate, consider first the maximum quantity of stormwater verse the maximum quantity of non-stormwater (e.g., groundwater, co-mingled surface water) that must be managed or treated. Consider the complexity of the treatment science that must be applied to achieve permit discharge requirements and to meet receiving water criteria. Consider also available space on the project site. Is there enough room to accommodate the temporary holding and storage of separate water sources during the treatment process? Can the system be designed to work in tandem to treat both water sources at the same time based on different treatment requirements? Is there a demand for separate treatment trains?

Coverage under different NPDES Permits for specific water sources often dictate the approach and desired outcome of treatment including but not limited to sampling, analysis, monitoring, recordkeeping, and reporting. The differing water management and treatment needs may be combined however insightful planning is critical. For example, the treatment of brackish groundwater from structure dewatering verse extracted groundwater polluted by petroleum products is different when compared to each other and when compared to the CGP and/or LTCGP. While the treatment process will be different, the goal of treatment is the same, to achieve an acceptable discharge water quality.

On occasion a project specific NPDES Permit may be issued to address project conditions that require additional water treatment considerations. In most instances, when multiple water sources require management and treatment during project work, a comprehensive evaluation of treatment options will be required. The evaluation should focus on project needs to better understand if a single treatment system designed to operate in an alternative manner would work, or perhaps a dual treatment system designed to achieve separate water quality objectives may be most appropriate for the project. These example considerations are not exhaustive and professional expertise in the decision-making process of water treatment system choice and design is recommended.